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MAUNA:
EXPLORATIONS IN NDUMBA
ETHNOBOTANY

by

TERENCE EUGENE HAYS

A thesis submitted in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF WASHINGTON

1974

Approved by

James B. Watson

(Chairman of Supervisory Committee)

Department

Anthropology

(Departmental Faculty sponsoring candidate)

Date

13 June 1974

UNIVERSITY OF WASHINGTON

Date: May 23, 1974

We have carefully read the dissertation entitled _____

Mauna: explorations in Ndumba ethnobotany

_____ submitted by

Terence Eugene Hays

_____ in partial fulfillment of

the requirements of the degree of Doctor of Philosophy

and recommend its acceptance. In support of this recommendation we present the following joint statement of evaluation to be filed with the dissertation.

This dissertation addresses the "distribution of culture," the question of common knowledge and behavior and of individual variation, specifically among members of a single small New Guinea community. Through the intensive study of a single domain of the local culture, the naming and use of plants, respectively, by each of a small sample (10) of members of the local group, the extent and distribution of their knowledge and practice is detailed at length. A sphere of common knowledge and common use of plants is recognized as well as a substantial variability among informants as to how much and what they know and how well it agrees with what others know. Individuals are compared to discover possible patterns of similarity and of variation, e.g., with respect to age, sex, or peculiarities of their respective experience. Distinguishing nomenclature and taxonomic ordering from practical knowledge, further, the author compares known plants to discover, e.g., whether greater "ambiguity" or variation occurs with less widely or less often used plants or with plants whose uses are more easily substituted by others. While by these means some of the individual variation and some of the ambiguity can apparently be accounted for in the sense of statistical correlation, a substantial residue remains unaccountable. The author suggests that, even in a domain like the present one, critical to the daily lives of the informants, such ambiguity is both native to the local culture stream or tradition and compatible with practical needs. It is also, at least by inference, generally representative of the phenomenon of norm and variation in culture at large.

The study is, narrowly, a contribution to the field of ethnosience, more broadly to the theory of human culture, above all the descriptive problem of generalizing a standard or normal culture in respect of

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culture bearers none of whom is wholly representative of any norm but his own. The present study fails to discover the existence of any simple or obvious supra-individual organization exhaustive of all the diversity of individuals, suggesting for the present at least that some such variation may be random at the level of community and culture.

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Doctoral Dissertation

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July 30, 1974

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ORTHOGRAPHICAL NOTE

The orthography employed throughout this dissertation is based upon that developed by Alex and Lois Vincent and is used in Summer Institute of Linguistics literacy classes in Northern Tairora-speaking villages. The typographic conventions used here along with descriptions of their corresponding phonemes are:

<u>p</u> , <u>b</u>	aspirated bilabial stops, always prenasalized as <u>mp</u> , <u>mb</u> , but not written as such here except as they occur medially
<u>t</u> , <u>d</u> <u>k</u> , <u>g</u>	aspirated alveolar and velar stops, always prenasalized as <u>nt</u> , <u>nd</u> , <u>nk</u> , <u>ngg</u> , but not written as such here except as they occur medially (with the sole exception of <u>Ndumba</u>)
<u>q</u>	glottal stop
<u>f</u> , <u>v</u>	bilabial fricatives
<u>s</u> , <u>z</u>	grooved fricatives
<u>l</u>	fricative lateral (allophonic with <u>r</u>)
<u>m</u> , <u>n</u>	bilabial nasals
<u>mm</u>	"fricative nasal" (extremely nasalized <u>m</u>)
<u>nr</u>	"flap <u>n</u> " (bilabial nasal with flap of tongue)
<u>ng</u>	velar nasal

<u>r</u>	alveolar flap
<u>i</u>	as in " <u>see</u> "
<u>e</u>	as in " <u>say</u> "
<u>a</u>	"schwa" as in " <u>sun</u> "
<u>aa</u>	as in " <u>father</u> "
<u>o</u>	as in " <u>roam</u> "
<u>u</u>	as in " <u>do</u> "
<u>au</u>	as in " <u>out</u> "
<u>ai</u>	as in " <u>mine</u> "

Tairora is spoken with three phonemic tones. These are indicated in this dissertation only occasionally, when they involve minimal contrasting pairs, both of which are plant names. Stress is indicated with the apostrophe ('); unless otherwise indicated, stress is always placed on the first syllable (this initial stress not being marked here).

Throughout the dissertation Tairora lexical expressions and scientific names will be underlined. Direct quotes, expressions or words used in a context suggesting dubiousness, and Neo-Melanesian terms will be placed within double quote marks. Single quote marks are restricted to English glosses of Tairora or Neo-Melanesian expressions.

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CHAPTER I INTRODUCTION: THE PROBLEM OF INDIVIDUAL VARIATION AND THE CONCEPT OF CULTURE

I remember being rather shocked than pleased when in my student days I came across such statements in J.O. Dorsey's 'Omaha Sociology' as 'Two Crows denies this.' This looked a little as though the writer had not squarely met the challenge of assaying his source material and giving us the kind of data that we, as respectable anthropologists, could live on. [Sapir 1938:7]

Thus Edward Sapir voiced his dismay when faced with Dorsey's (1884) particular resolution of a major dilemma of ethnography. Now, some ninety years after him, we still go to the field, equipped with the concepts of "society" and "culture," in search of groups -- seeking patterns in the ways they behave, ideas and beliefs which they hold, their kinship systems, their myths, But what we find, as did Dorsey before us, is "a finite, though indefinite, number of human beings, who [give] themselves the privilege of differing from each other..." (Sapir 1938:7).

The ethnographer's dilemma to which I refer arises from a disjunction between means and ends. His goal is to describe the society or culture of "The X"; yet, all he can do is observe the actions and record the statements of individual informants. If he has not previously enjoyed Sapir's good fortune of being disabused of some of the "mythological" aspects of Anthropology (Murdock 1972) while still a student, he is soon faced with the reality so carefully recorded by Dorsey. As Kroeber is reported to have said, "Cultures don't paint their toenails." The ethnographer in the field finds himself

in a Heraclitean world where some informants paint their toenails, while others do not; some used to, but have given up the practice; others begin to, having been stimulated by the asking of the question; and Two Crows, perhaps thinking of particular persons, says that no one -- or that everyone -- does it.

The ethnographer, then, is faced with the reality of variation, which he feels compelled to abstract into the "kind of data that anthropologists can live on." Two Crows must somehow be absorbed into, or even become, The Omaha.

The variation and contradiction which are evident at every turn in the process of doing ethnography can be discussed under two general headings: local variation and individual variation. This dissertation is concerned especially with the latter, but problems arising from each are similar as have been the various attempts at their resolution. Thus a brief discussion of the former will serve to introduce the argument.

Local Variation

While ethnographers have been notoriously lax with regard to employing rigorous sampling procedures, in fact from the very inception of his research the ethnographer engages in selection from his potential universe of study (Honigmann 1970: 266). The initial demarcation of an "ethnolinguistic group" is itself a selection, with its own attendant methodological problems, but is not immediately to the point of this discussion.¹ It constitutes the usual first step in what I view as a process leading from one reification ("X ethnolinguistic group")

to selection ("community₁") through generalization ("communities_{1...n}") to a further reification ("X society" or "X culture").

Having reached some decision regarding the spatial boundaries of the world he has chosen to investigate and describe, the ethnographer makes another selection -- that of his actual field location(s), and it is at this point that a coping strategy must be devised to deal with the fact that it is a selection.

Most ethnographers choose to concentrate their efforts on a single community, arguing on the basis of the depth of understanding believed to be thereby gained, as opposed to the presumed inherent superficiality of more diffuse approaches. Variation among the possible choices of a community is not usually denied; indeed, it often guides the selection, as in cases where one community is chosen because it is smaller or larger than others or because it is more "traditional" than others. Thus inter-community isomorphism is not normally assumed. What is often assumed, however, is that local variation with respect to "culture" or "social structure" is negligible to the point of legitimizing either of two common approaches in ethnography: what Watson (1967b:61) has called the "typical case" and the "composite" methods (cf. Geertz's "representative unit" and "lowest common denominator" approaches in Geertz 1959: 1009-1010).²

In following the "typical case method" the ethnographer takes the locality or community he studies to be representative

of the whole region (Watson 1967b:62-63). Such a decision is seldom the result of actual sampling procedures; rather, it is an initial assumption or, at best, a working hypothesis which in fact remains untested. The resultant descriptions, while based on observations in a single community, are nevertheless often made in a form which imputes far wider general validity, with the implication that community₁ represents an adequate sample of the larger whole (Arensberg 1961).

Of course, most ethnographers do not confine all of their observations to a single community. Those who travel widely in a region and take seriously the variation they find, however, must ask themselves the question, as did Geertz in Bali, "Are we to take Njalian, Tihingan, or Blaju as typical...? In a direct descriptive sense they are not typical of much beyond themselves; but neither, probably, is any other Balinese village" (1959:1010).

Others who take a wider view, on the other hand, are less timorous and obscure the variation they find in their adoption of the "composite method." Rather than taking the locality for the region, this approach "in a sense accepts the region for the locality" (Watson 1967b:62). The synthetic account that results commonly takes one of two forms:

At the one extreme, the question of variation is completely ignored, and the data of two or more communities are used indifferently, thereby holding local differences to be implicitly nonexistent or, at the very most, too minor for investigation. At the other end, a composite treatment may more or less casually note the occurrence of some variation within the vicinity, neither lumping differences nor discriminating systematically in relation to analytical criteria. In the latter case,

the final synthesis, such as it may be, is produced in the mind of the reader. [Watson 1967b: 61-62]

There are a number of valid reasons for supplementing one's study of a community with observations made in others. Perhaps the ethnographer's arrival in community₁ was two days too late to witness a ceremony, which he must observe in community₂ if he is to see it at all. Or, perhaps he has the opportunity to witness a funeral in community₂, whereas he cannot be certain that a death will occur in his focal community during his necessarily limited field stay.

The abuse of such supplemental observations occurs when the ethnographer assumes that the event would have taken place in exactly the same way, or that a given belief is held, in both places, and neglects to make explicit his differential sources of information. The resulting "composite" description may in the end be totally misleading as in Bali where "though certain patterns are common throughout the whole area the form in which they actually appear differs so widely that any synthetic picture must be drawn in such a generalized fashion as to have little substantial reality of any kind" (Geertz 1959: 1009).

Either method, then -- "typical case" or "composite" -- may involve the suppression or obfuscation of a basic feature of the reality purportedly being described, viz., local variation. The consequence is all too often that "a wide gap exists between the level of generalization and the unit of personal observation in anthropological studies" (Hackenberg 1967:

479). The accounts which fill the ethnographic literature thus become, not descriptions of observed entities, but portraits of reifications -- "societies" and "cultures" whose actual features remain as elusive and phantasmagoric as their boundaries.

Individual Variation

Closely related to the phenomenon of variation among communities is that which is even more strikingly obvious to the ethnographer, yet even less attended in published accounts, viz., individual variation, or variation within each community itself. To some extent the former is a statistical effect of the latter (Watson 1967b:65), but there is, I believe, a more significant sense in which individual variation repays close attention. The explication of this view is the subject of Chapter IV below; in fact it is generally such a view that is the subject of the entire dissertation. It will thus be useful to introduce the discussion, as with local variation above, with a brief sketch of traditional ethnographic approaches to intra-community variation.

The process of selection and generalization which transforms studies of communities into descriptions of "societies" and "cultures" is also evident at a lower level of abstraction, wherein the statements and acts of individual persons are transmuted into "the kind of data that anthropologists can live on," i.e., descriptions of "communities."

Most ethnographers would agree that the ontological status of any community is problematic, involving questions of bounded-

ness of precisely the same type as referred to earlier in connection with "ethnolinguistic groups," and some have addressed these problems in "network" and "village-outward" studies (e.g., Mayer 1962). Others (e.g., Clarke 1971) have directly acknowledged the ultimate arbitrariness of community boundary definitions and conscientiously sought to avoid the impression that they were describing anything outside of their own self-imposed limits.

To whatever degree the ethnographer may qualify his descriptive statements in order to more accurately reflect his actual data base, he is forced to recognize that whatever reality a community may possess is that of a highly variable field -- a collection of persons who "[give] themselves the privilege of differing from each other" (Sapir 1938:7) in their statements and their actions. Any description of a community is necessarily, then, an abstraction, all the more so to the extent that variation in the ultimate loci of social and cultural reality -- the individual members of the community -- is obscured or lost in the process of selection and generalization.

The fact of individual variability in both informants' statements and observable behavior, which constitute the data from which inferences are drawn by the ethnographer, is too familiar to require extensive comment here, although in Chapter IV I present documentation in some detail from my own field research. I do not contend that ethnographers have generally been unaware of variability within the populations they study.

Indeed, as in the selection of a focal community, variable characteristics such as age, sex, status and relative articulateness are often consciously seized upon by the ethnographer in selecting his so-called "key" or principal informants.

What I do contend is that this represents explicit consideration (which often becomes much less explicit in subsequent publications) of individual variability, but of kinds whose significance is at best undemonstrated and at worst may be trivial. Seldom is attention given to deeper levels of variation, e.g., in the distribution of knowledge in a population, except to note it, as does Goodenough, who says that "no two persons in Truk have identical standards for what they regard as Trukese culture, and the amount of variance they accept in one another's behavior differs from one subject matter to another and from one kind of situation to another" (1970:99).

Nor has this relative neglect been offset by studies which have examined variability as a phenomenon associated with individual development (e.g., Stross 1969). Important as they are, such investigations which focus on children and adolescents as if the subjects were "on their way to becoming culture-bearers" can carry the implication that adults grow out of these imperfect states and become "real," i.e., homogeneous, "X."

Studies which have focused on variable knowledge among adults often tend to assume that such variation for the most part involves "specialized knowledge." This in turn is assumed to be associated with age, sex, caste, occupational or

other roles, as in studies of curers or religious specialists and, more recently, "women's culture." Whatever specialized knowledge may exist within a population, and the degree to which it is in fact restricted to a certain segment, are important ethnographic questions and must be answered empirically. It is clear, however, that the discoverable variation in knowledge among the membership of a population is not limited to the esoteric but is found regarding the most basic and mundane concerns of all, as will be demonstrated in this dissertation.

Dorsey (1884) knew this to be true for the Omaha with whom he worked. He reported numerous instances of disagreement among his informants, each of whom would surely be regarded by most ethnographers as capable of providing "authoritative statements" (cf. Goodenough 1970:100-102) about "Omaha culture." The point made, perhaps unwittingly, by Dorsey was not lost on Sapir, who went on to consider the implied challenge to ethnographers:

Apparently Two Crows, a perfectly good and authoritative Indian, could presume to rule out of court the very existence of a custom or attitude or belief vouched for by some other Indian, equally good and authoritative. Unless one wishes to dismiss the implicit problem raised by contradictory statements by assuming that Dorsey, the anthropologist, misunderstood one, or both, of his informants, one would have to pause for a while and ponder the meaning of the statement that 'Two Crows denies this.' [Sapir 1938:7-8]

The "implicit problem" raised by Two Crows is that of individual, or "intra-cultural," variation, and the purpose of this dissertation is to pause and consider the meaning of it

as Sapir suggested. In my view, it has been dismissed for too long, especially by those for whom it is more critical, and at a considerable price. The failure among ethnographers to attend to the problem can be traced to two major sources of obfuscation: (1) inadequate sampling procedures, which result in variation not being discovered or, at least, in its scope and possible patterns not being realized; and (2) emphasis on culture as a shared and/or a group phenomenon, which tends to result in variability among individuals being defined at the outset as irrelevant, or minimally relevant, to the ethnographer's real concern. The "cultures" which have been so described have as a result the tangibility of "group minds" and "collective consciousnesses," and are not only abstractions, I would contend, but reifications in the true sense of the word.³

(1) Ethnographic sampling procedures.

As in the selection of a community in which to work, ethnographers have typically selected informants with the same disregard for systematic sampling procedures. The goal of making valid generalizations about groups of people, i.e., societies, coupled with the inevitable limitations on time and energy, would suggest a need for the most careful use of adequate samples, both of informants and of direct observations. In fact, however, ethnographers have commonly practiced what has been called "opportunistic sampling," wherein

the researcher resourcefully seizes any handy chunk of the universe that promises to reward him with relevant information: he observes whatever children or mothers are available, visits receptive house-

holds, tests willing adults, records remarks he overhears or has volunteered to him, and attends almost any public meetings, church services, and entertainments that he happens to hear about.

[Honigsmann 1970:269]

Such opportunism is usually supplemented with the use of a few "key informants" who, ideally, provide more detailed information than can be acquired in such a casual way. Unfortunately many ethnographers do not always distinguish in their published accounts between "overheard remarks" and statements corroborated by dozens of informants, or between chance observations of single occurrences and repeatedly-viewed recurring events.

The use of small numbers of informants, with no indication of any systematic sampling procedures employed, is characteristic of many ethnographers, but it has been especially conspicuous in the work of the "New Ethnographers," as several critics have pointed out (e.g., Harris 1968, E.R. Heider 1972). It has been particularly obvious in their work because they have attempted to explicitly state the field procedures they have employed, including the specification of informants actually questioned or observed, in contrast to more traditional and less candid approaches.⁴

Candor is not the same as legitimation, however, nor does the explicit admission of having used a small number of informants transform those individuals into a representative sample of a population of thousands, or even hundreds. The use of small, or otherwise inadequate, samples entails problems which are not avoided simply by neglecting to consider them, as E.R. Heider (1972) has recently shown.

Heider demonstrates that, so far as Dani color terms are concerned, the use of only a single informant (as is the case for many of the languages entered as evidence in Berlin and Kay 1969) would lead to two types of error: what she calls "False Positives" and "False Negatives." False Positives are "false identifications of idiosyncratic terms as colour names" which are likely to occur if only one informant is questioned (1972:456-457). False Negatives, on the other hand, are "failures to identify terms which are actually used consistently by some Dani," but not known by the informant (456). The latter constitute the more serious problem since

the probability that a single informant, chosen at random, is a potential user of a given chromatic term is precisely the percentage of the population using that term....With only one informant, we have an even chance of obtaining someone who does not acknowledge the existence of chromatic terms at all. [E.R. Heider 1972:457]

Thus, if Heider had followed the procedure used in many cases by Berlin and Kay in the study of color terms (as well as by many other ethnographers) and employed a single informant, she might have arrived at a totally erroneous view of Dani color terms. An increase in the number of informants, on the other hand, together with an adequate sample of stimuli (also a potential source of problems), led to a progressively more complete description (457 ff.).

Exactly the same situation pertains in the Ndumba plant name data to be presented in Chapters III and IV below and, in fact, the argument can be phrased more generally. In any community or population studied by an ethnographer⁵, knowledge,

or information, is variably distributed; i.e., different people do not necessarily know exactly the same things, hold the same beliefs, or share exactly the same values. The assumption that a "key informant," or several of them, will possess the information an ethnographer is seeking, or that his version of that information is representative of anyone other than himself (let alone the whole community), completely disregards this basic fact of variation, which a concern for systematic sampling can not only control for but also lay bare for examination.

It is this last point which is of special concern in this dissertation, for systematic sampling is not simply a matter of numbers which automatically confer validity through quantification. According to the point of view taken here, there is no specific number of informants which constitutes an adequate sample; four, five, or ten informants can lead to error, as can one, although not of the same magnitude, so long as the ethnographer disregards the variation those informants exhibit as being itself of interest. Following Heider, in the case of semantic categories especially, "an adequate sample of people is one which includes enough informants to recognise idiosyncratic usages as such, to discover low-frequency usages, and, most importantly, to document real variations of usage in the population" (1972:448).

Here, in my view, Heider has pointed to the little-recognized additional power of systematic sampling: it not only helps to free the ethnographer from the errors of "False Posi-

tives" and "False Negatives," but it makes possible the discovery of the patterns of variation which exist in the population. I contend that it is these very patterns of variation which manifest the cultural system the ethnographer is trying to describe. The description of such systems has, however, been hindered on the one hand by obfuscation through inadequate sampling procedures and, on the other hand, by distortion through the use of concepts of culture which make of variation what it is not and fail to recognize what it is.

(2) Culture as a Group Phenomenon.

Most, if not all, ethnographers are aware that their informants' statements and their own direct observations do not include the total range of variation discoverable in the community, let alone the region. They also know that the descriptions they formulate as ethnographies are not descriptions of the variable reality they did discover, but of abstractions derived from that reality. Such a description, however, is not seen as a compromise, reached by the ethnographer after examining his data in the light of sampling considerations such as those discussed above. Rather, it has been his goal all along to describe a "culture," which, as we continually tell beginning students in anthropology, is an abstraction (cf., e.g., Keesing and Keesing 1971:23-24).

Whether or not the choice of supra-individual phenomena, such as "culture" and "society," was the result of "a misconception of the role of ... psychology" by our founding fathers (Murdock 1972:20), generations of anthropologists have left the

study of individuals, and their seemingly infinite variability, to others as they have pursued human groups, literally to the ends of the earth. There would be few denials that individuals are the ultimate loci of social and cultural phenomena, for groups do not believe in ghosts, practice matrilocal residence or avoid mothers-in-law, except as statistical aggregates of individuals who do these things -- itself a matter to be determined empirically rather than inferred. Nor would any deny that individuals are our only sources of data regarding these phenomena -- not groups, but individuals, address kinsmen and answer questions.

Despite these fundamental ways in which the individual forces the attention of the ethnographer, however, he is not usually considered the object of study, nor are his thoughts, words, or deeds. Rather, these are regarded as but manifestations of a supra-individual phenomenon -- "culture"; and the individual but a substantiation of an intangible reality -- "society." These abstractions rather than individualized phenomena have been the objects of study for ethnographers and, since this dissertation is concerned with "culture," a closer view of it as an abstraction must be established at this point. More particularly, since the present work in many respects follows the paradigm of "ethnosemantics" (in ways that will be made more explicit in Chapter III below), I am concerned with the concept of culture as it has been developed within that paradigm⁶.

A fundamental distinction drawn by ethnosemanticists is

one between behavior per se, and the ideational phenomena -- concepts, beliefs and values -- which underlie and in some sense inform behavior. It is this ideational order which is meant by "culture," and it is the ethnographer's task to construct a theory or model of such an organized system of ideas. In terms which Chomsky (1965:3 ff.) has used to distinguish language from speech events, "a cultural description is a theory of cultural competence ... [which] underlies performance, observable behavior" (Keesing 1970:441; his emphasis).

Individual human beings vary in their competence, whether linguistic or cultural, just as they do in their performance; that is to say, even within a single community or society, individuals differ in what they think and in what they do. In ethnosemantics, however, as in traditional ethnography, the ethnographer is not concerned with constructing models of individual competences, but a composite model which in some sense is that of the society of which the individual is a member, a model which is an abstraction from the individual models.

Werner (1969) has usefully contrasted two different sorts of abstractions which ethnographers have commonly referred to by the term "culture." One is that which views a culture as "the common element which all members share, or the set theoretical INTERSECTION of individual competences"; and a second according to which an ethnographic description is "an attempt to characterize the set theoretical UNION of all individual competences" (Werner 1969:333; his emphasis; cf. Werner and Fenton 1970:540).

The first view of culture is held by some ethnosemanticists (at least some of the time), e.g., Frake, who speaks of culture as "socially acquired and shared knowledge" (1964b: 132), and Kay, who says, "abstractly, then, a culture, like a language, is a code shared by all the members of a set of people" (1966b:110; his emphasis).

This view of culture, however, is a severely restrictive one which, if strictly adhered to, would produce models which ignore the richness of empirical diversity.

Since no two Hopi will have precisely the same version of the code, what we describe as common to all of them is in one sense a kind of common denominator, more general -- and thus abstract -- than the detailed variants of each Hopi....we would be left with such a bare skeleton common denominator that it would not enable us to produce or account for the acts that Hopi themselves produce. [Keesing and Keesing 1971:23]

The incompleteness of a view of culture as shared knowledge is often felt to be avoided, without sacrificing the group referent, by those who adopt the second view and consider a full description of a culture as a "composite picture of the cultural competence of many informants. Such a complex picture is conceivable only as the supra-individual record of an ideal 'omniscient' native speaker-hearer" (Werner 1969:332-333). This composite set of ideas is clearly what Goodenough had in mind when he said, "a society's culture consists of whatever it is one has to know or believe in order to operate in a manner acceptable to its members, and do so in any role that they accept for any one of themselves" (1957:167; my emphasis; cf. Frake 1962a:54).

According to this view of culture, the goal of an ethnographer is to construct a "cultural grammar" which

is a model of the cultural knowledge of an idealized actor-observer, in a community completely homogeneous in culture, who knows its culture perfectly. If we follow the Chomskyan model, a 'cultural grammar' would describe, with a set of explicit elements and rules, the organized knowledge that enables this idealized actor-observer to produce appropriate ('grammatical') acts and correctly interpret observed events and acts. [Keesing
1970:441.]

With the ethnosemanticists (and many others) I consider it extremely useful to analytically separate ideational phenomena (culture) from observable behavior, which is the product of additional causative factors as well as of "rules and plans." However, both of the abstractions just outlined are problematic in two ways: (1) with respect to field procedures by which they can or cannot be derived; and (2) with respect to their utility or lack of it as explanatory constructs. The field ethnographer encounters the procedural problems first and will be accorded priority in a brief discussion here.

The main questions facing the fieldworker trying to operationalize the above senses of "culture" are two: how many and what kinds of informants can provide the statements and observable actions from which culture may be abstracted? Most of us concentrate on adult members of the society and reasonably so, since they participate in social relations more fully and more extensively than do children, and thus have more comprehensive understanding, whether they are able to articulate it or not.

But, how many adults must be consulted in order to ascer-

tain the society's organization of rules or standards -- "standards for deciding what is,... what can be, ... how one feels about it, ... what to do about it, and ... how to go about doing it" (Goodenough 1961:522)? Clearly a single informant cannot reveal, in any number of hours of intensive interviewing, the ideas shared by the society's members, except as he imputes them to others, and the ethnographer accepts his reliability as a reporter or assumes him to be a representative member of the society (cf. discussion of "typical case method" above). Nor can a single informant be assumed to provide reliable accounts of the total range of knowledge held by the other individuals in his community, from which a "composite" picture might be drawn. This would credit him with a degree of omniscience which ethnographers would only grant to the idealized speaker-actor they are trying to construct.

Even the use of several informants, no matter how "authoritative," does not necessarily provide all of the information an ethnographer requires for his abstractions. Only a rigorously drawn sample -- a rarity in ethnography compared to the use of "opportunistic" methods -- can provide indications of the culture shared by the population as a whole. Even here one inevitably confronts the problem of "equally authoritative" informants, like Two Crows and Joseph LaFleche (Dorsey 1884), who disagree (cf. Goodenough 1970:100). As for a "composite" model, which would include the total range of cultural knowledge in the community, a sample can only provide the data for

a composite model of itself, except as the ethnographer is willing to uncritically extrapolate to the larger whole.

Both concepts of culture, then, encounter the same problem "on the ground," and inevitably thereby result in distorted abstractions. As Heider says:

There is an important respect in which the criterion that a category exists only if all speakers agree to it and the criterion that a category exists if only one speaker ... uses it are identical: both exclude the discovery and examination of real intra-cultural variation. [E.R. Heider 1972:464]

Heider's statement speaks directly to the two kinds of abstract culture I have been considering. I would differ, however, with her claim that such approaches exclude the discovery of variation; to the contrary, variation is inevitably discovered by the ethnographer no matter how his concept of culture directs his analysis. What will likely be excluded, however, is the discovery of patterns within the variation, which is my principal concern in Chapter IV below.

To the immediate point is the question of what happens to the variation in the intervening process of abstraction between observation and description. In the case of shared knowledge as the main concern, those ideas which seem to be idiosyncratic, or at least not held by all, are often simply defined out of consideration, as are those held by only some individuals, as "non-cultural"; thus, the actuality of variation is eliminated from the description. Those who attempt to describe a culture as a "composite pool" of ideas, on the other hand, directly include variable knowledge and beliefs, but of-

ten as if the variation represented a "division of intellectual labor," so to speak. Thus, detailed knowledge of spells, e.g., is assumed to be held (at least in its "most accurate and complete form") only by "ritual specialists," and goes into the pool with no indication of its actual distribution in the population (cf. Whiteley 1966:150-151).

A particularly awkward form variation takes, from the standpoint of one constructing a composite model of a culture, is that exhibited by the Two Crows in any community; i.e., a "good informant" who contradicts other equally "good" informants, or even himself on occasion. It would be an unusual ethnographer who would report, e.g., that "marriage to one's x is allowable and absolutely forbidden." The most common recourse, as contrasted with Dorsey's (1884) example of simply reporting such conflicting testimony, seems to be that of reporting a kind of "average" of informants' various views, as apparently the Brights chose to do in their study of Yurok semantic structures:

Many misleading answers were clarified by the cross-checking built into the routine of questioning, and by consulting several informants. To be sure, there are discrepancies between informants, but these are probably inherent in any taxonomy. [Bright and Bright 1965:252]

An alternative to "averaging" (which makes of the "omniscient speaker-hearer-actor" something of a statistician as well), is to give more weight to statements of "authoritative" informants (Goodenough 1970:100) -- an Orwellian position which regards some informants as more "cultural" than others,

a position which again amounts to ignoring variation except in viewing it as an inconvenience.

Thus do the two concepts of culture -- as shared knowledge or a total pool -- result in the ethnographer's abstractions. It is a short step from abstraction to reification and anthropologists, in their search for explanations of human behavior, have not hesitated to take that step, with results that Murdock (1972) calls "anthropology's mythology."

Murdock explains his use of words thus:

When I characterize the concepts of culture and social system as 'myths', I do not imply that they bear no relation to reality, for they are obviously derived from observations in the real world. I mean merely that, as reified abstractions, they cannot legitimately be used to explain human behaviour. Culture and social aggregates are explainable as derivatives of behaviour, but not vice versa. All systems of theory which are based on the alleged or inferred characteristics of aggregates are consequently inherently fallacious. They are, in short, mythology, not science, and are to be rejected in their entirety -- not revised or modified. [1972:19; his emphasis]

Murdock's remarks were intended to apply to such concepts as "culture" as they are used as explanatory constructs but, for the reasons discussed in the preceding pages, I feel they apply equally well to models of "cultures," i.e., ethnographies since it is these models which provide the explanations in any particular case.

Descriptions of cultures viewed either as systems of ideas which are completely shared by the members of a group or as summations of individual systems of ideas, even if derived properly (statistically speaking) cannot be assumed to, and

probably do not, constitute adequate models for the prediction and/or explanation of the behavior of individuals, who stand at a different level of abstraction. This seems especially evident in two areas of current anthropological interest: decision theory, and studies of cognition.

Ethnosemanticists have long stressed an emphasis on description in terms of "native categories," as opposed to categories derived from typological systems developed by comparativists. One of the principal arguments employed has been in relation to decision-making rules, e.g., in Goodenough's discussion of Trukese choices of post-marital residence. He argues that Trukese

do not choose on the basis of criteria which are outside their culture, which exist only in the heads of anthropologists. They choose on the basis of the criteria which are provided by their particular culture and which may be quite different -- indeed probably are -- from those used by the anthropologist in classifying their culture.
[1956b:29]

Goodenough's discussion of Trukese residence rules has now been followed by increasingly sophisticated attempts to construct anthropological decision models (e.g., Geoghegan 1971; Keesing 1971). What these studies have almost all neglected to consider, however, is the fact that decisions are made by individuals, acting together with others or alone, and rules or criteria which exist only in an abstract model of a "group's culture" can have no real explanatory power. To paraphrase Goodenough as he was cited above, Trukese do not choose on the basis of criteria which are outside of their own

heads, which exist only in a "group mind" constructed by the ethnographer. They do not choose only on the basis of information and criteria which are known to all the members of their society, nor on the basis of information and criteria known to others but not to them. They choose on the basis of criteria which are provided by their individual versions of "Trukese culture," which may be quite different from that constructed by the ethnographer in describing Truk.⁷

Just as decision-making is patently an individual act, so too are other thought processes functions of individual thinkers. One would expect, then, that an enterprise which identifies its "great problem" as "how to get from the objective world of materiality, with its infinite variability, to the subjective world of form as it exists in what, for lack of a better term, we must call the minds of our fellow men" (Goodenough 1957:173) would consider individuals, and their variability, as the proper subjects of both investigation and description. Such has not been the case, however. Ethnosemantics, or "cognitive anthropology" as it is sometimes called (Tyler 1969) has set about the construction of taxonomic, paradigmatic, algorithmic, and other formal models of semantic categories and the operations by which they are manipulated -- all discussed in terms of societies or hypothetical ideal informants.

The fact of individual variation in knowledge, with respect to even the most clearly-delimitable domains, has not gone unnoticed, but it has usually been regarded as evidencing

imperfect familiarity with the "real" system. Thus Frake says that Subanun "may debate, or not know, the placement of a particular case [of illness], but to their minds this reflects a deficiency in their individual knowledge, not a deficiency in the classificatory system" (1961:131).

Wallace (1970), on the other hand, has suggested that perhaps variation is the system. Perhaps, he argues, stable social interaction depends not so much on cognitive sharing, or uniformity (as would seem to be indicated by the empirical diversity that does exist), as it does on complementarity of "uniquely private cognitive worlds." From such a view would follow the larger question:

How are diverse cognitive models (of values, plans, taxonomies, and so on) articulated in a functioning cultural system? This question leads to a consideration of the properties of a metacalculus whose components are the diverse calculi of particular individuals or subgroups cooperating to maintain stable systems of relationships (or, for that matter, failing to do so). [Wallace 1962: 356]

Despite Wallace's insights, which could lead not only to descriptions which more accurately reflect social and cultural reality, but could also open up possibilities for understanding cultural change as a kind of "unraveling" of the "relationship between individual cognition and unrealized summative implications" (Wallace 1968:539; cf. Sapir 1938:9, E.R. Heider 1972:464), ethnosemantics has for the most part continued to search for the semantic system which can be abstracted from all of the messy variation. The point has still to be made occasionally that "there is no reason to assume that all native

speakers have the same semantic models 'in their heads'" (Keesing 1966:23; cf. Hammel 1970:654). Harris has argued, furthermore, that it is reasonable to suppose that variation can "take place inside the same head" (1968:586; my emphasis), and that ethnosemantic models have also failed to attend to the considerable ambiguity evident in at least some domains (Harris 1964:157-160, 1968:585-589, 1970; cf. Sanjek 1971).

In the face of all this discussion, it is surprising how few attempts there have been, relatively speaking, to describe individual variation, let alone to relate it to culture theory. This perhaps explains why, more than twenty years after Goodenough suggested the program in his classic monograph on Truk (1951), Keesing can say that "the internal structure of cultures as cognitive systems remains largely a mystery" (1970:423).

This dissertation is such an attempt, building on what other studies already exist⁸, in the direction indicated by Sapir over a generation ago when he suggested that

it is only through a minute and sympathetic study of individual behavior in the state in which normal human beings find themselves, namely in a state of society, that it will ultimately be possible to say things about society itself and culture that are more than fairly convenient abstractions. [1938:12]

In this I am not, nor was Sapir, advocating a reductionism which views the individual as standing at the end of anthropological inquiry. It would indeed be desirable, I think, to be able to describe and explain human phenomena on a larger scale, but individuals are surely the obvious beginning point

of such a task, and I wish to take the obvious seriously (Homans 1964:818). In this quest

We shall have to operate as though we knew nothing about culture but were interested in analyzing as well as we could what a given number of human beings accustomed to live with each other actually think and do in their day to day relationships. We shall then find that we are driven, willy-nilly, to the recognition of certain permanencies, in a relative sense, in these interrelationships, permanencies which can reasonably be counted on to perdure but which must also be recognized to be eternally subject to serious modification of form and meaning with the lapse of time and with those changes of personnel which are unavoidable in the history of any group of human beings. [Sapir 1938:11]

Explorations in Ndumba Ethnobotany

This particular work is an ethnographic description, but only indirectly in the traditions discussed above. That is, my goal is to describe a cultural domain but not as a system of shared concepts and ideas, nor as a summation or averaging of ideas variably held within a population. Either sort of description, to be sure, may be abstracted from the data to be presented, and might be useful in comparative studies. At the close of the dissertation, however, I discuss some of the problems which attend such an enterprise.

My principal concern is with a description of the "distribution of culture," so to speak, among a certain set of individuals. This set explicitly includes ten adult members of Ndumba, a community in the Eastern Highlands of Papua New Guinea, and may represent no larger collectivity. I have reason to believe that much of the description is generalizable to other members of Ndumba, and even to members of other

communities in the region, but this is a matter which would have to be determined empirically rather than assumed and, in that sense, it is an acknowledged -- and essential -- limitation of the study.

A second limitation intrinsic to the work is its restricted focus. The subject matter is not the entirety of a culture but a single domain, that of plants. Data regarding other domains will be brought into the discussion at various points, as will ecological, demographic, and other sorts of information about the population and its environment. Primary attention is given throughout, however, to knowledge regarding plants and how it varies among the individuals selected for the study.

The exposition centers on the construction of individualized folk taxonomic models of the plant domain. Each model concisely represents an individual's conceptual categories with respect to plants and certain relations among them, as postulated through the use of specified techniques. These several individual models are then compared and, together with a discussion of the referential content of the categories, differences and similarities among individuals' conceptualizations of the plant world are examined.

The study demonstrates the existence of individual variation in plant knowledge in a more systematic and comprehensive form of description than has previously been offered by ethno-semanticists for any cultural domain. Beyond this, however, I am concerned with the patterns of variation which might be identified and plausible explanations of such regularities as

might be found. To the extent that this is possible, the dissertation not only represents a partial ethnography of a previously undescribed culture, but can also be seen as a contribution to an ultimate understanding of human cognition, cultural ecological relations, and general cultural systems, in ways to be made more explicit in the final chapter.

In Chapter II, I describe in some detail the community of Ndumba, in which the field research was conducted. General features of the natural environment, with special attention to the vegetation of the region, are outlined together with a brief discussion of the wider social matrix of which Ndumba is a part. A sketch of Ndumba society provides a general context within which plants, and knowledge of plants, can be seen as a focus of considerable attention on the part of the inhabitants themselves and not merely of the ethnographer. I view this broader context, moreover, not simply as "background information," but as a social and cultural field which provides important clues to ultimate explanations of the nature of the patterns discovered.

The assumptions and exact procedures employed in the research are set forth as clearly as possible in Chapter III. Both derive largely from the paradigm of "ethnoscience," which will be outlined in some detail, taking into consideration several criticisms of the approach not already discussed above. Admittedly, I went to the field expecting to find "intra-cultural variation," motivated largely by the considerations developed in this Introduction. I found what I was seeking, but

initially had only vague expectations as to the likely forms this variation would take. Such leads as exist in the anthropological literature I regarded as working hypotheses, and these are made explicit in conjunction with the techniques by which I felt the required data could be obtained.

In Chapter IV, I present some of the data in detail in the course of analyses which proceed along several lines. I have provided the totality of the primary data considered in appendices for the reader's inspection. Thus the analyses performed can be checked and possibilities for future explorations more clearly seen. The investigations I undertake are informed by the working hypotheses but do not themselves constitute an adequate test of them. My purpose is, rather, to explore some of the patterns I have discovered in the data and suggest tentative explanations.

The exploratory nature of this dissertation must be stressed, especially as I finally relate my analyses of the data to the wider issues I have raised above, viz., the nature of culture and how it is to be investigated and described. Nevertheless, this intensive examination of variability in one domain and among a specified set of informants, despite its limitations, contains what I feel are serious implications for the study of cultural systems, especially as these bear on the relationship between human cognition and behavior.

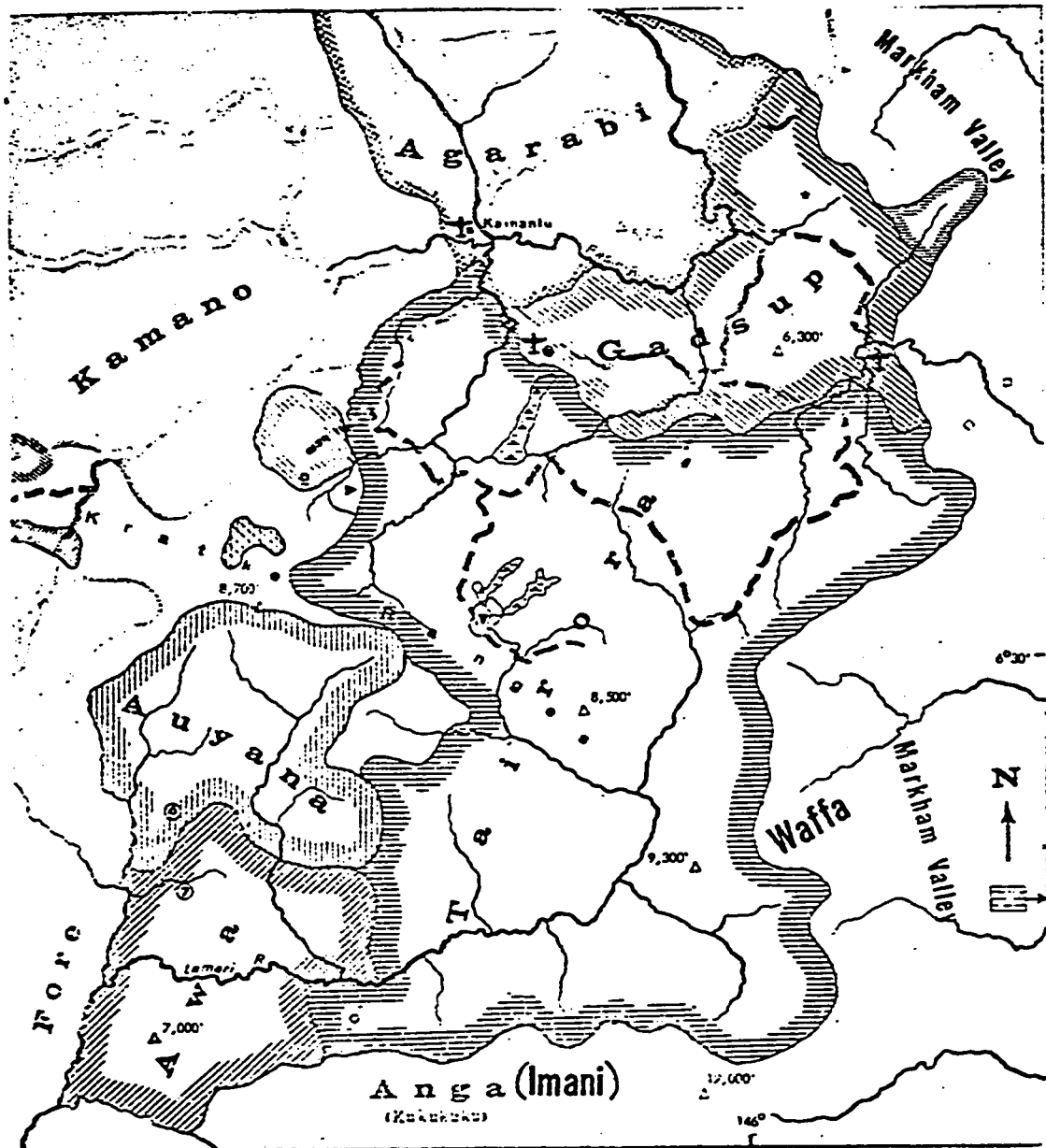
CHAPTER II NDUMBA: A SOCIETY IN THE PIORA BASIN

In 1919, Stephen Lehner, Vice-Senior of the Lutheran Neuendettelsau Mission, accompanied eleven Atzera people from Kaiapit in the Upper Markham Valley on a trip to the eastern edge of the New Guinea Highlands (see Map I). After spending a sleepless night in a Gadsup village, the party returned to Kaiapit, having participated in what was probably the first encounter between Europeans and highland people. Lehner was followed in 1920 by Dr. Georg Pilhofer and in 1921 by Leonhard Flierl, both of the Lutheran Mission, in further probes into Gadsup territory north and east of present-day Kainantu. The missionaries were succeeded by prospectors penetrating to the west in the late 1920's, and the lives of a hitherto-undreamed-of population of three-quarters of a million people were changed forever (Radford 1972).

These expeditions, late by world exploration standards but pioneering in New Guinea, entered the Highlands in an area where its dominant characteristic -- linguistic and cultural diversity -- was strikingly apparent. Even today, the traveler who seeks the full flavor of the Highlands as human landscape can do no better than to visit the Kainantu region. Here the borders of four linguistic groups converge: Gadsup, Agarabi, Kamano, and Tairora, the mix further accented by the nearby Binumarien, Usarufa, Oyana, and Auyana (see Map II). The veritable Babel of tongues is accompanied by variety in physique, house types, traditional dress, ... -- seemingly endless variations on themes seized upon, but held only tenuously,



MAP II
KAINANTU REGION
EASTERN HIGHLANDS DISTRICT



(Adapted from Littlewood 1972:6)

by those who prefer the illusion of "the Highlanders."

Such an embarrassment of anthropological riches was not to be soon described, however. For the missionaries spreading the Word, and the prospectors gathering the gold, this diversity was more of a hindrance than an object of fascination. It meant a need for a succession of interpreters, whether the message to be translated was a promise of heaven or a request for firewood; even more importantly, it meant a profusion of territorial boundaries, the crossing of each of which renewed the danger of hostility from people for whom constant warfare was a fact of life. Largely because of the latter, the period of the 1930's-50's was one of extension of the Pax Australiana, with the establishment of government administration posts throughout the Highlands, one of the first of which was the Upper Ramu Post (later to be called Kainantu) in the early 1930's (Watson 1965b:93). Only after such "pacification" were anthropologists allowed into any particular area to follow their less pragmatic muse -- to describe this bewildering variety of humanity, to stop for an instant the shadowy blur in its rush toward the monoculture of a NiuGini.²

Thus it was not until more than three decades after Lehner and his evangelist colleagues that the Kainantu region received the attention of ethnographers on a large scale. The first professional anthropologists to publish comprehensive ethnographies (e.g., Vicedom and Tischner, Reay, and Salisbury) followed the frontier to the west, as if the cultures of the eastern end of the Highlands had vanished along with the ore

from the Kainantu goldfields (cf. Watson 1964b:1-2). Exceptional in this regard were the Watsons, who provided the first descriptions in any detail of a Kainantu society in the Agarabi language group (J.B. Watson 1960, 1963a, 1967a, 1972; V. Watson 1955, 1965). Their research, aside from this foundational role, also constituted the groundwork for the subsequent Micro-Evolution Studies Project, an effort unprecedented and still unequalled in scope in New Guinea anthropology.³

The present dissertation is related to that project only indirectly, benefitting more from it than contributing to it. While the people to be discussed here are the southeasternmost speakers of the Tairora language, and thus fall within the range of the larger study (see Map II), its aims are much more limited, as was discussed in the conclusion to Chapter I. The work done by those in the northern section of the Kainantu Sub-District provided many leads for my own research; some led to interesting similarities, others to even more intriguing differences. The differences began with the very terrain, and that will provide an introduction, as it did for me in 1971, to the Piora Basin.

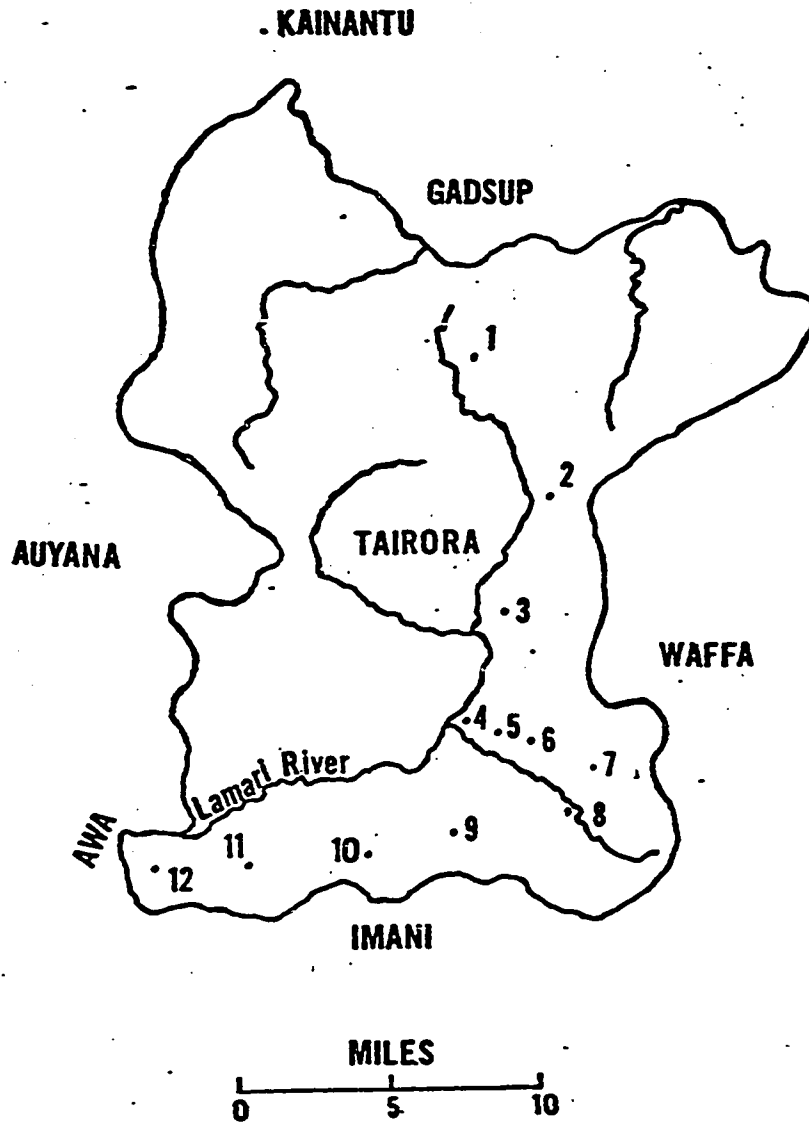
The Tairora Landscape

The Kainantu region is fairly typical of the high valley systems which form a corridor travelled by many early explorers in crossing the Highlands and may, in fact, trace the route of man's first entry some thousands of years ago (Robbins 1963). Broad expanses of "kunai" (Imperata cylindrica) grassland stretch across Pleistocene lake beds and up the slopes of low

hills to forested ridge tops. Meandering streams wash the clay and sand from their gravelly beds into the Ramu River, thence to the north coast lowlands a mile below (cf. Dow and Plane 1965:5-7).

In all directions the hills hint at the mountains beyond: to the northeast, the Finisterre Range; to the northwest, the Bismarcks; and immediately to the west and south, the Kratke Ranges, any group of which provides striking horizons from various vantage points in the Kainantu Valley. As one heads southeast into the Kratkes, two additional directions -- up and down -- are added to the cardinal four as the Tairora Valley is left behind and the headwaters of the Lamari River transform the landscape (see Map III). Here, beginning in the vicinity of Suwaira, the topography becomes much more rugged, with streams cascading down from ridges reaching 9,000 feet above sea level in Mount Elandora. Their fall ends in the Lamari River, whose gorge cuts through Lamari Conglomerate, in places exposing up to 2,000-foot layers of the basic volcanics and tuffaceous sandstone, in its rush toward the Purari River to the southwest and ultimately emptying into the Gulf of Papua far to the south (see Map I; cf. Dow and Plane 1965:12-13). Kunai is not left behind, however, as wide bands of it parallel the Lamari on both sides and cover the slopes up to more than 7,000 feet. Above that elevation, vast areas of oak and beech forests remain, supported by alpine peat and humus in contrast to the humic brown clay soils of the grasslands (Haantjens 1970:85-87).

MAP III
TAIRORA LINGUISTIC GROUP



(Adapted from Littlewood 1972:19)

- | | | |
|-------------|-------------|----------------|
| 1. Suwaira | 5. Anima | 9. Oraura |
| 2. Obura | 6. To'okena | 10. Konkonbira |
| 3. Asara | 7. Ahea | 11. Pinata |
| 4. Himarata | 8. Ndumba | 12. Owenia |

The Lamari River region marks differences which go beyond physical features, however. An area of primary forest between Suwaira and Obura has been suggested (Pataki 1968:84) as a "natural biotic deparation between Northern Tairora and Southern Tairora" which seems to correspond to a linguistic dividing line as well (Pataki 1968:81). According to the best surveys so far conducted, the Tairora language is divisible into at least seven dialects, five of which are limited to the region south of Suwaira (Vincent personal communication; cf. McKaughan 1964). This disproportionate distribution of dialects does not simply reflect population patterns, however, as Northern and Southern Tairora each contains approximately half of the total population of 12-15,000 speakers.⁴

The greater dialectal diversity in the south might suggest greater relative isolation, historically, of the southern groups. Under such circumstances, one can easily imagine a "drift" phenomenon resulting in considerable social and cultural differences between the northern and southern populations. In fact, as will be discussed below, the people to be described here seem to have had no awareness of the existence of Northern Tairora groups prior to the 1950's. Their social universe was not severely constricted, however, because they regularly interacted with groups to the east and further south, of whom those in the north were no doubt unaware, and this fact constitutes another major potential source of differences.

Whatever processes and factors might be responsible for either differences or similarities, it is difficult at this time

to engage in detailed comparisons of Tairora groups due to the lack of material presently available.⁵ Some observations have been reported, however, which may be briefly mentioned.

In Pataki's survey of much of the Tairora area in 1962-63, he noticed significant variations in settlement patterns:

In Northern Tairora, settlements are large and relatively permanent; they might be described as 'large villages' in more traditional nomenclature. Proceeding south beyond the 'Suwaira' complexes toward the Obura and Baira complexes...the settlements (with some interesting exceptions...) become much smaller in mean size and fragment into clusters of 'hamlets' which become the multiple loci for their larger reference unit...

[Pataki 1968:82-83]

Pataki considers this likely to be the result of differential acculturation, however, with the pre-contact residence units throughout the area having been small stockaded settlements (Pataki 1968:82, 83; cf. Watson 1967c). He also reports that the settlements on the south side of the Lamari were more widely scattered, with a lower overall population density than in the north, but does not speculate on the time depth of this pattern (Pataki 1968:84).

Early patrol reports for the Lamari region note differences in dress and ornamentation from that observed in the Kainantu area, which varied again between the Middle and Lower Lamari, along with a general increase in emphasis on taro as a basic crop (outranking sweet potato) as one proceeded down the Lamari (cf., e.g., Linsley 1951; W.T. Brown 1953). These reports are difficult to evaluate, however, as these patrol officers were, perhaps understandably, more concerned with de-

scribing the latest attacks they had suffered (especially in the Middle Lamari area) than with noting subtle cultural and social features of the people they were trying to pacify.

The Piora Basin⁶

These were the superficial differences noted, too, in 1971, proceeding from Kainantu toward the extreme southeastern corner of Tairora country where the Piora Basin lies: the large, concentrated villages of the Tairora Valley giving way to scattered hamlets at Suwaira and continuing southward; the single-family dwellings of the north becoming fewer until reduced to the exception amidst the traditional groups of women's huts clustered around large men's houses; women's pounded bark aprons gradually outnumbered by the full reed skirts of the south, men everywhere along the route in western dress (shorts, laplaps, and shirts); and the tiny taro patches of the north increasing to full-sized gardens along the southern streams and rivers.

These impressions were almost subliminal, however, compared to the overpowering effect of the change in physical landscape. At Suwaira (see Map III), Mount Elandora loomed ahead as a presage, its steep slopes in truth only suggestive of the climbs ahead. Conventional directionality soon became almost meaningless as the road was forced to disregard mathematical laws concerning shortest distances, unlike the footpaths which incredibly followed straight lines whatever the consequences for straining leg muscles.

The temporary relief of skirting, rather than climbing,

Mount Elandora, was further heightened by the only two nearly straight stretches of road to be found. Upon leaving the Suwaira complex, the road paralleled the Lamari River, there a smooth-flowing, shallow stream, its rich banks crowded with yams, taro and bananas. Then, after a climb to Obura with its several hamlets, a government Patrol Post and airstrip, and Swiss Evangelical Brotherhood Mission station, a view opened up which seemed to contradict the contortions of the river, now far below. Great kunai-covered slopes now engulfed the Land Rover, studded by boulders whose enormous mass forced comparisons of size, leaving man and his artifacts always the loser. Nearby ridge-top Asara houses seemed fifty miles distant; garden shelters and pig-houses seemed pathetically small in the sea of grass below. Far to the west, where the Lamari, now a torrent, cut and gouged through what can only be called the bottoms of mountains, could be glimpsed the distant hamlet clusters of Oraura, Konkonbira, Baira, and Pinata -- seemingly insignificant slashes of cleared earth at the meeting point of ascending grasslands and slowly-yielding forest.

Then, as if turning from a picture window and walking into a closet, the road turned at Asara and climbed into the forest. Over logs laid down like a corduroy road in Colonial America, but cut from the bush only months before, another climb began. Up through dripping Pandanus, oak, beech, and myriad other trees -- wet even in the dry season -- the road finally gained the crest at 7,500 feet, and began the descent into what promised to be something altogether different again: the Piora

Basin.

Only from this point at its northern edge, or from the summit of Mount Piora to the south (see Plate I), or from the air above it all, can the character of the Basin be seen at a glance. While physiographically similar to many in the Highlands, it undoubtedly presents the most spectacular landscape in the entire region of Tairora-speakers. Approached from the north, one's first view of the Basin is dominated by the Piora massif, a jagged series of peaks rising to over 11,300 feet a.s.l. (see Plate II). This great uplift of limestone is largely responsible for the morphology of the Basin, pouring millions of gallons of water through its cascading streams down to the "Malaria River" (as it is called on government maps) and thence to the Lamari, just as the ridges to the east and north contribute their share to the cutting action.

What accentuates the basin-like appearance, however, is the kunai which, except for the secondary vegetation along watercourses, dominates the floor and slopes up to a limit of 7,500 feet throughout the whole Lamari area (see Plate I). That such grasslands are the result of human activity is almost certain (Robbins 1962, 1963; Brookfield 1964:33; Henty 1969:1), and the spatial association between kunai and present human habitations and gardens is strikingly evident. Sweeping the Basin, all settlements may be seen to lie between 5,500 and 6,500 feet in elevation and on or near the dividing line of kunai and forest: Himarata, Anima and To'okena on the north side of the Basin, Ahea on the east, and Habi'ina (hereafter called

PLATE I THE PIORA BASIN (as seen from 11,350 feet)



PLATE II MOUNT PIORA (as seen from the north)



Ndumba⁷) and Oraura on the slopes of Piora (see Map III). Gardens, furthermore, except for the most recently established ones at the forest's edge, are all found in the grassland either below or above the settlements.

The process resulting in this pattern is of long duration, as is human utilization of the Basin's resources. Some kind of human group, doubtless hunters and gatherers, apparently occupied at least the lower river banks as long ago as 8,000 B.P. (White 1972:30). The first such band to enter the Basin had to come to terms with formidable terrain, probably then covered with the primary forest which still forms extensive tracts at upper elevations today (White 1972:16-17). The exact nature of their relationship with this forest can never be known in full detail, but it must have been vastly different, even if foundational, from that of the Basin's present inhabitants (cf. Watson 1964c, 1965a, 1965c, 1967a, 1968).

The choice of practicing horticulture in the Basin, as opposed to exclusive hunting and gathering, set in motion processes which have influenced the biotic composition as surely as Piora has shaped the land itself. The expanses of tall kunai grass, initiated by those who first made the choice (Robbins 1962, 1963) resist the efforts of the simple tool-kit of stone, bone and wooden implements which were all the Ndumba and their forebears possessed until forty years ago. The pall of smoke which hangs over the Basin during the dry season evidences the only recourse of the Ndumba in their struggle with the grass. Fire is the great leveller in dealing with kunai,

but provides only partial and temporary solutions, perpetuating as it does the very problem it attacks. Ultimately, the need for more gardens forces the clearing of more bush.

And the forest is always waiting. If the oppressive heat of the kunai almost blinds you with your own perspiration, the rain forest can offer bone-chilling cold and the dampness of a million dripping trees. When your eyes can take no more of the bright sun reflected by the brilliant sere grass, the forest offers greens and greys whose darkness and gloominess was foretold with your first sight of Piora, always towering above.

The forest is not totally hostile and impenetrable, however, anymore than is the grassland completely alien and untillable. If the marvelous biotic complexity of the Basin may be, in some sense, reduced to the simple opposition of bush/kunai, Ndumba have come to terms with both. Any understanding of their coping strategies must follow an expansion of this simplified view of the Basin, however, in order to appreciate more fully the landscape they live in. Since all of the vegetation communities of the Basin, and more, are represented in Ndumba territory, moreover, a closer examination of that section will serve present purposes.

Ndumba Territory

The area claimed by the people here called Ndumba includes the greater part of the southern half of the Piora Basin, by orthographic measurement approximately 23.5 square miles of land (cf. Maps III and IV)⁸. Most of this land is presently forested, with an approximate bush/kunai ratio of 1:0.2 (or

4.8:1), which may be compared to an overall ratio of 1:1.36 for Tairora as a whole in 1963 (Pataki 1968:34). Ndumba appears to have more grassland, more forest, and more land in general available to them than do any of their neighbors in the Basin, a fact which would support the unanimous agreement among informants as to their previous invincibility in warfare.

Not all of this land is tillable, of course, which is an important qualification for a horticultural people. Hunting and gathering of wild vegetable products are of considerable importance in Ndumba, however, and nearly all of their land is exploited in some way, as will be discussed below. The resources which exist to be exploited can be more clearly seen by expanding upon the simple division of forest/grassland in a more detailed description of the phytogeography of Ndumba territory.

Only in recent years has knowledge of the New Guinea flora reached a point where it has been possible to define the major vegetation communities. In part this is due to a general neglect, on the part of botanists, of the complexities of the "rain forest" which covers much of the island (Corner 1962:356); in part also to the sheer biotic diversity facing the systematist. In this respect, Robbins's characterization merits quoting at length:

If a biogeographer wished to create a hypothetical island for his studies -- one that included every possible ecological niche ranging from sea level to snowline -- then to populate it with an interesting array of animals, insects and plants (but with certain omissions just for interest), and finally tow it into some intriguing geographical location, then he could

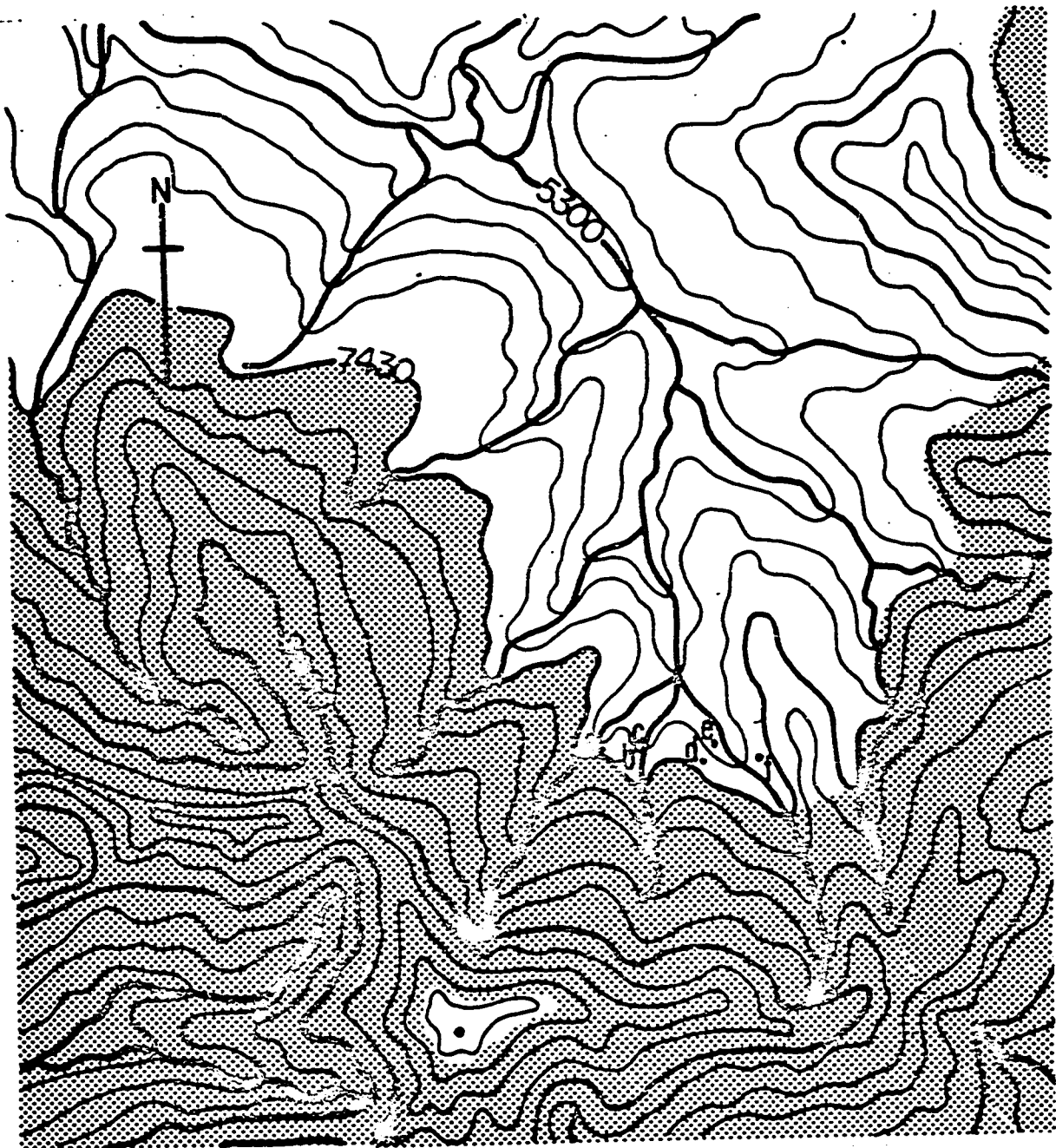
hardly do better than New Guinea. This great island, with its coral reefs and littoral fringes, its delta-plain swamps and vast tracts of humid lowland rain forest, its mid-mountain slopes and mossy montane forests which, on the highest peaks, give way to alpine tussock grasslands and tundra, lies at the very crossroads of Asia, Australia and the Pacific. Its flora and fauna but reflect the great biotic migrations, geological upheavals and climatic changes of the distant past.

One of the last large land masses to be explored biologically, New Guinea is at the same time one of the richest, for here are to be found, in its rugged interior, more geographically different kinds of plant and animal life assembled together than anywhere else in the world.
[Robbins 1971:23]

The total range of this diversity, including some 10,000 species of flowering plants and again as many of ferns and other spore-bearing plants (Robbins 1971:24), need not concern us here, however, since much of it is limited to the coastal and lowland biomes. There is variety enough in the Highlands, and classification schemes developed for the flora there are generally applicable to Ndumba. In large part, vegetation communities are associated with elevation together with accompanying climatic zones. A concise description of the flora of Ndumba can thus proceed along these lines by beginning at the lowest point in Ndumba territory, at the "Malaria River" (elevation c. 5,300 ft.) and ascending to the very summit of Mount Piora at 11,350 ft. (cf. Map IV).

While any such description entails arbitrary divisions which obscure the extent of overlapping content, eight major vegetation communities or associations may be identified in Ndumba: (1) Riparian Vegetation; (2) Gardens and Garden Re-

MAP IV
NDUMBA TERRITORY



FOREST

CONTOUR INTERVAL 500 FEET



SCALE IN MILES

a - Ferora
b - Daandura

c - Nrummaungkura
d - qAarapura

e - Wahara
f - Suwanranra

growth; (3) Sword Grass and Shrub Regrowth; (4) Induced Grasslands; (5) Mixed-Oak-Forest; (6) Mixed-Beech Forest; (7) Sub-alpine Forest; and (8) Alpine Grasslands. What follows is in no sense a comprehensive description of these associations, nor an exhaustive species list, but only an overview of the Ndumba plant world as a botanist might conceptualize it.⁹

(1) Riparian Vegetation: Ndumba is extremely well-drained, there being few flat areas where marshes and bogs might form, by numerous streams descending from the Piora massif and eastern ridges into the major watercourse, the "Malaria River" (called by Ndumba qOranaam'bu -- literally 'mountain water') (see Map IV). At higher elevations, stream-bank vegetation is nearly identical with that of the surrounding forest, but below 7,500 feet their floristic composition is quite distinctive, although containing transitional elements.

The qOranaam'bu forms a social boundary, marking the meeting point of Ndumba, Ahea, To'okena, and Anima territories, as well as constituting the lower elevation limit of Ndumba. At this lower limit, and ascending from 5,300 to 6,000 feet, the river and its tributary streams are lined with dense stands of hoop pine (Araucaria cunninghamii)¹⁰, perhaps remnants of larger pine forests which stood there in the distant past. The pines emerge to over a hundred feet in height from a corridor consisting mostly of Elaeocarpus, Ficus, Maclura, Piper, Saurauia, Schefflera, Syzygium, and Wendlandia spp. Occasional groves of Casuarina oligodon and Pandanus spp. are present, but generally in association with gardens which abut the water-

courses.

These trees are festooned with various epiphytic ferns and mosses, while climbers are few. Beneath the trees, herbaceous plants such as Begonia, Hemigraphis, Impatiens and Spathoglottis compete with the young shrubs and saplings in a tangled precarious grasp for the soil in the boulder-studded banks.

Further upstream, from c. 6,000 feet to the forest edge around 7,000-7,500 feet, a major change takes place as oaks (Castanopsis and Lithocarpus) replace hoop pines, and the banks become more crowded with grasses such as Coix, Miscanthus, Penisetum, Saccharum and Setaria. The shrubs and smaller trees from the lower reaches are mostly retained, to which are now added cultivated small groves of bamboo and Casuarina. As the forest is approached, stream-bank vegetation becomes progressively more like its surroundings until the moss forest virtually obliterates all distinctions above 9,000 feet.

(2) Gardens and Garden Regrowth: Gardens (huta) are widely scattered throughout the non-forested areas of Ndumba and are of widely varying sizes and shapes. Some twenty-nine different kinds of food crops, most of which are polytypic (see Appendix 2), are planted in five distinguishable types of gardens, although only three are named in the local language: sara'huta ('taro gardens'), taana'huta ('yam gardens'), kaamma'huta ('sweet potato gardens'), coffee gardens, and house gardens. Each kind of garden is more diversified than its name implies, and the various contents may be briefly outlined here.

'Taro gardens' (sara'huta) are made only between 5,300 and c. 5,800 feet in Ndumba, although scattered plantings of taro (sara) occur in house gardens and along streams up to 6,500 feet. Informants invariably stated that taro simply does not grow well at the higher elevations, although the relative dryness of the higher soils was the limiting factor offered in explanation. Thus, higher sites which for one reason or another were marshy were considered capable of supporting a few taro plants, but nothing like the large patches nearer the river below.

Most taro gardens are in fact on the banks of the river at 5,300 feet, but they also run up the depressions between slopes. They are always fenced against the depredations of pigs, it is said, although pigs (at least the domestic ones) rarely, if ever, wander down to such low elevations in their daily free-range foraging. Some taro gardens are as large as 200 by 50 feet in area, although most are slightly smaller.

Taro gardens usually contain some yams as well, Cordyline shrubs as borders, and various herbs planted as magical growth aids for the crop (see below). In general, however, sara'huta are the least diversified of gardens -- as one informant explained it to me, good taro ground is not plentiful, and requires a great deal of work; thus, the precious space is not wasted on things which can grow elsewhere.

Slightly more diversified are the 'yam gardens' (taana 'huta) although, again, 'good yam ground' is considered to be in short supply. Yam gardens are made within exactly the same

elevation limits as taro, with the exception being that yams are not found in house gardens but exclusively in the lower areas. The same reasons are given for this as for taro, but with more apparent consciousness of elevation, rather than dampness, being a primary consideration.

Curiously, yam gardens are rarely fenced, even though they usually contain scattered taro plants as well as "winged beans" (Psophocarpus tetragonolobus). In fact, since both yams and winged beans (tepi) are run up poles, a 'yam garden' presents a mass of poles covered with vines to the viewer's eye, with no clear separation between the two crops. Thus, taana'huta might be more properly called "yam-winged bean gardens." Taro is undoubtedly a minor crop in such gardens, and extra space is allowed again for only a few Cordyline shrubs and herbs associated with garden magic.

The "taro-yam-winged bean complex" has been discussed more generally in Highlands ethnography, especially as it may represent the pre-sweet potato basis of these horticultural societies (cf. Watson 1964c, 1965a, 1965c, 1967a, 1968; Brookfield and White 1968). There is certainly good reason to separate these three crops in some way from the others to be considered shortly, at least for Ndumba, and several considerations may be mentioned here, although discussion of historical or other implications will be reserved for separate publication.

(a) All three crops, as just discussed, are considered to have inherent ecological constraints, resulting in their restricted spatial distribution; (b) the cropping is much more

intensive, i.e., there is much less diversification than in the gardens to be discussed shortly; (c) these three crops are considered by Ndumba to require much more work than others, and all involve some special techniques: in the case of taro, a complex system of bamboo irrigation tubes (in the past, but no longer) and with yams and winged beans, training the vines up poles which have to be especially cut for the purpose; (d) a marked seasonality in harvesting, all three being harvested only at the end of the rainy season (i.e., around May-July)¹¹ while virtually all other crops are harvested year-round; (e) the employment of extensive ritual in both planting and harvesting of the three, whereas much less (but still some) ritual is associated with sweet potatoes; (f) all three are considered to be "prestige foods" in some sense, e.g., especially favored at feasts, and used in food displays in connection with "sing-sings"; (g) all three are associated with men, who plant and tend these crops along with sugar cane and bananas, while sweet potatoes are left primarily to women; and (h) suggestive linguistic associations, at least with taro: viz., the word for 'food' is fusara or, more often, simply sara, which is phonologically indistinguishable from, and is acknowledged to be the 'same word' as the generic name for taro, sara.

Again I wish to stress that these are simply items of evidence which suggest some kind of a difference between this set of three food crops and all others in Ndumba, especially sweet potatoes, the staple. An obvious contrast may be seen with the third named type of garden, kaamma'huta ('sweet potato

gardens'). These may be found anyplace in Ndumba between 5,300 and 7,500 feet in elevation: along river banks and atop ridges; in enormous "fields" in open grassland and small patches at the forest edge.

The contents of kaamma'huta are as diversified as their locations, and these gardens (when producing) are continually being harvested for sweet potatoes or any of the numerous other crops which are intermingled. Those gardens on the hamlet side of the qOranaam'bu (see Map IV) are invariably fenced, while those on the opposite side never are, except above the major stream which enters the river from the east. Despite these fences, intrusions by domestic pigs are frequent and provoke innumerable conflicts between pig- and garden-owners.

Fences are typically constructed of Casuarina palings, but often are dense walls of Cordyline shrubs (saara), especially of the variety called haanisa'saara (literally, 'fence Cordyline'). Inside the fences, sweet potatoes are usually planted in long rows of mounds up to 18 inches high, consisting mostly of earth thrown up in the process of digging drainage ditches which run in regular lines throughout the gardens. Other crops are planted along the fence, as unfenced border, or interspersed between the mounds. A typical kaamma'huta might contain any combination of sweet potatoes, bananas (geta), sugar cane (saagaa), corn (haang'guma), cucumbers (ho'haa), beans (ho'hondi), cabbages (kaa'pisi), "edible pit-pit" (kwaanru), "native asparagus" (kosa), potatoes (ma'tate), "native spinach" (nraa'mmunra), pumpkins (paangki), marrows

(furi), onions (qaanigaani), tomatoes (to'maato), and various greens including gaa'nrosa, honri, meru, and waahe.¹² Also found in 'sweet potato gardens,' but in smaller quantity is nraa'mmaahina (Pueraria triloba, of which I was able to learn only in one instance), squash (faa'nrau), and doqa (Cyanotis spp.). In addition, Casuarina trees are commonly planted in such gardens as are small stands of Pandanus spp., from whose branches hang vines of passion fruit (fa'ruti). Finally may be mentioned occasional plantings of tobacco (fu'kaa), various magical herbs, and ornamental shrubs (e.g., Coleus, Impatiens, etc.). Especially near hamlets, these gardens are very often partially shaded by clumps of cultivated bamboo.

Thus, the diversity of crops in a kaamma'huta may be seen to overwhelm the relative intensity of the taro, yam and winged bean gardens discussed above. The diversification is further enhanced, although not intentionally, by the many "weeds" (waang'gusa) which may be found in even the best-tended sweet potato garden, in contrast to sara'huta and taana'huta, which are kept remarkably clean. Especially conspicuous are annual herbs such as Bidens, Blumea, Crassocephalum, Lindernia, Polygonum, Sigesbeckia and Veronica. Common grasses include Arthraxon, Eragrostis, Imperata, Setaria and Sporobolus. Additional regrowth may be found, depending upon the stage of the garden in the normal cultivation cycle of a few years or fallow cycle, which can last up to twenty years and involves plant communities which will be discussed below.

Two final types of gardens may be mentioned briefly, al-

though neither receives a name in the local language. Since its adoption as a cash crop in the early 1960's, coffee has caught on to such an extent that in 1972 there were approximately 30,000 coffee trees in various stages of growth in Ndumba. These are planted almost any place where there is room, and plantations may range in size accordingly, from a few trees to hundreds in a single garden. Coffee gardens are always fenced against pigs, except as they are protected on all sides by watercourses.

Despite the great attention now being given to coffee, these gardens seldom involve only the single crop. Rather, in many cases, they seem to build on what may have been an earlier specialized type of garden, with coffee trees planted amidst bananas and sugar cane. In these groves also are commonly found squash, occasional tobacco, and an especially-valued form of ginger (haana). Magical herbs may be found beneath coffee trees, but they are reported to be there mostly for the sake of the sugar cane and bananas. Shade, which Ndumba have been told is necessary for coffee maturation, is provided by clumps of bamboo and Casuarina, although the castor-bean tree (Ricinus) is increasingly being planted for this purpose.

Finally may be mentioned the house gardens, which are almost as diverse as sweet potato gardens. Not every house has a garden, and they may vary from a very small patch of tobacco to extensive tracts with numerous crops. Here may be found some taro, the recently-introduced but still not popular cassava (bum'buri), peanuts (nraa'viga), occasional pineapples

(nra'nraasa), and any number of other crops in small plots, such as sweet potatoes, onions, greens, corn, coffee and bamboo. Most of the tobacco grown is planted in these house gardens for easy access.

House gardens are found outside of women's houses and in the men's house yards. The men's house gardens contain less of a variety, although they always have large stands of sugar cane and bananas, as well as coffee trees. It is also in the men's house yard gardens that the especially important ritual plants are found, as well as the highly secret herbs used in sorcery.

These five types of gardens thus contain an enormous variety, as well as number, of plants. They are responsible for even greater variety, however, in that so far they have been considered only in their food-producing stage. The next two vegetation associations to be discussed are intimately related to gardens as they involve the various successions of which a garden itself may be seen as a stage.

(3) Sword Grass and Shrub Regrowth: This community appears at two different points in the gardening cycle and, accordingly, is as widely distributed in Ndumba as are gardens. It appears after initial forest clearing and when a garden is abandoned. In the first case, it is successional vegetation which would return to forest without further intervention, but is normally arrested by the land cultivation for which the forest was cleared in the first place. After a garden is abandoned, continued burning, as is frequently done in Ndumba

in hunting wild pigs, small marsupials and rats, in trying to clear the sword grass for another garden, or simply for fun, can deflect the community towards short grassland, which will be described in the next section.

Because of this variable intermediate position, the sword grass community may be found in several different phases in Ndumba. At the forest edge it commonly includes its dominant cane grass (Miscanthus floridulus) along with many forest-affiliated shrubs, such as Acalypha, Macaranga, Pittosporum, Rhododendron and Saurauia. Nearer the hamlets and in gardens abandoned in recent years, common regrowth shrubs and small trees include Dodonaea, Ficus spp., Glochidion, Schefflera and Schuurmansia. Where gardens have been long abandoned, the transition to short grassland is foreshadowed by fewer small trees and more shrubs such as Solanum spp. and tree ferns (Cyathea spp.).

In all phases, the sword grass community includes many grasses, sedges, ferns and small herbaceous weeds such as Bidens, Polygonum and other Compositae. The exact composition is always influenced by nearby forest communities, watercourses, or established grassland, and thus it is one of the most variable communities in Ndumba, although the feathery plumes of Miscanthus make it one of the most visually striking of all.

(4) Induced Grasslands: Even more striking are the grasslands, over-simply referred to as "the kunai" in the discussion so far. This association is established after a lengthy series of floristic degradations of the sword grass community, perhaps

lasting more than a hundred years. The short grasses appear first as incipient patches in a mosaic pattern with the Miscanthus. Initially a mixture of grasses includes Arthraxon, Capillipedium, Ischaemum and Setaria, but gradually dominance passes over to immigrant species of Imperata and Themeda. Grasslands in all stages of this process may be seen in Ndumba, but here the discussion will concentrate on the established community, which itself varies with respect to the dominant grass for any specific area. Its detailed composition also varies with its general degree of abutment on the river at 5,300 feet or its finger-like projections into the forest up to 7,000 feet or more (see Map IV).

Apparently the major factors in the dominance of any one species in the grassland are degree of slope and depth of soil. In Ndumba, much of the non-forested land consist of steep hill slopes with shallow soils, and the dominant grass is Themeda australis. The deeper soils of more open (but never really flat) areas are covered with Imperata cylindrica, with small tussocks of Arundinella, Imperata conferta and Ophiuros as scattered emergents. Other grasses include Arthraxon, Ischaemum, Sacciolepis and Setaria, while sedges (Cyperus spp. and Fimbristylis) and bracken ferns (Cyclosorus spp.) are also frequent.

Further ground cover is provided by forbs which include Desmodium, Euphorbia, Polygala, Sida, Smithia and Urena, to mention the most common. Small woody herbs and shrubs frequently dot the grassland, such as Crotalaria, Hypericum, Os-

beckia, Pipturus and Rhododendron spp., as do occasional tree ferns (Cyathea spp.).

Thus, the grassland, which formed one over-simplified half of the opposition offered previously as kunai/bush, is in fact a complex community and highly variable internally. To the casual observer it seems a waving monotonous expanse, even as the eye is also deceived as it sweeps over the vast forest, which seems to be a mass differentiated only by the varying shades of green in its canopy. To what degree the term "bush" is another simplification will become clearer in a discussion of the last four plant associations in Ndumba.

(5) Mixed-Oak Forest: It is probable that the present grasslands of Ndumba were covered with oak forests prior to man's introduction of horticulture to the Basin. Remnants of this forest, if such they be, have already been mentioned in the discussion of riparian vegetation, with the hoop pines at lower elevations and oak species higher up on the watercourses. They can be seen more completely intact in the large tracts of still-uncleared forest occurring below 7,500 feet (see Map IV).

Oak communities are found as pure stands on ridge crests with a greater mixture of other trees on the side slopes and gullies, hence my preference for the term "mixed-oak forest" for this association. This is a two-tree-layered forest, its canopy dominated by oaks (especially Castanopsis and Lithocarpus), with some incidence of Elaeocarpus spp., Garcinia, Nothofagus and Syzygium. The canopy is formed by large spreading crowns at 80-100 feet, but is not so dense as to prevent

the filtering through of considerable sunlight all the way to the floor below.

The under-story is more mixed, and various trees reach heights of 30-50 feet. The most common of these include Euodia, various Ficus spp., Gardenia, Helicia, Myristica, Saurauia and Timonius. Numerous species of Pandanus are found in this second layer, both in small cultivated groves at the edge of the forest, and wild species throughout. Climbing up the trunks and running along the tree branches are many kinds of vines as well as Freycinetia and "climbing bamboo" (Nastus sp.) Ubiquitous epiphytic ferns and orchids make the trees even more difficult to distinguish as individuals in their upper branches.

Beneath this second tree layer are many small undergrowth shrubs, including Ardisia, Geniostoma, Prunus, Rapanea and several species of Symplocos. Finally, a ground layer includes small herbaceous plants, many Zingiberaceae, Begonia spp., ferns, mosses and liverworts.

The mixed-oak forest provides a generally valid impression of the Ndumba "bush," although it represents only one distinguishable community. The many epiphytic plants, hanging vines, and mixture of trees of widely-varying heights are features which combine to give an air of density of vegetation, but at the same time a sense of openness due to the canopy which is more of a filter than a roof. This characteristic generally continues as one proceeds up the slopes of Mount Piora, just as does the dampness of the lower forest. There is almost daily

cloud invasion here, in the early morning during the dry season and afternoons and nights during the rainy season, and the ground is nearly always wet. This dampness provides a pleasant relief from the hot sun, but exacerbates the chill of rains. The wetness increases in ascending to the forest above, the direction we now take.

(6) Mixed-Beech Forest: Native tracks in Ndumba almost invariably follow ridge crests when possible, thus making more conspicuous to the traveler a transition which takes place at about 7,500 feet in the forest. The form of the forest remains about the same, but the composition changes. The dominant species are southern beeches (Nothofagus spp.), which form almost pure stands on the crests, with more variety on slopes and in depressions between the ridges. This structural similarity to the mixed-oak forest is reinforced by, again, a double layer of trees with approximately the same height ratios as found below.

Thus the canopy layer is formed at 90-100 feet by the spreading crowns of the beeches, but other trees are found in this top layer as well, including Alphitonia, Bubbia, Elaeocarpus and Podocarpus spp. The beech canopy is considerably less open than that of the oaks, but sufficient sunlight penetrates to support a great variety of other vegetation, including a second tree layer at 30-50 feet. This lower stratum is richer in species but less dense in cover, consisting of such small trees and tall shrubs as Drimys, Euodia, Ficus, Helicia, Pittosporum, Psychotria, Pullea, Rapanea, Schefflera, Sloanea, Symplocos, Syzygium and Timonius.

Epiphytes are even more numerous and diverse than in the lower forest, with many species of orchids and ferns present, as well as small climbers and scramblers such as Alyxia, Clematis, Dichrotrichum, Parsonsia and Smilax. The diversity is continued in a rich ground flora with Begonia spp., Dianella, Elatostema, Ophiorrhiza and Pilea especially abundant. Many Zingiberaceae form conspicuous clumps as do ground ferns such as Adiantum, Asplenium and Diplazium. Everywhere, as epiphytes or forming terrestrial cushions, mosses, liverworts and fungi abound.

This, then, is the marvelously complex middle forest of Ndumba, which forms enormous tracts reaching up to 9,000 feet and sometimes higher in smaller pockets. Here is the haunt of several species of birds of paradise and the elusive cassowary. Many marsupials are also found here, but not as abundantly as in the next forest to be considered.

(7) Subalpine Forest: At approximately 9,000 feet, and always by 9,500, a dramatic change takes place in the forest vegetation, whether on ridge crests or in depressions. This is the eerie, hushed "mossy" or "elfin" forest. The "canopy" is usually no more than thirty feet high, and there is normally a single layer of twisted and gnarled trees or tall shrubs with flat, twiggy crowns. It is always cold and wet, with persistent mists reducing the sunlight. Bright splashes of reds and yellows are provided by occasional orchids and rhododendrons, but the predominant colors are the dark greens of leathery leaves and conifers or the yellow-browns of the truly ubiquitous mosses and liverworts. As much vegetation lies

decaying on the ground as stands erect, of the tangle of surface roots and fallen logs may be considered a kind of floor. Aside from the crashing of each footstep through these soggy hummocks, the only sound comes from the occasional bird of paradise or the dripping of moisture deposited by the almost permanent mists which drift in and out.

Trees are of small girth and twisted bole form, with some emergent conifers such as Papuacedrus and Phyllocladus. In the main, however, the trees are stunted species of Drimys and Elaeocarpus, with a rich variety of tree ferns (Cyathea spp.) and shrubs, especially Rhododendron and Vaccinium spp. Climbers are few, with most epiphytic vegetation consisting of ferns, orchids and great clumps of mosses which hang from every branch. Here one literally cannot see the trees for the forest.

In its highest parts, at nearly 11,000 feet, the mossy aspects decrease as a "subalpine scrub" layer, in Ndumba, anticipates the open summit of Piora, now just above. This is a dense growth of shrubs and small trees up to 20 feet tall, including many Rhododendron spp.; others include Dimorphanthera, Drimys, Pittosporum, Psychotria, Schefflera and Symplocos. This is a more open, and drier, community, still with a twisted and wind-bent appearance as limestone outcrops expose more and more of the slopes to the sunlight and winds of these high elevations. Where density slightly decreases, the shrubbery still presents almost impenetrable tangles and thickets, through which only the richly abundant marsupials pass with relative ease.

(8) Alpine Grasslands: When the tangles have been ne-

gotiated, however, one arrives at the final major vegetation community and, literally, at the top of the Ndumba world. Here, at 11,000-11,350 feet¹⁵, the summit of Mount Piora presents extreme climatic conditions in stark contrast to those of the mossy forest below, and the vegetation has responded accordingly. Almost drought conditions prevail at this elevation, caused by intense sunlight, low temperatures and lashing winds. The occasional shrubs have a gnarled and woody appearance, but the major flora consist of grasses which combat the dryness by growing in cushions.

Tussock grasses, primarily Danthonia, Deschampsia and Poa, form clumps up to a foot in diameter and some two to three feet high. In between grow smaller tuft grasses, such as Agrostis and Festuca, which often conceal such herbs as Gentiana, Myosotis and Ranunculus, with their delicate flowers. Ground ferns include various Belvisia and Gleichenia spp.

Scattered throughout the tussocks, and especially lining the deep gorges on the top of Piora, are small shrubs such as Gaultheria and Hypericum, and large clumps of Rhododendron and Vaccinium spp. Also dotting these grasslands are small cycad-like tree ferns (Cyathea sp.).

The general appearance of the summit is thus that of a large (perhaps two square miles of surface) potential plain, were it not broken up by these several features: enormous limestone boulders, deep gorges and clumps of shrubbery. These diversions do not completely detract from the general openness of the summit, however, and one is offered a relatively unobstructed view of the entire known universe of pre-contact

Ndumba (see Plate I). Before descending to look more closely at life in the hamlets far below, then, this opportunity would be well taken to look outward and place Ndumba in its larger context.

Ndumba in Its Social Universe

Looking out from the summit of Mount Piora, one can see enormous distances, as hunters from Ndumba have been able to do for as many generations as they have climbed the mountain. Far to the north, the Finisterres provide a dramatic horizon, with Mount Otto (c. 11,600 feet) clearly visible; to the northwest, Mount Wilhelm, highest in Papua New Guinea at well over 14,000 feet, rises majestically. Between these northern mountains and Piora the eye sweeps over the territory of seven linguistic groups -- Binumarien, Gadsup, Agarabi, Usarufa, Kamano, Auyana and most of Tairora; yet, until recent years, Ndumba knew of only the nearby Tairora groups. To be sure, distant grassland fires in the Kainantu Valley and elsewhere indicated the likely presence of men, but Kainantu was the vaguely-defined final resting place of the dead until Ndumba men visited there in the 1950's, whereupon it was shifted even more vaguely to the west.¹⁴ Such a place aroused little desire for any but the ultimately necessary visit and, even if one were so inclined, a wall of enmity stood as a barrier with enemies as far as Obura, and little but mystery and myth beyond (see Map III).

To the east, gradually descending ridges fall away to the Markham Valley, usually covered with cloud or haze but where automobile lights are said to be visible at night. These ridges

are sparsely inhabited by speakers of the Waffa language, who are explained in a myth as having descended from a union between a Ndumba man and a woman from a posited, but unnamed, region further below. The Waffa are well-known to Ndumba, although not by any collective name, standing as an important link in a pre-contact trade network (see below). Their isolated hamlets are visited frequently, although their rugged, heavily-forested country -- called ha'nraa'mmaata, 'forest place', by these dwellers on the slopes of Mount Piora (!) -- is considered inhospitable due to its alleged heat and innumerable poisonous snakes.¹⁵

Looking to the west, Mount Michael (at c. 11,900 feet) marks Fore country, completely unknown to Ndumba until recently, as were the nearer Awa-speakers on the north bank of the Middle Lamari River. From Piora, the Lamari can be clearly seen, cutting its way through a belt of grassland, flowing westward past Tairora hamlet clusters and Owenia, in its still-unclear linguistic position between Tairora and Awa (see Map III). The pre-contact Ndumba social universe did not extent to Owenia, however, again due to redoubtable enemies in Pinata, Konkonbira and Oraura.

Finally, to the south, the view is more limited as the social boundaries become blurred. The south slopes of Piora are "Kukukuku" country, referred to as Imaani by Ndumba (cf. "Baruya" below). Here, kunai and forested mountains, higher and more rugged than those to the north, form a valley system whose settlements cannot be seen although they, like the Waffa, were an important trading link (see below). Men from Imaani

have long visited Ndumba, but reciprocity awaited the construction of a government airstrip at Wonenara, which provided wage-labor for several Ndumba men, finally free to travel through pacified country to the west. Now visits to the south are once again rare, the real attractions lying to the north in towns such as Kainantu. To the southwest, the Aziana River parallels the Lamari forming almost its mirror image, the two separated by heavily-forested ridges of the Piora massif's westward extension. The people living on the Aziana were only vaguely known by Ndumba to be related to Imaani, and are still never encountered but relegated to the fuzzy borderline between known and unknown.

Enemies, Friends and Marriage Networks: Ndumba, like other Highlands societies, was involved in continual warfare since time immemorial, a state officially terminated with Administration "de-restriction" in 1961 (Connolly 1961:1), but always seething below the surface and breaking out on one occasion during the field research period in 1972. Open fighting, involving scores of warriors on each side, resembled that reported elsewhere, and the details need not concern us here (see Berndt 1964). For the most part, this has been replaced today by a cycle of sorcery and counter-sorcery accusations which flow in the same directions as the large-scale raids and attacks of the past. What is of interest here is the restrictions such relations of enmity imposed, and still do to some extent, upon Ndumba familiarity with the territory of their neighbors and their mobility within it. Administration-sponsored roads now provide routes of theoretically safe travel

throughout the region. Even so, only the younger people trust this new "peace," and they only cautiously.

A twofold distinction may be drawn between the kinds of people who inhabit the Ndumba universe: 'enemies' (nrautua) and 'friends' (tondi). This dichotomy is oversimplified, however, in that 'enemies' were such only as part of a war/peace cycle.¹⁶ Periods of fighting, during which men, women and children of enemy groups were nrautua and killed on sight, were followed by peace ceremonies at which a ritual feast and gift exchange among the men of both sides marked a temporary truce. Following this ceremony, nrautua became tondi, but new fighting could erupt at any time, thrusting them back into the nrautua category.

Other groups, however, were unambiguous tondi, with whom Ndumba never fought. These included the Waffa and Imaani, who were important trading partners, and more distant groups who were known but lived too far away to ever pose direct threats in competition for land, women or pigs, the main sources of friction in the Basin. Beyond this circle of 'friends' and 'enemies' were the people of whom Ndumba have learned only in recent years. These are all considered tondi, as are Europeans, if a label were necessary (as it sometimes is to an anthropologist), but only in this extended sense.

Examination of Map III suggests two final comments: (1) Ndumba may be seen as virtually backed into a corner by their enemies, although it is a very large corner indeed and less of a refuge than a choice property assaulted on two sides.¹⁷ A "core" of enemies may thus be distinguished, consisting of all

of those whose territory abuts on Ndumba, viz., Ahea, To'okena, Anima, Himarata and Oraura. More distant groups were enemies by virtue of their occasional alliances with those nearer in fights with Ndumba, such as Pinata and Konkonbira, who allied with Oraura, and Baira and Obura who, on one occasion each, allied with groups from the north side of the Basin. (2) Aside from the trading partners of Waffa and Imaani, other groups became 'friends' indirectly, as with Asara, Ondora, Kovara, Nombia, Kaurona and Suwaira, who were all known to be enemies of enemies, thus 'friends.'

Thus, those group territories within easy walking distance of Ndumba, with their slight differences in flora and fauna, were unreachable and thus outside of normal Ndumba experience. Friends, on the other hand, were equally out of reach, except for the Waffa groups, because of the enemies lying in between, thus cutting Ndumba off from knowledge of the vast kunai plains to the north and the sago swamps to the south of Imaani. Waffa, however, were located at considerably lower elevations than Ndumba, and the differences in vegetation were well-known.

The adage attributed to many Highlands societies as "we marry those we fight" (cf. P. Brown 1964) is generally true in Ndumba, although it does not tell the whole story. Most marriages in pre-contact times, and today as well, involved only parties who resided in Ndumba, within the limitations posed by sib exogamy (see below).

When women did marry in from elsewhere, they came from five places, which by no means represent all of the enemy

groups. 'Many women' (qaasau'nraase) came from Ahea and Oraura -- the two worst enemies of Ndumba -- and Konkonbira; on one occasion a woman from a Baira hamlet, and on another a woman from a Waffa group (Naina), were brought in. Going in the other direction, women were sent to five places, with some differences from the in-marrying groups resulting in an asymmetrical system except at the "core." Thus, most women who married out went to Ahea and Oraura, while one went to a Waffa group (Tumbuna), one to To'okena and two to Obura.

Except for the isolated instances, there was a fairly clear symmetrical pattern involving the mutual exchange of women by Ndumba, Ahea and Oraura, the three bitterest enemies in the Basin, and these marriages were almost invariably a formal part of the peace ceremony alluded to previously. This pattern is breaking down today, with a widening of the Ndumba social universe, but it can be seen as providing a long-standing opportunity for a flow of more than genes in the Basin. Ahea, speaking a different dialect from Ndumba; Konkonbira, speaking yet another; Baira, yet another; and Naina, with a different language, have allowed a considerable amount of linguistic diversity to flow into Ndumba. With different vocabulary also came slightly different customs and knowledge of different micro-environments, which may partly explain some of the cultural diversity to be discussed in Chapter IV (cf. Owen 1968). Still more routes for a flow of information existed in the trade relationships, to which I now turn for a brief discussion.

Trade Networks: A local myth recounts a story of a Ndumba man whose entire body was covered with scabies to the point where he resembled a tree covered with lichens, making him something hideous and forcing him to live like a hermit. A wandering Imaani man came over Mount Piora and, upon encountering him, was not repelled but instead cured him. The two went back to Imaani where the unnamed Ndumba man saw the wonderful vegetable salt produced there, and a trading partnership was established which set the precedent for an exchange network that still persists, untold generations later.

However it began, the salt trade in this part of the Highlands places Ndumba in a strategic position, linking the "Kukukuku saltmakers" (Sinclair 1966:24-75) to all of southern Tairora and, through them, to the north, and to Waffa on the east. Individual trading partners carry on trade, although groups of Imaani men and women arrive in Ndumba at a time, and parties of Ndumba men and women go to the Waffa hamlets. There appears to be no fixed schedule for these transactions, aside from a preference for undertaking such journeys during the dry season. Occasionally smaller trading parties arrive, as was the case when the first Administration patrol to visit Ndumba, on December 12, 1951, was astonished to find there an Imaani man, youth and young boy trading salt -- the patrol's primary mission had been to find "Sinclair's saltmakers" and determine the exact location of their settlements for administrative purposes (Linsley 1951).

If the trading appears to be almost casually conducted, the importance of the commodities involved is great. Natural

sources of salt are scarce in Southern Tairora and apparently in Waffa as well. The Imaani (Baruya) have developed the intensive cultivation of Coix gigantea, from which their salt is manufactured, to an art (cf. Godelier 1969a, 1969b, 1970). Black palm for bows, arrows and axe-handles, on the other hand, seems to be scarce in Imaani, as are shells, a universal valuable in the Highlands. These commodities are plentiful in Waffa, partly through their own links to the coast through the Markham Valley. Ndumba stands in the middle and benefits from both. Its more favorable position with respect to the acquisition of Western goods, such as steel axes and knives, clothing and money, has allowed considerable diversification of trade items, as has Ndumba's reputation for producing some of the finest string bags in all of Southern Tairora. Salt, shells and black palm are the central valuables concerned, then, but the exchanges include much more as well, as is indicated in Table I.¹⁸

As can be seen in that table, a great many different items pass in and out of Ndumba hands, and they manage it with little movement on their parts. Ndumba do travel to Waffa, but often Waffa come to them; Imaani come to Ndumba since the only good route to Imaani is over a ridge behind Konkonbira, and that would require travel through the country of Ndumba's arch-enemies in Oraura as well as Konkonbira; finally, the enemies on the north side of the Basin could be traded with at the peace ceremonies between wars. Thus, these trade relationships, aside from bringing Ndumba products they desperately want for themselves, such as salt, black palm, bark cloth capes, pan-

TABLE I

NDUMBA EXCHANGE NETWORKS

<u>PLACE</u>	<u>ITEMS OBTAINED FROM</u>	<u>ITEMS TRADED TO</u>
Imaani (Baruya)	1. salt¹⁹ 2. tree bark (for hunting magic)	1. black palm 2. cowrie shells 3. large shells 4. bailer shells 5. shell headbands 6. beads 7. steel knives 8. steel machetes 9. steel axes
Waffa	1. black palm 2. cowrie shells 3. large shells 4. bailer shells 5. shell headbands 6. beads 7. stone adze blades 8. pandanus nuts 9. bark cloth capes 10. vegetable dye 11. parrot feathers 12. bird of paradise plumes 13. money	1. salt 2. tree bark 3. string bags 4. pigs 5. clothing 6. soap 7. money
Konkonbira	1. salt (from spring at Pinata) 2. black palm 3. string bags	1. black palm 2. pandanus nuts 3. bark cloth capes 4. parrot feathers 5. reed for skirts 6. woven armbands
Ahea, To'okena, Anima, Asara, Oraura	1. pigs 2. cowrie shells 3. shell headbands 4. money 5. soap 6. matches 7. clothing	1. salt 2. black palm 3. reed for skirts 4. string bags 5. bark cloth capes 6. parrot feathers 7. bird of paradise plumes 8. marsupial fur

danus nuts, and the like, also considerably add to their store of information about their neighbors' worlds, even when personal observation was impossible.

It is in this kind of universe, then, that Nadumba has existed, possibly for centuries -- seemingly restricted but broadened, at least intellectually, through exchanges of women, goods and, always, information. The Piora Basin is thus not an isolated backwater of small groups walled off from each other by warfare and hatred; rather, it is a fluid pool of people, shifting about, carrying their individual worlds to each other in various forms but continually interacting in some way (cf. Watson 1970). Stopping this flow for an instant, we may now look more closely at Ndumba as a localized segment of it.

Ndumba Society

Demography and Social Organization: If the time of man's entry into the Piora Basin is uncertain (White 1972), the initial settlement of Ndumba by horticulturalists is even more mysterious. According to Fai'ote, an old Ndumba "big man": 'Long, long ago all of the forest accidentally burned (not through human acts), and the land turned to kunai; then people came.' It is likely that the kunai grasslands were in fact the result of human action (cf. Robbins 1962, 1963) but, in any event, whence did the first Ndumba come? Konkonbira traditions hold that Ndumba was founded by a group from there who split off, founded Oraura, split again and went to Ndumba. Yet, Ndumba myths are extremely localized, with each sib having an

autochthonous ancestor (usually unnamed) who, already in Ndumba, gave rise in various ways to ensuing generations.

However, whence and whenever, people settled in Ndumba and were "officially discovered" there by Europeans in 1951.²⁰ At that time they were widely dispersed, with scattered men's houses on crests of spurs and women's houses grouped beneath (Linsley 1951:19; W.T. Brown 1953:12). Their population was estimated in 1953 at 190, although based on very impressionistic methods, such as counting the men's houses seen, adult males seen, and areas of cultivated land (W.T. Brown 1953:11). By the time of the first official census in 1964, the figure produced was 311, whether the population itself had increased proportionally or not. The Administration has made a practice of censussing Ndumba ("Habi'ina Census Unit") and Oraura at the same time, requiring all Oraura people to gather at Ndumba. Confusion has resulted in many cases, with some people from either place mistakenly registered as living at the other, and a number of people from both simply do not participate. With these considerations in mind, the census figures in Table II can be no more than approximations, except for the 1972 total which is based on house-to-house surveys conducted by myself and my wife on three separate occasions.

There is little doubt that the population of Ndumba has increased in recent years, although the figures in the table are not sufficiently reliable to compute a meaningful rate of growth over time. Infant mortality has doubtless decreased since the introduction of pre- and post-natal medical care at the Swiss Evangelical Brotherhood Mission, established in

TABLE II

NDUMBA CENSUS FIGURES

<u>YEAR</u>	<u>TOTAL NUMBER OF RESIDENTS²¹</u>	<u>SOURCE</u>
1953	190 (est.)	W.T. Brown 1953:11
-		
1963	202 (est.)	Pataki 1968:92
1964	311	Official Census, Obura Patrol Post
1965	288	" "
1966	302	" "
1967	292	" "
1968	304	" "
1969	304	" "
1970	333	" "
1971	323	" "
1972	332	Author's Census

To'okena in 1963. Adult mortality, also, has declined with Western medical services and the reduction, if not complete cessation of warfare, reinforced by the establishment of a government patrol post in Obura, also in 1963. These factors have been offset somewhat, however, by a probable decrease in the birth rate, since many young men have been away for years at a time under the Highlands Labour Scheme, initiated in Ndumba in the late 1950's. The absence of these marriageable, and sometimes married, men has had wide-ranging effects on Ndumba society, too complex to be discussed here (cf. P. Hays, forthcoming). Considering all of these qualifications, a population increase of 3% for 1971-1972²² is probably indicative of a general trend.

In Table III, the 1972 population is shown as it is distributed across the most meaningful age groups (see discussion of "life cycle" below). During the research period, some 30 men were absent, employed as wage-laborers on coastal planta-

tions, nearly all of whom are in the 21-45 age group. Had they been included, the male/female ratio for that group would be considerably more balanced. Otherwise, the Ndumba population may be seen to be young in terms of reproductive capacities. It would seem reasonable to expect continued population increase, especially as fewer men are presently being recruited for coastal labor (see P. Hays, forthcoming).

TABLE III

DISTRIBUTION OF NDUMBA POPULATION BY AGE GROUPS

<u>AGE GROUP</u>	<u>MALE</u>	<u>FEMALE</u>	<u>TOTAL</u>
0-5	27	20	47
6-12	27	32	59
13-20	9	22	31
21-45	40	80	120
46-70	22	33	55
71+	6	14	20
	<u>131</u>	<u>201</u>	<u>332</u>

The pre-contact settlement pattern of scattered hamlets has been largely retained, although some consolidation has taken place at the urging of the Administration. Thus, the present population is distributed across six named hamlets, most of which originated in the 1960's in a continuing general process of shifting location of settlements. Five of the hamlets are within five minutes' walking distance of each other, while the sixth is approximately three times that far, very near the forest edge on the extreme eastern side of Ndumba (see Map IV).

The traditional pattern of a men's house with a cluster of women's houses has changed to some extent. Each hamlet (except

qAarapura) has at least one large, circular men's house, but some men now live together in small groups in European-style rectangular houses. At least two men, moreover, regularly live with their wives and children in single-family dwellings, a practice encouraged by the S.E.B. Mission but running counter to a long-standing taboo. Each hamlet (again except for qAarapura) also contains one or two large, round menstrual houses, segregated from the rest of the houses, to which women are confined during menstruation and childbirth. The distribution of dwellings and population across these hamlets is shown in Table IV.

TABLE IV
NDUMBA HAMLET COMPOSITION

<u>HAMLET</u>	<u>POPULATION</u>			<u>MEN'S HOUSES</u>	<u>WOMEN'S HOUSES</u>
	<u>M</u>	<u>F</u>	<u>T</u>		
Ferora	10	21	31	1	10
Nrummaungkura	40	35	75	2	23
Daandura	31	52	83	1	26
qAarapura	1	5	6	0	3
Wahara	18	41	59	1	28
Suwanranra	30	48	78	2	29
TOTAL	<u>130</u>	<u>202</u>	<u>332</u>	<u>7</u>	<u>119</u>

There are seven named sibs represented in Ndumba, all of which occur elsewhere in the Basin, this despite localized Ndumba origin myths for several of the sibs. Ideologically, membership is by patrilineal descent, and there are few empirical exceptions. The sib is a corporate group in at least two senses: (1) it is a fundamental exogamous unit, and (2) it is

the land-owning group in Ndumba. It does not function as such, however, in ceremonies, warfare or exchanges. While sexual relations between members of the same sib have been known to occur, and are considered 'wrong,' no recognized marriages of this kind have taken place in recent decades.²³ All land, whether gardens, empty grassland or forest, belongs to one of the named sibs (or sometimes to two jointly), and rights to cultivate or hunt are granted accordingly. Each individual may exercise his rights of both kinds to land belonging to his own or his mother's sib. While this results in an abundance of land theoretically available in any particular case, nevertheless, occasional disputes arise which are most often settled through the tracing of history of use or through recourse to the genealogical knowledge of older men.

While there is a tendency for men's houses to be composed of men belonging to the same sib, and their older sons, this is not always the case. Women often, but not always, reside in the same hamlet as their husbands. Furthermore, any individual changes his residence occasionally, the choice being dictated more by such considerations as proximity to gardens currently in production than by hamlet composition. This fluidity and diversity may be seen in Table V.

Life Cycle and Socialization: A Ndumba child enters the world described above in the smoky, crowded confines of a menstrual house filled with excited women.²⁵ His mother on all fours in the final moments, the baby drops onto a six-inch-thick mat of saamma, a reed (Elaeocharis dulcis) cultivated by women in special ponds and used in making traditional skirts,

TABLE V

DISTRIBUTION OF SIBS ACROSS NDUMBA HAMLETS

HAMLET	SOAMANA	TAAPISANA	UPIRUNA	SAAQIA	QORAVAI	KWAAMENA	QAATANA	+ ²⁴	T
Ferora	14	2	1	5	4	5	0	0	31
Nrumneung- kura	38	17	6	5	7	1	0	1	75
Daandura	32	8	17	8	13	3	2	0	83
qAarapura	4	0	1	0	1	0	0	0	6
Wahara	24	14	4	5	1	0	8	3	59
Suwanranra	20	10	39	5	2	2	0	0	78
TOTAL	132	51	68	28	28	11	10	4	332

N.B. The column marked "+" indicates sib membership other than the seven principal sibs. For more information, see Note 24 as indicated.

menstrual pads and sponges for just such occasions. Thus, perhaps significantly, his first contact with the world outside of his mother's womb is with a plant, with which he is cleaned and wrapped immediately. He will come to know many more plants as they surround him, as they do on this day, before he is finally wrapped in a faapa (bark cloth cape) and laid in his grave.

Perhaps because of the uncertainty as to how far off, or how near, that day might be, he must wait to be granted even the most basic status, that of a human being, before he goes on to a series of age-grades which will categorize and re-categorize him until he dies. Prior to a birth, expectant parents laughingly decline to even speculate as to the baby's sex, although men at least express a hope that it will be a boy (because, it is reported, 'girls leave home,' i.e., marry out). At first the infant has little more than a gender identity, and even that is submerged under its status as nraaqinra -- simply 'baby' (cf. quara'nraaqinra, 'baby pig,' sa'tari'nraaqinra, 'tree seedling') rather than qiaatara ('girl child') or nraangwa ('boy child'). Perhaps this ambiguous status explains the otherwise enigmatic cry of the midwife at the moment of birth of quaravano! ('a pig!'), and references to the neonate as quara throughout the birth and cleaning-up process afterward.

The child indeed has to acquire its status as human being, and many others as well. A few weeks after he is born, he may receive a name, one of several he will be given during his lifetime. After a period of up to three months (depending on

whether he is a first or later child) he emerges from the menstrual house where he has been confined with his mother, and faces the outside world for the first time. His father, who has been hunting in the forest with the help of sib-mates and friends since the day after the child was born, is at last allowed to see his newborn and speeds up the process of smoking the marsupials he has killed and stored in the men's house. About a month later, a public party is held (nduha'nraaqinra, literally, 'baby feast') at which the marsupials (as many as 172 for a single baby) are distributed to every man, woman and child of the new mother's sib. At this party also the stringent food taboos on the new father are lifted, and life settles back to its normal pace.

While the new father may not hunt again in the high forest for about a year, he is released from taboos against eating all of the 'sweet foods' he has missed for nearly a year: greens, "edible pitpit," pandanus nuts, "native asparagus," squash, bananas, edible forest products, salt, marsupials, birds, pork, eels, rats and tinned meat.²⁶ Pregnant women are said to be subject to food taboos only when they are previously childless; in these cases, frogs, rats, eels and cicadas are forbidden.

The newly-feted child, whether male or female, is taken to his mother's house, where he will live with her, any other young children she may have, and sometimes another woman as well. There he will stay for a number of years, carried on his mother's back in a string bag, then in a back sling of beaten bark, then straddling her hip, and finally toddling behind her in her daily excursions to the gardens and low forest.

At the age of three or so he takes up with a group of his age-mates, and wanders about the hamlet with them, relatively free to experience whatever befalls him and only slightly watched over by older siblings, his mother or other kinsmen. He is subject to no food taboos and no restrictions on his movements except for entry into the men's house compound, fenced off and forbidden to all females and those males who are not yet gummaana.

When five or six, a child of either sex is introduced to violence at first-hand after years of indulgent handling. His septum and sometimes ear lobes as well are pierced with a sharpened cassowary leg bone by his father in a casual but public ceremony, and thin bamboo or twigs of wood are inserted to prevent healing over. The holes are subsequently enlarged for the boy to later insert curved pig tusks in the septum to present a fierce appearance to enemies, and pendants of various kinds in the ears; girls wear only the latter, if those. At this time the child is unambiguously a nraangwa or qiaatara, and life changes pace and direction.

Socialization continues in its informal way, with little in the way of explicit instruction; rather, children learn by doing and by watching others. While considerable freedom continues, experiences begin to fall along lines based on gender. For a nraangwa, his footloose wanderings expand, now deeper into the forest with his age-mates, armed with newly-acquired bows and arrows of bamboo and stiff grass. He is free to roam through gardens, chase pigs, stalk birds, watch men build a house, ... -- anything except go near the men's house, for he

still resides with his mother and is allowed to visit the menstrual house, locus of a Ndumba man's greatest fear, menstrual blood. The danger of association with women is brought home to him, if still without explanation, at this early age as he is subjected to his first food taboos: marsupials from childbirth parties, any food which has been in the menstrual house, and food which has touched the paths and drainage ditches of gardens where women walk and with each step pollute anything beneath them.

For the qiaatara, on the other hand, no such dangers exist for she is a female and already a self-polluter (at least potentially). She thus suffers no food taboos, but her freedom is gradually curtailed by increasing responsibilities. She still occasionally plays in the fringe of the forest, but increasingly she is given tasks to perform: minding younger children, assisting in the gardens, and generally being on call to adult relatives. Her experiences are widely varied, and her education by example continues with more things to do and watch. Her life proceeds in this way for another ten years or so, until she reaches menarche.

Not so the young boy, who arrives at his next age-grade when he is between ten and twelve years old. At that time he is eligible to become an gummaana and undergo the most severe initiation ceremony of his life. When several boys reach this age range, and their fathers decide that resources (especially pigs) are sufficient to support a large feast, the three-day ceremony (nduha'nraa'nrenra, 'eating feast') is held.²⁷ On the first day, the boys are taken away from their mothers, with

whom they will never again sleep or live. All of the men of Ndumba gather and take the boys to a secluded stream at the edge of the forest, while the mothers and other women remain near the hamlet, singing and wailing in pretended confusion and shock.

At the stream, standing over the running water, each boy has his nose 'shot' by a member of his mother's sib. A bundle of sharp-edged, stiff sedge (Cyperus spp.) is forced up the boys' nostrils and into the upper sinus cavities, resulting in a copious flow of blood into the water. The boys reportedly do not know in advance what is in store for them and, indeed, they panic and cry for their mothers as the blood-letting is followed by a brisk rubdown and beating with stinging nettles (Laportea sp.). The boys are then led back to the hamlet in a noisy procession, swelled by the women met on the way, with singing and dancing ending at the men's house compound, which the boys enter for the first time in their lives.

Once inside the compound, more beatings with nettles accompany mock battles between mothers' and fathers' sibs as secrets are revealed to the boys: the location of the highly secret latrine behind the men's house, the powerful and sacred center pole sticking out of the canonical roof, etc. Finally the new gummaana are left to rest for the afternoon until the men all gather again in the evening, summoned to the men's house by the sound of bamboo flutes, whose sound is explained to women and children as emanating from spirits. This is one of the few times in a boy's life when he is explicitly taught, for he must learn a whole new set of rules for his life among

men.

All night long the boys are intensively lectured: stories are told of men and boys who were careless, and the disasters that befell them -- for urinating or defecating without proper precautions, for having too much contact with women, for over-indulging in sex, for eating forbidden foods, of which there are now many more: birds, rats, eels, frogs, grubs, cicadas, most marsupials, mushrooms, and any vegetable foods with unusual characteristics, such as red or 'hairy' tubers, beans which grow curved, fruit from bushes with thorns, all of which will cause the boy himself to have these deformities. At dawn, the gathering breaks up after singing and story-telling all night, punctuated by more beatings of the boys, and all sleep for most of the day.

The second evening is a duplication of the first, except that the women sing and dance outside of the compound all night, dressed in men's clothes in order, they say, to sneak up on the men and recapture "their" boys. The women have spent the second day eating food distributed by the boys' mothers while the men slept. At dawn on the third day, everyone gathers as the boys are led out of their isolation, dressed in new reed aprons, shells, feathers and other decorations. They are shown to their mothers, showered with gifts, and led back into the compound amid another mock battle. Up to fifteen pigs may be killed (for five boys) and a gigantic feast ends the ceremony.

For a girl the next transition after becoming a giaatara does not occur until her first menstruation, usually at around

the age of 17-18. With this first flow, she goes to the menstrual house and the news is spread. After a few days, during which women gather nightly to sing, dance and tell stories about the new power in the girl and its dangers to men, she is brought out for a pig feast. While the earth oven steams the food, she is taken to a nearby stream where her nose is 'shot' by her "mother's brother," as are those of other girls who have recently gone through the ceremony or are close relatives of the girl. They are also beaten with nettles in a general melee of frivolity, in marked contrast to the solemnity of the gummaana ceremony.

The girls are returned to the feast site, where they are forced to crawl through a corridor of arrows stuck into the ground, plucking them out as they go (a ritual which no one present at the ceremony witnessed seemed able to explain). When the food has been prepared, the "mother's brother" spits food into the face of the new kwaasi, and makes a speech regarding her new responsibilities, after which all are given food from the earth oven.

In fact, a kwaasi has no new responsibilities to speak of; rather, they are anticipated as she is now marriageable. She now must observe taboos against eating frogs, rats, eels, and cicadas until her first child is born, and must be careful of her new power of pollution. But otherwise her life continues in much the same way it has gone for several years. Since the age of 12-14, her skills and duties as a gardener have increased to such an extent that by the time she is a kwaasi, she is almost an equal partner with her mother, and may well have some

gardens of her own. She will not have the full responsibility of a food producer until marriage, however, which may happen within a very few years.

A boy is not ready for marriage until he has gone through a final ceremony, which will make him a qia'vaati -- a man. At around the age of 18-20, the gummaana has his septum pierced again in the men's house and wears pig tusks for the first time. Again his maternal kinsmen are the principal actors in a ceremony which usually involves a number of young men simultaneously, and occurs as part of a cycle of such ceremonies throughout the Basin. Male informants state that the ceremony is not so elaborate as for gummaana, and mainly involves the awarding of the tusks and the young men's first real bows, made of black palm. Now he is ready for marriage and is a full adult in all other respects, including participation in warfare.

Marriage is not a major public ceremony in Ndumba, and seems to consist primarily of a ritual donning of a full reed skirt by the woman (in contrast to her kwaasi skirt which is open at the sides), followed by presentation of gifts and a small feast. It is up to the man then to build his wife a house and help her begin making gardens. Sexual intercourse is said to be avoided until the first garden so made has been harvested and re-planted, which could take up to a year. The woman, now a nraase, has the responsibility of providing food for her husband if he demands it, but often he continues to eat at his mother's hearth.

After the years of childbearing are over, a man and woman

continue to hunt, work in gardens, fight, dance, ... -- virtually everything -- until they are considered 'old,' which may not be until well into their 70's. At this time they reach the final age-grade: a man becomes a naambai, and a woman a sona. Little is expected from them, all previous food taboos are lifted, and they do little except sit around the hamlet, how well they are taken care of depending on the degree of obligation felt by their individual children.

The sequence of age-grades in the Ndumba life-cycle thus can be seen as consisting of parallel stages in the two sexes, although not synchronized:

	<u>nraaqinra</u>	
<u>nraangwa</u>	(5-6)	<u>qiaatara</u>
<u>gummaana</u>	(10-12)	
<u>qia'vaati</u>	(17-20)	<u>kwaasi</u>
	(22+)	<u>nraase</u>
<u>naambai</u>	(70's)	<u>sona</u>

Subsistence Activities: The final aspect of Ndumba society to be considered in this necessarily brief overview is that pertaining to the exploitation of resources. Again, only a sketch can be offered in the space available, but such an outline will serve present purposes.

As was suggested by the previous discussion, the division of labor in Ndumba is based almost entirely on age and gender. While certain individuals are considered to be better gardeners than others, or hunters, or string bag makers, there is little that one could consider occupational or economic specializa-

tion. The only traditional exceptions would consist of the men and women who are highly-reputed curers and midwives, although with the coming of cash crops it is likely that some men will become small trade store operators in Ndumba, just as a few initiated such activities just prior to the close of the research period.

Ndumba is basically a "self-help" society, despite some political functions served by the descent groups. Sibs, as was said previously, are rarely action groups; rather, when a group effort is needed, as in building a bridge, all of the people are likely to turn out to help. More limited projects, such as the building of a new men's house, would involve only those most directly concerned. Other tasks tend to be performed by individuals working alone. Thus, if a man's wife needs a new house, he is most likely to build it by himself, but occasionally will be helped by a brother. Each man or woman tends to make his or her own implements, just as each gathers and administers his own medicines, except in very serious cases requiring a curer. Cutting across this general pattern, however, is a fairly rigid division of tasks by sex, which in some instances forces a degree of cooperation. These tasks may be briefly discussed under three main headings: food-getting, construction and manufacture.

Food-getting activities have already been partly described in the discussion of gardens earlier in the chapter. With the exception of bananas, sugar cane, taro and yams, which are tended almost exclusively by men, the labor of gardening is divided by sex, although there are always some exceptions.

Thus, clearing of land, whether by felling trees or burning secondary growth, is men's work, as is removal of boulders and stumps, digging drainage ditches and building fences. Often a husband and wife will work together in their gardens, the man doing this heavier work and the woman tending to the planting, weeding and harvesting. The gathering of wild vegetable foods, such as mushrooms, wild greens, fruits and ferns is women's work, except as it requires tree-climbing as in the case of edible pandanus nuts. This pattern is broken, however, in the case of coffee, with men frequently planting and harvesting their own carefully-guarded crops. Another exception is found in the artificial ponds created for the planting of saamma, the reed used in making skirts. All of the work connected with these is done by women, as men regard the ponds as extremely polluted places, filled with snakes and all manner of evil things.

Ndumba utilize many animal foods, including both domestic and wild pigs, marsupials, all kinds of birds, rats, frogs, eels, cicadas and tree grubs. Snakes are greatly feared (as the lethal death adders, abundant in the kunai, might well be) and not eaten. No fish other than eels are found in Ndumba waters except for an artificial fish pond initiated and stocked by the S.E.B. Mission in 1972. Domestic pigs are owned by nearly all adults, and by some children as well. Previously they slept in women's houses and were fed by the women in the evening after day-long free-range foraging. The Administration has outlawed this arrangement, however, and now most pigs are kept in special pig houses, with some men feeding their own

pigs. The only other livestock kept are dogs, used by men in hunting and never eaten, and cats (introduced by the author) about which there are differences of opinion regarding edibility. The S.E.B. Mission has tried to introduce chickens, ducks and sheep but failed to generate much interest; Ndumba men are greatly interested, on the other hand, in starting a cattle herd, but have not so far succeeded in raising the necessary money.

Hunting and trapping are almost exclusively male pursuits, with frogs, cicadas and rats caught by women and children by hand, the men joining in communal rat hunts following funerals. Wild pigs are hunted by men with bow and arrow or by digging pit traps in the kunai. Men hunt marsupials, usually alone or sometimes in small groups, and also build several different kinds of snares and traps in the kunai and bush. On these hunting trips, which are frequent and often last for several days at a time, men are always on the lookout for birds, all of which are eaten along with their eggs and some of which, especially birds of paradise, cassowaries and parrots, provide decorative plumes. Also on hunting trips, men occasionally dig grubs out of the inner bark of certain trees, which are favored as a snack food eaten raw. Finally, men construct elaborate traps and catch eels in the lower parts of the qOranaam'bu.

Construction is invariably a man's job. Bridge-building and, recently, road-building are carried out by large community work groups. Most construction tasks are handled by individual men, however, such as house-building, fence-building and the construction of women's latrines, although the pits are dug by

the women. Virtually any job that requires the use of a stone adze or a steel axe is certain to be men's work, except for some firewood-cutting which is done by women for their cooking hearths.

Part of the reason for this allocation of tasks may be the fact that construction often involves some climbing, which women are supposed never to do. In addition, however, it also usually requires trips to the forest to obtain lumber and vines for lashing, and the forest is primarily man's domain. Myths tell of the tragedies that occurred when women went high into the bush, where they have no business being since they do not hunt. Women do go into the forest to collect and carry back to the hamlets fence palings cut and left there by the men, and to collect mushrooms. However, there is an upper limit of approximately 7,500 feet beyond which they are not supposed to go, with the beginning of the Mixed-Beech Forest providing an easily-identifiable marker (see discussion above). A further instance of this male/female, forest/grassland opposition may be found in the one role women play in house construction -- it is their job to collect the grass used for thatching, which they gather in the kunai.

Finally, implement manufacture is generally conducted by whatever person is going to use the implement, with some cooperation required when raw materials must be obtained from special places. Only a few implements or items were traditionally used by both men and women: reed skirts, which are made by women; bamboo knives, made by both as needed; and bark cloth capes, which were traded in from the Waffa. Steel axes,

spades and knives, introduced in the 1930's through Waffa, are used by both and acquired as individuals obtain money from their individual coffee sales or other sources of income (sale of goods and services to the Mission, government, or anthropologists, bridewealth and funeral payments, etc.). Other than these items, Ndumba "material culture," like so much else, is sex-linked and individually produced.

Thus bows, arrows, war shields, daggers, stone adzes, wooden head-rests, "jew's harps," armbands, legbands, wristlets, bark "girdles," plume headdresses and other decorations are used exclusively by men and manufactured by them individually. On the other hand, digging sticks, pandanus sleeping mats, beaten bark baby slings and bamboo cooking tubes are all women's possessions and are made by them. One item in addition to reed skirts which is used by everyone, and is one of the most important of all, is made exclusively by women, and that is the carry-all string bag. No such universally-used product of male labor exists in Ndumba.

Finally may be mentioned three items which are not manufactured in Ndumba, but are all obtained from trade with Waffa: stone adze-blades, now completely replaced by steel axes; drums of which only a few exist and are owned individually; and clay pottery, of which little can be found today, largely replaced by tins and steel cookware.

The "material culture" of Ndumba, then, is fairly simple by Western standards, but typical of that of most Highlands societies, the vast majority of the items involving the use of plants. While this discussion has been necessarily less than

complete, it illustrates two themes which have run throughout the larger discussion of Ndumba society: the age and gender divisions which permeate everything; and the highly individualistic nature of so many activities. These points will be returned to as the major topic of this dissertation is developed in the remaining chapters, beginning with a discussion of the field techniques employed in the research project.

CHAPTER III FROM PLANTS TO MAUNA: RESEARCH PROCEDURES

In Chapter II I have presented an overview of the physical and social milieu in which the people of Ndumba live. The description offered there of vegetation communities is derived from the concepts and categories of Western botany and, while incomplete, is what Rappaport (1968:237-238) calls an "operational model." My primary goal in Ndumba, however, was to discover the ways in which the people themselves conceptualize their botanical surroundings: what entities are considered to exist, what features are relevant in distinguishing among them, what relationships obtain among them, how they are named, how they are utilized -- in brief, the ethnobotany of Ndumba as describable in a "cognized model" (Rappaport 1968: 238-239).

A comparison of the two kinds of model would likely show that they overlap but are not identical. Each would contain elements, e.g., nitrogen-fixing bacteria or plants with magical powers, not included or even possible to include in the other (cf. Rappaport 1968:238). Such a comparison, while potentially illuminating to important questions regarding human cognitive processes (see, e.g., Bulmer 1970, Hunn 1973), is beyond the scope of the present dissertation. Rather, the objective here is to examine the proposition that more than one cognized model exists within the subject group, and the implications for the understanding of general properties of cultural systems.

Thus I do not offer "the cognized model of the Ndumba

plant world," except in qualified senses to be made explicit in Chapter IV. "Ndumba," like other human societies, is a convenient analytical construct for some purposes and has been so used throughout Chapter II. However, it is not "Ndumba," but individuals who perceive, form concepts, name and utilize plants. Acknowledging this basic fact, my research was designed to formulate and compare models of individual Ndumba conceptualizations of a shared botanical environment -- more precisely, individual conceptual systems of relationships among plant categories. By employing a set of ten members of the Ndumba population, I undertook to construct ten "cognized models," from which additional models -- "shared" and "composite" -- may be obtained through abstraction. By beginning with individuals and only subsequently extrapolating to supra-individual entities, a measure of empirical grounding is attained which allows a meaningful examination of similarities and differences among these individual models and their implications for theories of ethnosystematics and cultural systems in general.

By attending to individuals in depth in this dissertation I thus depart from traditional practice in ethnosystematics. This does not, of course, imply rejection of the general theoretical and methodological premises of the paradigm of "ethnoscience." Indeed, I employ a number of techniques and methods developed by others working within that paradigm, modified in the light of various criticisms which are pertinent, and the hypotheses to be stated below derive principally from this previous work.

Very little of this work has been done in New Guinea and almost none in Highlands ethnobotany (cf. Lea 1966 and Panoff references for coastal societies), although considerable contributions have been made to the study of Highlands ethnozoology (Glick 1964, Diamond 1966, Bulmer 1957 et al.). This is not to say that nothing is known of Highlander's utilization of plants, for a number of excellent reports have been published (e.g., Blackwood 1940). These represent a different genre of ethnobotany, however, from those upon which I have drawn for methodological tools in the present study. It will be useful here to explain this distinction.

Ethnobotany: "Old" and "New"

The Zuni live with their plants -- the latter are a part of themselves. The initiated can talk with their plants, and the plants can talk with them....The Zuni love their plants. [Stevenson 1915:36]

The Tzeltal world of plants...can now be summarized as follows....

There are four life form names...There are 471 generic names. Generic names mark taxa which are the basic building blocks of the taxonomy and are of major importance psychologically. Most generic names, 398, are monotypic, while a minority, seventy-three, are polytypic. These latter polytypic generics include among them 239 specific names in contrast sets ranging from two to seventeen members. [Berlin et al. 1973:226]

Whatever period in history one chooses to mark the beginnings of Anthropology, there also may be seen the starting point of Ethnobotany, broadly definable as the study of man's relationships with his plant environment. From the chronicles of Herodotus, with their detailed notes on food habits observed by him and other travelers (Hodgen 1964:23 ff.), to the token

chapter or paragraphs on "subsistence behavior" in the most recent ethnographic report, plant resource utilization has been a long-standing, albeit never dominant, interest in the wider study of man.

In the United States, ethnobotany was the subject of many specialized monographs (e.g., Stevenson 1915) in the early decades of the twentieth century, largely resulting from the salvage ethnography attempts by the Bureau of American Ethnology and students in the Boas-Kroeber-Lowie tradition. These monographs typically consisted of two parts: an introductory section, describing the general ecological features of the area, with an ethnographic sketch of its aboriginal inhabitants; and the main section of the report, including a list of the more important plants, i.e., "economically useful plants," found in the region, the "native name" for each of the plants, and a description -- frequently anecdotal and impressionistic -- of the ways in which each was used in ceremonial and secular life. Such information was generally obtained by seeking out native speakers of the language concerned who also remembered the relevant details of social life, which was often no longer a living reality. The search frequently resulted in the use of only one or a few informants (usually aged) who provided all that we will ever know, except what archaeology might tell us, regarding the thoughts, beliefs, and behavior of populations sometimes numbering in the thousands.¹

This reliance on so few informants, and the problems intrinsic to working only with "memory culture," both of which

were unavoidable conditions of research in societies which had undergone radical changes, and sometimes near-extinction, in the nineteenth century, doubtless significantly affected the quality of the data obtained. Two further limitations, moreover, were intrinsic to ethnobotanical research of this kind by the very definitions of the problems they were intended to solve.

The first of these restrictions involved the selection of focus of investigation, i.e., almost exclusive attention to plants which were utilized in "important" ways. Instead of investigating relationships with the plant world in any broad sense, this "classic ethnobotany" showed a much narrower, although legitimate and understandable, concern. In one of the late programmatic papers which sought to systematize research in this tradition, Harrington (1947:244) states the goal of the study of ethnobotany to be to "find out what the natives know about plants." What he meant by this, however, was explained in the following two sentences:

A small part of the study consists in determining the native names of the plants with which the informants are familiar, and the classification of these names. What should be a larger part of the study consists in determining the uses of plants for material culture on the one hand and for food or medicine on the other. [Harrington 1947:244; my emphasis]

Such an emphasis on plant uses, thus on plants which were used, led to research of severely restricted scope, which had prompted Kroeber to comment earlier in a review:

Then there is the question, which is almost always avoided in work of this character, of what

plants the natives might have used but did not.
 ...That four tribes used 170 different plants will
 have quite different significances according as
 the flora of their region numbers 200 or 2000
 species. [Kroeber 1920:385]

Thus, instead of providing comprehensive accounts of knowledge and differential utilization of local plant environments, classic ethnobotany more resembles what has come to be known as Economic Botany.

The second major internal restriction of these studies was rooted in their consideration of the investigation of linguistic and semantic aspects of plant knowledge as only a "small part of the study." Along with Harrington, one of the leading ethnobotanists prior to the 1950's was Edward Castetter, who listed twelve "factors to be kept in mind in carrying out research in [ethnobiology]" (1944:168-169). One of these twelve attended to the "native name" of the organism which, Castetter conceded, "often gives an insight into the tribe's conception and knowledge of the structure, function and method of classification of organisms, as well as into related aspects of the people's ceremonial life" (1944:168). This point was far overshadowed in his exposition, however, by the other eleven considerations, stressing accurate identification (according to the categories of Western science), relative abundance of the organism, parts used by the natives, exact details of the uses, and the like.

For the most part, then, ethnobotany as practiced prior to the 1950's (and as still practiced by many) omitted any intensive concern with the conceptual systems of nomenclature

and classification which underlay the native names sometimes collected. The emphasis was nearly always on what natives did rather than on what they thought.² The result was a large ethnobotanical literature but only sketchy accounts of folk taxonomic systems in those cases where there is in fact any account at all.

The classic ethnobotanists cannot be faulted, however, for failing to do what they had not set out to accomplish. The materials they did produce, furthermore, have proven invaluable to many other concerns in anthropology, such as the tracing of migrations of peoples (e.g., Narrau 1963). The work which has traditionally been signified by the term "ethnobotany" within anthropology, however, is a research tradition which contrasts sharply with later developments, such as are represented in this dissertation. The "New Ethnobotany," as it were, has taken as its major focus of investigation what was only a minor interest in the earlier work, viz., systems of folk classification and nomenclature. This choice of focus may well be in its turn criticized by an even "Newer Ethnobotany" yet to be outlined, for the developments to which I now turn are as much a reflection of mid-twentieth century anthropological concerns as was the "Old Ethnobotany" a product of its time.

The major turning point occurred with Harold Conklin's still unpublished doctoral dissertation, The Relation of Hanunoo Culture to the Plant World (1954). In this work and in subsequent articles, Conklin suggested a new program for the study of man's relationships with his botanical environ-

ment. One of his more recent papers may be quoted here at length, for nowhere else are the ground rules for research of the type represented by this dissertation so articulately expressed:

To provide for an adequate ethnobotanical account of a contemporary community, including a statement of the patterned ways members of that community identify, group, label, and treat the available flora in locally recognized natural context, at least three types of information must be available in easily communicable and (manipulable) form:

1. Floral specification: so that similarities and differences in plant morphology, etc., can be accounted for; this is often expressed initially in terms of systematic botanical determinations of live or herbarium specimens observed and collected in the area;

2. Folk botanical terminology: so that contrasts and assumed classifications reflected in language usage can be tested against plants and their differential cultural treatment; this should be expressed in a way which systematically indicates the relevant phonological, grammatical, and semological distinctions employed in the folk nomenclature; and

3. Plant significance data: so that observed and discussed cultural contrasts in natural settings can be economically recorded and checked against associated folk-segregates (Conklin 1962) and botanical data; unambiguous recording is hampered by incomplete mastery of the relevant folk classification. [Conklin 1967:205-206]

This statement may be seen as a continuation of earlier emphases, specifically in the expressed need for systematic botanical determinations of the local flora and for data regarding plant significance which, for Conklin and myself among others, includes plants which are not used in addition to those which are. In both of these concerns the New Ethnobotany has attempted to provide more comprehensive and systematic accounts of local flora, both as biological and cultural

phenomena.

A major point of difference between Conklin's program and those of earlier ethnobotanists is in the special emphasis on folk classification and nomenclatural systems. This focus reflects a general concern with terminological systems which has suffused American cultural anthropology in the 1950's and 60's under the various labels of "Ethnoscience," "the New Ethnography," "Ethnographic Semantics," and "Cognitive Anthropology"³. This concern, with which the New Ethnobotany is linked in its analysis of folk taxonomic systems, is at the heart of a general quest for the improvement of the descriptive adequacy of ethnography, the foundation of all of social and cultural anthropology.

According to the New Ethnographers (who in fact follow a long tradition in anthropology), a culture is an organized system of concepts, categories and rules or standards -- "standards for deciding what is, ... what can be, ... how one feels about it, ... what to do about it, and ... how to go about doing it" (Goodenough 1961:522; cf. Frake 1964c:112). An ethnography, then, is a model or a theory of a particular culture, i.e., a model of how the world is organized conceptually by a group of people: what things are held to exist, how they are to be distinguished from other things, and what is to be done or not done regarding them. Employing an analogy between language and culture, Goodenough (1957:167) writes of an adequate ethnography as a "cultural grammar" which would allow one to operate in a society "in a manner acceptable to its members, and do so in any role that they accept for any

one of themselves," just as a properly-constructed grammar of a language would enable one to produce, or judge, utterances in a manner which would be regarded as appropriate by native speakers of the language.

One of the first tasks of ethnography, then is to discover -- not presume -- the conceptual domains of a culture, i.e., sets of concepts which are interlinked through the sharing of critical features of meaning. One then proceeds to ascertain the principles according to which the domains are ordered, and the construction of models which will describe this order, e.g., taxonomic models if the concepts are ordered by certain kinds of relations, paradigmatic models if ordered by others, and so on (cf. Kay 1969, 1971). Elaborate terminological systems have drawn special attention as they are seen to provide access to readily-delimitable domains which, being lexically-encoded, lend themselves to rigorous and well-developed techniques of analysis.

The analysis of terminological systems and domains such as kinship, color or plants is not simply a matter of linguistic translation, however. Early ethnobotanists made this error when they collected "native names" of plants, following a procedure which Frake has attributed to ethnographers in general:

The ethnographer typically performs this task by pointing to or holding up the apparent constituent objects of an event he is describing, eliciting the native names for the objects, and then matching each native name with the investigator's own word for the object. The logic of the operation is: if the informant calls object X a mbubu and I call object X a rock, then mbubu means rock....

This procedure for obtaining words for things ... assumes the objective identifiability of discrete 'things' apart from a particular culture. It construes the name-getting task as one of simply matching verbal labels for 'things' in two languages. [Frake 1962b:73; his emphasis]

Frake argues that such an approach ignores the fact that "not even the most concrete, objectively apparent physical object can be identified apart from some culturally defined system of concepts..." (1962b:74). Anthropologists had long ago realized this in the study of domains such as kinship categories, whose referential content or denotational meaning was not to be found simply in "a tribe's words for 'uncle,' 'nephew,' or 'cousin.'" Thus, for any domain, whether kinship or plant categories

An ethnographer should strive to define objects according to the conceptual system of the people he is studying. Let me suggest, then, that one look upon the task of getting names for things not as an exercise in linguistic recording, but as a way of finding out what are in fact the 'things' in the environment of the people being studied. [Frake 1962b:74]

The "things" to be discovered, then, are not "native names" for the investigator's categories, but the categories and concepts of the cultural system under investigation. These and not "trees," "vines" and "herbs" are the relevant things in the environment for the people who think about and manipulate them, and they cannot be assumed to constitute simply "the same world with different labels attached" (Sapir 1929:209). Once the "things" have been so discovered, one can proceed to more meaningful inquiries regarding them, and begin to understand such behavior as plant utilization as a function of cultural

rules operating on cultural categories and concepts.

The achievements of the New Ethnography, aside from its invaluable role in stimulating a wide-ranging rethinking of basic anthropological methodology, have resulted primarily from analyses of limited domains such as plants, with few advances so far in the quest for formal linkages between domains, as would be required for descriptive models of whole cultures (cf. Keesing 1971). Such limited studies, however, have often provided insights into the larger cultural systems of which the domains of focus are parts, as in the present dissertation.

Whatever may be the ultimate evaluation of any particular analysis, moreover, the paradigm of ethnoscience, with its emphasis on culture as ideas and on rigorous formal techniques of discovering and analyzing those ideas, has unquestionably had a far-reaching impact on social and cultural anthropology, at least in the United States. Kinship studies, long relegated to the anthropological doldrums by all but specialists, now sparkle with controversy as geometry, algebra and symbols clash (Reining 1972); color terms, seldom more than curiosa in the past, now are offered by some investigators as evidence for the evolution of the human mind (Berlin and Kay 1969; cf. E.R. Heider 1972); and ethnobiology, for decades only window dressing for discussions of economics, reveals possibly universal structural properties of classification systems which further suggest principles of human cognition (Levi-Strauss 1966, Berlin 1972, Hunn 1973).

Influence is not the same as conversion, however, and perhaps as much energy has been expended on the New Ethnography by its critics as by its proponents.⁴ Some of these criticisms (e.g., Berreman 1966) seem to involve differing tastes rather than substantive methodological or theoretical issues, with accusations that formalization equals dehumanization. Others are addressed to domain-specific controversies, as in kinship studies where the genealogical emphasis of componential analyses is challenged as distorting "what kinship is all about" (Schneider 1972). A number of criticisms are directly relevant to the study of folk taxonomic systems, however, and partly informed the research design of the project reported in this dissertation. These may most usefully be discussed briefly in conjunction with and outline of the assumptions and working hypotheses of the present study, following which the field techniques employed will be described in detail.

Concepts, Assumptions and Hypotheses

Introducing his "science of the concrete," Levi-Strauss states:

It has long been the fashion to invoke languages which lack the terms for expressing such a concept as 'tree' or 'animal', even though they contain all the words necessary for a detailed inventory of species and varieties. But, to begin with, while these cases are cited as evidence of the supposed ineptitude of 'primitive people' for abstract thought, other cases are at the same time ignored which make it plain that richness of abstract words is not a monopoly of civilized languages. [1966:1]

Indeed, ethnobiological research which has gone beyond the collection of "native names" has revealed, in every case

so far examined, the existence of richly elaborate and highly abstract taxonomic systems, leading to the conclusion that man everywhere is "by nature a classifying animal and nowhere is this fact exemplified more clearly than in his classification of the biological universe" (Berlin 1972:53).

In most contexts, men do not respond to animals or plants as individual organisms, but as members of classes of organisms. Thus, the table upon which I am writing was constructed from the wood of an oak tree, but neither I, nor the woodsman, nor the millhand, nor the furniture-maker was concerned with that tree as a unique organism. Rather, we were interested in it as a member of the class of all organisms which shared certain characteristics, the set of all oaks. None of us would likely have attributed an identity to it other than that of "an oak." As a token, it represented the class of oaks, of which it was but one member, just as the class of all oaks together constitute a member of the larger class of all trees. The process of classifying an individual entity as a member of a larger class, and this included in a yet larger class, is the basis of taxonomic systems, and appears to be a universal human cognitive process (cf. Bruner et al. 1956).

Largely responsible for the view that "primitive man" lacks such a facility of abstraction is the often-noted absence of linguistic labels at the highest levels of folk classification systems. Thus, in Ndumba, the conceptual class which includes all of the other classes of plants to be discussed in this dissertation, and which stands in the formal position of "unique beginner," is not habitually labeled by a

linguistic expression which could be glossed 'plant'; yet, I am certain that such a category is meaningful to Ndumba. The absence of a label at this level of abstraction, in fact, seems to be a general characteristic of folk classification systems (Berlin et al. 1973:215).

It is of critical importance in the study of such systems (as well as in drawing inferences about human cognition from them) to maintain a sharp distinction between categories and names. Some of the early attempts to systematize research of this kind (Frake 1961, 1962b; Conklin 1962a, 1962b), while important pioneering efforts in many respects, did not always make such a separation and some confusion resulted with regard to other aspects of these systems. In a major contribution to the formal study of folk taxonomies, Paul Kay (1971) has clearly outlined this distinction and, since his terminology and definitions will be used in this dissertation, it will be useful to summarize his main points before proceeding further.

According to Kay:

The purely formal entity which, under certain empirical conditions, underlies a taxonomy is called a taxonomic structure.... a taxonomic structure is concerned with sets (or classes, or segregates) and the relations among them; it is not concerned with the names these sets may or may not have. In keeping with standard usage, we call the sets ... involved in a taxonomic structure TAXA (singular TAXON). A taxonomy, on the other hand, always involves both a taxonomic structure and also a set of names, and a mapping involving the set of taxa and the set of names. [1971:868; his emphasis]

A taxonomic structure, then, is a relational structure with three components and which satisfies two axioms. The

first component is a finite set of taxa, each taxon itself being a non-null set, i.e., no taxon is without some members. Examples of taxa would be the set of all plants, the set of all trees and the set of all oaks. If the total number of taxa involved in a given taxonomic structure be $\underline{n}$, then the set $\underline{T}$ of taxa may be enumerated:

$$\underline{T} = \{ \underline{t}_1, \underline{t}_2, \dots, \underline{t}_n \} \quad (\text{Kay 1971:868}).$$

The second and third components are relations obtaining among the taxa. The first of these is

the relation STRICT-INCLUSION-OF-SETS restricted to the members of $\underline{T}$. A set $\underline{t}_i$ strictly includes another set $\underline{t}_j$ just if every member of $\underline{t}_j$ is a member of $\underline{t}_i$ and there is at least one member of $\underline{t}_i$ which is not a member of $\underline{t}_j$. The set of plants strictly includes the set of trees and also the set of oaks; the set of trees strictly includes the set of oaks. However, the set of Quercus does not strictly include the set of oaks, although it includes it, since the two sets have the same membership; that is, every set includes itself, but no set properly includes itself.

The phrase 'restricted to the members of $\underline{T}$ ' indicates that we are concerned only with strict inclusion relations among the sets under consideration, not among all imaginable sets. [Kay 1971: 868; his emphasis]

The other relation (i.e., the third component) is that of immediate precedence:

Let $\underline{t}_i$ and $\underline{t}_j$, each of which is a set, be distinct members of $\underline{T}$. We say $\underline{t}_i$ immediately precedes $\underline{t}_j$ just if (a) $\underline{t}_i$ strictly includes $\underline{t}_j$, and (b) there is no other set $\underline{t}_k$ in $\underline{T}$ such that $\underline{t}_i$ strictly includes $\underline{t}_k$ and $\underline{t}_k$ strictly includes $\underline{t}_j$ For example, 'tree' immediately precedes 'oak' because 'tree' strictly includes 'oak', and there is no other plant taxon which is strictly included in

'tree' and which also strictly includes 'oak.' Speaking loosely, one taxon immediately precedes another when the first is 'just above' the second in a taxonomic structure. [Kay 1971:869]

The relational structure consisting of the three components defined above is a taxonomic structure only if it satisfies two axioms. The first is that there is exactly one member of $\underline{T}$, called the unique beginner, which strictly includes every other member (Kay 1971:869). The second axiom involves the notion of partition, which is

a division of a set into subsets that places each member of the original set in exactly one of the subsets. The subsets are called cells of the partition....

Let $\underline{c}(\underline{t}_i)$ stand for the set of all those taxa immediately preceded by the taxon $\underline{t}_i$. For example, if $\underline{t}_i$ is 'oak' then the members of $\underline{c}(\underline{t}_i)$ are 'live oak', 'jack oak', 'red oak', etc. By the second axiom, for any taxon $\underline{t}_i$ in $\underline{T}$, if $\underline{c}(\underline{t}_i)$ has any members, [then] $\underline{c}(\underline{t}_i)$ is a partition of $\underline{t}_i$. This axiom ensures, for a taxon such as 'oak' that HAS subclasses, that (a) each individual oak in the world is in some subclass, and (b) each individual oak is in just one subclass. The second axiom does, of course, allow for the possibility that a taxon has no subclasses in $\underline{T}$. [Kay 1971:869; his emphasis]

Kay offers (1971:869-871) ten definitions and consequences of these, together with the axioms stated above, which are of fundamental importance in the construction of taxonomic models:

1. Contrast Set -- any non-null set consisting of all taxa which are immediately preceded by the same taxon (e.g., jack oak, red oak, etc.).

2. Terminal Taxon -- one which strictly includes no other

taxa.

3. Taxonomic Level -- the level of the unique beginner is, by convention, level 0; any taxon immediately preceded by the unique beginner is at level 1; any taxon immediately preceded by a taxon at level 1 is itself at level 2, and so on.

4. Taxonomic Depth -- the greatest level attained by any taxon in the structure.

Direct consequences of the above axioms and definitions include:

5. Every contrast set contains at least two members and is a proper subset of T.

6. Each taxon has exactly one immediate predecessor, except for the unique beginner, which has none.

7. The fundamental theorem of Kay's theory of taxonomic structure may be stated:

If two distinct taxa have any members in common, then one of them strictly includes the other. That is, any two distinct taxa are either mutually exclusive or in the relation of strict-inclusion. ...It corresponds to the intuitive notion that there is no partial overlap between taxa; either one taxon is totally included in the other, or they have no member in common.... [It] also expresses formally the intuition that taxonomic structures are strictly hierarchic and contain no element of cross-classification. This is the major formal basis for representing taxonomic structures in the standard tree or box diagram. [Kay 1971: 870]

8. A taxonomic structure has no gaps, i.e., it contains at least one taxon at each level, from level 0 to level n, inclusive.

9. The terminal taxa constitute a partition of the taxon called the unique beginner. Thus, in a plant taxonomic struc-

ture, each individual plant belongs to exactly one terminal taxon.

10. Except for the unique beginner, each taxon is a member of exactly one contrast set.

Two of the terms used above -- contrast and level -- require comment before proceeding, since ambiguous use of them has resulted in considerable confusion for some investigators. What Kay means by contrast is operationally defined as follows: "two categories contrast semantically if an assertion using one elicits assent from the informant, while the otherwise identical assertion employing the other elicits dissent from the same informant" (1971:873). Thus, while labels for taxa must usually be employed in such tests for semantic contrast, it is the categories, rather than the lexemes that label them, which should be thought of as contrasting or not. This position is based on the general assumption that:

theoretically significant contrasts in linguistic content are psychologically independent of significant contrasts in linguistic expression, but not conversely. To put it in plain, if perhaps imprecise, terms: We speak in order to communicate thought; we do not think in order to provide content for our speech. [Kay 1971:874]

Some writers have not kept such a distinction clear in speaking of the relation of contrast. Thus, e.g., Frake variously refers to "sets of contrasting categories at successive levels" (1961:117) and "the contrasts of each Subanun disease term" (1961:119). This leads him into confusion when encountering lexemes which recur as labels for different taxa:

The word man, for example, designates at one level a category contrasting with nonhuman organisms. At a more specific level, man designates a subcategory of human organisms contrasting with woman. Subordinate to this we find the contrast: man (adult male) --- boy. Man can even appear at a still more specific level to designate a kind of adult male human, as in Kipling's '... you'll be a man, my son.' [Frake 1961:119; his emphasis]

It is clear in this example that the entities which are in a relation of contrast are the categories or taxa: 'the set of all human beings' -- 'the set of all nonhuman animals'; the 'set of all male human beings' -- 'the set of all female human beings', etc. It is not the label 'man' which contrasts with something else, but, in each case, the taxon labeled by 'man,' a polysemous lexeme.⁵ This confounding of classification and nomenclature later led to more difficulties for the Brights, who ended up speaking of northwestern California Indian folk taxonomies which were "only partly hierarchical" (Bright and Bright 1965:253), which makes little sense in conventional discourse about taxonomies, hierarchical models by definition given the defining relation of inclusion (see discussion above).

A second source of confusion has arisen from the juxtaposition of two separate concepts, those of semantic contrast and taxonomic level, in the phrase "level of contrast" (e.g., see Frake quote above). The use of this expression has suggested to some researchers that any two taxa at the same taxonomic level are in the same kind of contrast relation, or even in the same contrast set. This is not the case, however, since

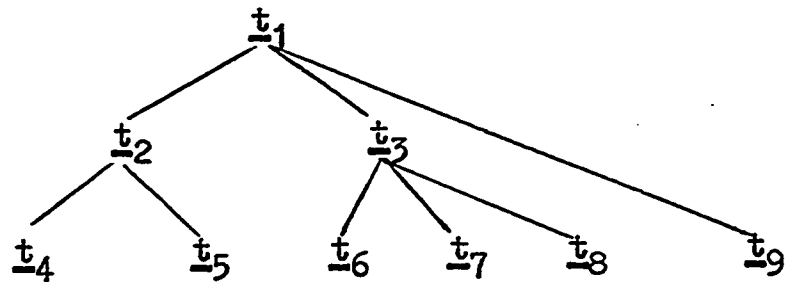
knowing the levels at which two taxa occur gives us very little information about the kind of contrast relations that obtain between them. The level of a taxon merely says how many taxa occur between it and the unique beginner in the chain of immediate precedence that connects them. In particular, two distinct taxa that have the same level may or may not be in the same contrast set ... The expression 'level of contrast', as it has been used in the anthropological literature, is at best ambiguous. In the context of the present formulation, it is meaningless. [Kay 1971:877]

In the hope of avoiding these kinds of confusion, Kay (1971:877-879) suggests definitions for five types of taxonomic contrast:

1. Inclusion Contrast -- the contrast relation obtaining between any two taxa, one of which strictly includes the other (e.g., t_1 , t_2 in Figure 1).
2. Direct Contrast -- obtaining between any two taxa which belong to the same contrast set (e.g., t_4 , t_5).
3. Indirect Contrast -- obtaining between any two taxa which contrast via the two taxa which include them which themselves are in direct contrast (e.g., t_4 and t_6 via t_2 and t_3).
4. Terminal Contrast -- obtaining between any two terminal taxa (e.g., t_4 , t_9).
5. Generic Contrast -- a special contrast relation holding between any two generic taxa (see discussion of Berlin's typology in Chapter IV below).

To complete Kay's formal model of taxonomies, it remains to add to the taxonomic structure a set of names (lexemes), and a mapping that relates the two. Some constraints are introduced in order that the formal structure be general

FIGURE I
HYPOTHETICAL TAXONOMIC STRUCTURE



(after Kay 1971:877)

enough to account for the natural folk taxonomies that have been described (e.g., Berlin et al., n.d.).

Synonymy, which is found in every taxonomy so far described, may be allowed by defining a collection of sets of synonymous lexemes as the counter-domain to be mapped onto the taxa. Covert categories, i.e., lexically unmarked taxa, are accommodated by defining the domain of the mapping not as the set $\underline{T}$ of taxa, but a subset $\underline{T}'$ of $\underline{T}$. Finally, the problem of polysemy is obviated by the fact that "multiple meaning in natural taxonomies appears to be restricted to a special subtype of polysemy with the following property: if a lexeme is polysemous in a taxonomy, its various senses always correspond to taxa which can be arranged in a sequence of immediate precedence" (Kay 1971:881).

It should be stressed again that what has been outlined above is a theory or model of taxonomy which is, of course, subject to modification should it prove inadequate to the task of accounting for natural folk taxonomic systems. Whether that

be the case remains for field researchers to determine, but my use of it in this dissertation acknowledges its general applicability to Ndumba ethnobotany. Kay's paper was not available to me prior to my field research, but much of it had already been formulated by others (especially Conklin 1962a, 1962b; Frake 1961, 1962b), and my confidence that such a model could be constructed led to my initial assumption of the present study, which may now be stated:

ASSUMPTION 1: A domain generally corresponding to the Western concept of "plants" would be discoverable as a part of Ndumba culture.

A further assumption was:

ASSUMPTION 2: This domain of "plants," for any individual and for abstract groupings of the people of Ndumba, would consist at least partly of a set of semantically-contrasting categories ("classes of plants") related by inclusion which would be describable, and subsequently amenable to comparisons, through a general formal taxonomic model.

While there has been no real argument concerning the likely universality of taxonomic structures, since the earliest programmatic papers in the New Ethnography a debate has raged over the issue of the value of rigorous discovery procedures in the investigation of such phenomena. Both sides have been vociferously defended on the question of the degree to which techniques of collecting and analyzing data can, or even should be formalized.

On one side are such researchers as Mary Black and Duane

Metzger. In a paper co-authored by them

the procedures both for gathering ethnographic data and for their storage and retrieval as well have been explicitly formalized, with a strict cost-accounting of the empirical bases for investigators' inferences and conclusions.... for we believe that a formal description of part of a culture is a public scientific document only to the extent that the data on which it is based and the procedures followed in gathering and analyzing them are made public along with the results of the analysis. [Black and Metzger 1965:142_7]

Critics on the other side have argued that such a concern with the methodology of producing semantic analyses, as in some studies of folk taxonomies (e.g., Black 1969), is more "scientistic" than scientific, sacrificing the ethnographer's intuition in the search for "rigorous" avenues to understanding (Berreman 1966:349). Burling suggests that ethnographers follow the example of linguists as they actually go about deriving grammatical or semantic rules, rather than simply attending to the ways they talk about them once they are found; they would discover, he contends, that "the methods by which we work out the rules are, in the end, irrelevant" (1969:822). Elsewhere he states:

One's analysis may be the result of long and painful struggle, or it may be the result of a single flash of insight. What really matters is whether or not the analysis allows us to predict back to the data and to predict additional grammatical or semantic uses of the language. [1970:43-44_7]

There are two separate issues involved here in my opinion, the formalization of data collection procedures, and procedures for model construction. With regard to the construction of models, I unreservedly agree with Burling; as for the collec-

tion of data, my position is unabashedly eclectic. I went into the field assuming that plant categories, their linguistic labels, their referential meanings, and other ideas about them were all potentially discoverable by me, just as they presumably were for any Ndumba individual in the process of growing up. Moreover, I felt strongly that, as they developed, my insights should be somehow testable by myself as well as by my colleagues.

As it turned out, formal techniques devised by others, especially substitution-frame eliciting (described in the next section), provided a crucial means of continually testing and modifying my conclusions, in addition to their power for discovering new data. While formal procedures were in this way valuable, they were not sufficient nor exclusively used in the collection of data, nor in analysis. For example, literally hundreds of apparent plant names came to my attention through chance observations or in myths or in other informal ways which had not occurred as responses in formal eliciting sessions. Upon further inquiry they almost invariably turned out to be legitimate labels for plant categories of whose existence I might otherwise have never become aware.

To the extent possible and feasible, I describe in detail in this dissertation these various means, formal and informal, by which the data of the study were obtained, partly because I believe, with Black and Metzger, that such reporting is a proper accompaniment to the data themselves, and partly because such a public record makes possible a more thorough evaluation of my interpretations and analyses by others. The

description thus results from my resolution in the field to welcome data however and wherever I came by them. The models I have constructed by drawing inferences from these data are doubtless incomplete and perhaps even adequate in some respects. Nor would my study be precisely "replicable" in the sense that another investigator could retrace all of my steps and come to exactly the same conclusions. Indeed, I would hope that he would improve on them, e.g., by increasing the precision of the eliciting queries. Nevertheless, I am confident of the overall validity of my understanding of the domain of "plants" in Ndumba. Toward the end of my field stay I was able to discuss plants with my informants in a manner which they seemed to regard as meaningful and accurate. To the extent that this is what matters -- "whether the model works" -- I regard the description as useful and valid.

Virtually all of the formal techniques employed in semantic analyses, as in the present case, directly involve linguistic data: names for categories, statements by informants about relationships, and the like. Indeed, the primary theoretical and methodological motivation has largely been derived from advances in structural linguistics (cf. Williams 1966). Some investigators, however, have overstressed the concern with verbal data, as in a statement by Perchonock and Werner:

Ethnoscience is concerned solely with classificatory principles as they are expressed by native speakers of the language, not as they are determined through anthropological investigation. Ethnoscience is interested in the speaker's knowledge of the various domains within his cul-

ture, not in his actual behavior in these domains.
 [1969:229]

Such extreme statements have understandably been perceived by critics as drawing too narrow a focus since

social and cultural anthropology enjoys a more ample scientific mandate than the study of what people say they will say. There remains the question of what they say they will do, and of the relationship between these sayings and the nonverbal happenings of history. [Harris 1968:589]

These critics, and some of the practitioners of ethnoscience, are often guilty of mistaking a route for a destination (Hymes 1970:300). Indeed, it is only one of the routes followed, for New Ethnographers also take censuses, measure gardens, take aerial photographs, ... -- in fact, pursue any means available "through interview, observation and, when possible, experiment, to discover some part of the system of meanings by which people organize the world" (Kay 1970:19). Whatever else they do, however, they also do semantic analyses of verbal behavior, for while the

analysis of a culture's terminological systems will not, of course, exhaustively reveal the cognitive world of its members, ... it will certainly tap a central portion of it. Culturally significant cognitive features must be communicable between persons in one of the standard symbolic systems of the culture. A major share of these features will undoubtedly be codable in a society's most flexible and productive communication device, its language.
 [Frake 1962b:75]

One of the untapped portions of cultural domains consists of those categories which are not lexically labeled, whose importance was suggested by Keesing (1966:23) among others,

and have been discovered in natural folk taxonomic systems (e.g., Berlin et al. 1968). In order to include such possibilities in my investigation, but acknowledging the richness of language as an encoding system which could be used by myself as well as by Ndumba, I began with a third assumption:

ASSUMPTION 3: Most, if not all, Ndumba plant categories would be lexically labeled and relations among them verbalizable, thus discoverable by me through tools developed in semantic analyses of language.

Within the general rubric of linguistic phenomena, a limitation has traditionally been self-imposed by semantic ethnographers, and is so imposed in this study. In an early programmatic paper on the semantic analysis of kinship terms, Goodenough stated:

The aspect of meaning to be dealt with is signification as distinct from connotation.... the significatum of a linguistic form is composed of those abstracted contextual elements with which it is in perfect association, without which it cannot properly occur. Its connotata are the contextual elements with which it is frequently but less than perfectly associated. Significata are prerequisites while connotata are probabilities and possibilities. Only the former have definitive value. [1956a:195; my emphasis]

With respect to this aspect of meaning, terminological systems may be regarded as collections of those linguistic expressions "whose denotata make it appear on inspection that there may be some common element in their significata; which is another way of saying that they appear to relate to the same general subject matter" (Goodenough 1956a:198). In other words, kinship terms or plant names, in their denotative func-

tion, can reveal to the analyst the partitions signified by them in the domain of interest. It is these partitions which are the main concern of the investigator, hence the emphasis on the significative aspect of verbal expressions and the phenomena they denote.

This is not to say that connotative meaning and metaphorical usages are of no importance; indeed, a complete understanding of plant naming behavior probably requires such a broadening of focus (cf. Rosaldo 1972). They are excluded in the present study, as in others, in the interest of confining the tasks of analysis within reasonable limits, as well as in the interest of analytical clarity. By the same token, considerations of homonymy are not included in order that the discussion be kept within the bounds of a single domain to whatever extent possible (cf. Wallace and Atkins 1960:66-67).

My interest in Ndumba verbal behavior, then, was primarily related to expressions as they were used to denote empirical phenomena ("plants"), which could be interpreted as instances or tokens of underlying conceptual plant categories. It was the categories themselves, and statements that could be made about relations among them, rather than the lexical expressions (which might properly occur in other contexts as well), which constituted the focus of the study. Stated in other terms, I proceeded under

ASSUMPTION 4: The referential content of Ndumba plant categories would be discoverable and specifiable through attention to the denotative meanings of lexical expressions, and through the performance of naming tasks by informants.

Brief mention should be made here of a controversy that has arisen in semantic analysis, and that is the debate over so-called "psychological reality." When the program of the New Ethnography was being put forth, the goal was often stated in cognitive terms. For example, in discussing the objective of formal analyses of kinship terms, Goodenough phrased it as getting to "the subjective world of form as it exists in what, for lack of a better term, we must call the minds of our fellow men" (1957:173; my emphasis). Frake, speaking more generally of the goal of ethnography, put it more graphically as, "we must get inside our subjects' heads" (1964b:133). The concern with culture as meaning thus led to an interest in "how the natives think," and the formal models produced by the analyst were then viewed as potential tracings of decision-making and other cognitive processes, hence the frequently used term, "cognitive anthropology."

With regard to paradigmatic models of kinship, however, the point was raised early in the endeavor that alternative models could account for the same observed phenomena (Wallace and Atkins 1960:75-79). That is, in defining kinship terms as signifying combinations of semantic attributes (sex, relative age, generation, etc.) with differential values on those attributes (male, female, older, younger, etc.), a number of equally predictive models were logically possible, varying in their employment of one set of attributes rather than another. The imputation of any of these particular choices of attributes and values to the informant, then, seemed a gratuitous assumption, raising the question: "when an anthropologist undertakes

a semantic analysis, is he discovering some 'psychological reality' which speakers are presumed to have or is he simply working out a set of rules which somehow take account of the observed phenomena?" (Burling 1964:27).

Advocates of the formal analysis of kinship terms were quick to respond, pointing out that careful field procedures and recourse to other linguistic and observational data in effect ruled out many of the logically possible alternatives and that, through his intimate familiarity with the system at hand, the analyst could judge some models as likely to be more "psychologically real" than others, although not all of the indeterminacy could be removed (cf. Hymes 1964).

The controversy has by no means been resolved; rather, most analysts currently pursue one of two courses. Some seek corroborative support for their models from independently-administered tests (e.g., Romney and D'Andrade 1964, Wallace 1965). Others concentrate on developing means for evaluating alternative models on purely formal grounds as explanatory devices, implying nothing directly about cognition or what might be "in the native's head" (e.g., Hammel 1970).

In my opinion, the imputation of "psychological reality" to folk taxonomic models is less problematic. An ordering of categories by the contrast relations described in an earlier section is not simply one of many models which would account for informants' statements such as 'x is a kind of y,' 'w is different from x, but both are kinds of y,' etc. Indeed, I can think of only one other type of model which would account equally well for statements of this sort, and that would con-

sist of a simple listing of all such statements, which would presumably have to be learned by rote at some point in the informant's life. The ease with which my only literate Ndumba informant responded to the task of constructing and manipulating tree diagrams, as well as extensive interviews with him and others about 'big names' and 'little names' and the notion of inclusion, all lead me to believe that a taxonomic model graphically displays conceptual linkages among categories that are "in the native's head."

Upon asking an informant, for example, 'Is x a kind of y?' and receiving the answer 'Yes,' it was not difficult to elicit the further information that 'x possesses certain characteristics and anything that possesses these is also a y.' While the sets of characteristics themselves were extremely difficult to elicit, such statements seem to lend support to the attribution of a model which represents these relations formally to the informant. Paradigmatic models, on the other hand, depicting such characteristics (features) and their values as might account for the formation of categories x and y, would be subject to the same kinds of problems as referred to above in connection with models of kinship and other domains. In this dissertation I will not attempt to construct paradigmatic models of plant categories, but restrict myself to taxonomic models of relations among categories. It is in this restricted sense that I discuss "what the natives think." To the extent that it is unjustifiable to attribute to the informants themselves the taxonomic models produced herein, to that extent are the interpretations based on such an attribu-

tion weakened. This possibility is a potential qualification to the validity of the discussions to follow.

For the purpose of clarifying this position in the context of what follows, a fifth assumption of the present study can be stated:

ASSUMPTION 5: Taxonomic models constructed on the basis of informants' statements and other behavior constitute valid representations of conceptual categories and relationships among them that, consciously or unconsciously, exist in the minds of the informants.

I have already discussed at greater length in Chapter I above the long-standing emphasis in ethnography on the description of cultures as supra-individual entities. It remains here to relate that discussion more directly to the present research project, and the articulation turns upon what I regard to be the inherent limitations in a view of cultures as collective constructs.

Viewing a culture as an ideational system, the descriptive task has generally been conceived as one of proceeding from performance data -- observable behavior, whether verbal utterances or nonverbal acts -- to the construction of a competence model: the "rules, maps, and plans" which underlie and, in some sense, inform performance (cf. Chomsky 1965:4, Keesing 1970:441). Just how competence relates to performance is far from clear with regard to linguistic behavior, let alone nonverbal acts such as selecting a tree for house construction material, or composing a household. The problem becomes even

greater when, in conventional ethnography, the loci of observed behavior (performance), i.e., individual informants and observed actors, are different from the locus of the competence model, i.e., a hypothetical "omniscient culture-bearer" (cf. Chapter I above).

This disjunction between the locus of behavior and the supposed locus of the conceptual structure which is offered to account for the behavior is most apparent when variability in individual performance is seriously attended. Ethnography which seeks to construct "composite" models of culture is forced to regard such variability as "informant error" which, perversely, verifies the "real system" (Cancian 1963), or as "deviations" comparable to ungrammatical sentences in speech behavior (Burling 1969:823-824). Neither approach to variability, however, has suggested how such exceptions might be produced by an "ideal speaker-hearer-actor" who, in his omniscience, presumably should know better.

Moreover, recent research in ethnosystematics indicates that variation is too ubiquitous to be entirely explained as informant errors or exceptions. Thus, Rosaldo reports that, with regard to Ilongot naming of plant specimens

the amount of variation was striking. Plants used only in spells, like orchids, might be identified by one or as many as 13 different labels. Informants not only disagreed with one another but were often at variance with themselves. Understood as labels for objective segregates, names were clearly inconsistent. [1972:86]

It seems potentially more useful to me to re-evaluate the procedure by which we abstract a constant culture from

variable behavior, recognizing it as a process of distortion. Thus, the failure of any Dani to come close, in individual lexicon, to the number of sweet potato names in their pooled knowledge, led Karl Heider to raise the question

How many names does any individual control? Is it possible that in most reported cases [of "names for sweet potatoes" in Highland New Guinea cultures], several botanical micro-dialects are being inadvertently lumped together to produce a large total of names? [1969:79]

I would answer Heider's query by suggesting that not only is it possible that such "lumping" has occurred in ethnobotanical studies, but that it has not been inadvertent at all. Rather, it is an established procedure in describing cultural domains as "composite models" (cf. discussion in Chapter I above).

The variable performance of informants is less mysterious when one considers that not only is there "no reason to assume that all native speakers have the same semantic models 'in their heads'" (Keesing 1966:23; cf. Harris 1968:585-586), thus no reason to expect their behavior to be the same, but furthermore, there is no reason to expect native speakers to have the composite model "in their heads."

Carried further, it might then be more useful to consider the notion of "a culture" not as the competence model of an "omniscient informant," but as a system of competence models, internally variable and ambiguous but, because of these very qualities, productive of variable performance (cf. Wallace 1970:22-24, 27-36). The task of doing an adequate ethnography would then become one of describing the ambiguity and variability of the system and the organization of the variability

rather than abstracting out its very essence in the search for a neater, but inadequate, amalgamation (cf. Harris 1968: 586).

A decision as to the potential utility in viewing culture as an "organization of diversity" (Wallace 1970:27-36) must ultimately be based on empirical studies which focus on the variability and diversity of performance (i.e., behavior) and the possibility of comparable variability in the underlying cognitive models of those who perform. The research reported here is offered as one such empirical study, incorporating informant variation, disagreement and ambiguity as direct concerns in the task of describing the domain of "plants" in Ndumba culture.

On the basis of the experiences of others who have conducted ethnobiological research, I expected to find individual variation in responses by informants to such tasks as naming of plants and statements of relations among plant categories. Systematic recording, investigation and analysis of such variable performance, I felt, might then suggest underlying variation in conceptualizations of the plant world held by individual members of Ndumba society.

Presumably, moreover, in a relatively small face-to-face interaction society such as Ndumba (selected partly on the basis of its conformity to this general character), the requirements of communication and some stability in social interaction would constrain such variability within limits. These necessities, together with a common experiential base,

would then likely serve to derandomize variations in cultural competence, and would be indicated by discoverable patterns or regularities in the observably variable performance. Such patterns might then offer a new perspective on the ethnographic problem of informant disagreements and inconsistencies. Rather than representing "errors" or "imperfect knowledge" of the system, varying conceptual models of the Ndumba plant world might be better interpreted as constituting "the system" itself (cf. "partial equivalence structures" in Wallace 1970).

The above can be stated more concisely as the sixth, and final, assumption of the present study:

ASSUMPTION 6: Observable variation in performances by individuals of tasks related to plant categories could, to some degree, be considered to reflect variation in individual cultural competence in that domain. This variation would not be totally random, but patterns and regularities would be identifiable and at least partially explainable in socio-cultural terms.

Few systematic empirical studies of individual variation had been reported prior to the present project. Those which had, however, provided a number of leads as to the kinds of regularities or patterns in variation which might be expected in knowledge of such a domain as "plants," and some of these were operationalized as working hypotheses of the Ndumba project.

The phenomenon of conflicting statements by different informants, or even inconsistencies in the statements made by

the same informant at different times, is well known to every ethnographer, but has less often been examined in detail than simply noted or, more frequently, brushed aside as an inevitable frustration in getting at "the real culture." In those cases where variation in verbal behavior has been investigated and explanations attempted, two major lines of inquiry have been identified by Sankoff (1971), which she calls "sociolinguistic" and "cognitive."

The first of these accounts for variation "in terms of a number of situational or contextual factors, such as the nature of the speaker's audience, his aims in making a particular claim, or the formality of the occasion" (Sankoff 1971: 390). This kind of analysis, which she calls sociolinguistic, "considers variation as a surface-level phenomenon of expression, for it focuses on the sociological aspects of speech events and assumes that everyone shares the same cognitive model and simply expresses ideas differently as a result of various situational and social constraints" (Sankoff 1971: 390).

Several studies have demonstrated the influence of contextual or situational factors in the variable assignment of kinship terms to individuals (e.g., Tyler 1966), and much of the variation in Ilongot naming of plants seems to be related to different contexts in which they are used (Rosaldo 1972). Following this line of investigation, one of the working hypotheses developed for the present study may be stated:

HYPOTHESIS 1: Variable responses by different informants

assigned the same task (naming a plant specimen, stating a relationship between plant categories, etc.), or variable responses by the same informant over different trials of the same task, are a function of varying physical, social, or linguistic contexts in which the task is performed.

Confirmation of such a hypothesis would support, although it could not verify, the postulation of a shared conceptual model of the plant world, but one which allows for different statements to be made about a given category, depending upon the context in which they are elicited. Thus, for example, the following set of responses could have occurred in Ndumba:

Q. (Pointing at a bird sitting on a nearby branch)

Nraave? 'What is that?'

R. qIcgieve! '(a bird called) qioqio!'

Q. (Pointing at the same bird, but within hearing range of a young woman named qIcgieve, who stands in a name taboo relationship with the informant)

Nraave? 'What is that?'

R. Kurive! 'A bird!'

Q. (Pointing at the same bird, which has now flown too high to be seen clearly)

Nraave? 'What is that?'

R. Kurive! 'A bird!'

Since the field techniques I intended to employ in Ndumba involved the strictest practicable controls in data eliciting contexts, I had to be prepared for the eventuality of variable

informant responses which could not be explained in sociolinguistic terms. A second approach, which Sankoff calls the cognitive, allows for the possibility that

variation in verbal expression represents real differences in individual cognitive maps of the content of the discourse, rather than simply the influence of the social situation. This second line of explanation ... treats variation as resulting from a lack of congruence among speakers' individual cognitive models. [1971:390]

Regarding this deeper level of variability, in what might be termed different individuals' knowledge concerning a given cultural domain, the notion that members of a society vary among themselves is too much a truism for the simple demonstration of that fact to be a startling revelation in and of itself. Moreover, the existence of patterns or regularities in such variation and its counterpart, similarities -- in what might be phrased as the distribution of knowledge in a community -- has often been assumed if seldom investigated in detail, as has the general nature of these patterns, leading ethnographers to choose their principal informants from among those who are likely to "know the culture best" (cf. Chapter I above).

In designing the present research project, then, I began with propositions that seemed intuitively obvious to anthropologists: that individual members of a society differ in their particular "cognitive maps" of the world (some kind of aggregate of these being what is usually signified by "the culture" of the group); and that these different cognitive maps are not totally unrelated or irreconcilable but are, as

it were, fairly regular "variations on a theme." The task I set for myself in going to Ndumba was to select a particular cultural domain (that of "plants") and, using a manageable number of informants, determine how in fact individuals' conceptualizations of that domain differed and similar, what patterns of difference and similarity could be found, and how these might be explained.

In operationalizing this task it seemed, on the basis of empirical studies and general understandings of the nature of socio-cultural phenomena, that two principal kinds of patterns might be likely: (1) those which have to do with the individuals themselves, as occupants of various positions within the society; and (2) those which are related to the substantive content of the domain itself, its constituent parts being variable in their relative cultural importance to the people who must think about and deal with them. With regard to these expectations, two working hypotheses were developed.

In any society, it would be reasonable to suppose that motivations, values, beliefs and knowledge must be shared to some extent by all of its participants in order that the mundane business of social living can be carried on at all. As Goodenough expresses it:

People who deal recurringly and frequently with one another develop expectations regarding the manner of conducting these dealings....

The people who deal with one another and who have these expectations of one another do not necessarily agree on all the details of what they expect in their mutual dealings. But the

variance in their individual expectations must be small enough so that they are able to accomplish their purposes with and through one another reasonably well most of the time. [1970:98-99]

One might, then, speak of a "core" of a culture -- in the present case, of that domain which has to do with plants -- to which all members of a society must have immediate access, presumably in their heads, in order for them to efficiently anticipate and interpret the behavior of their fellows, as well as to behave appropriately themselves.

It is also reasonable to suppose, however, that the same social expectations do not apply to all members of a society. Children, for example, would seldom be expected to know as much as adults, and it seems to be true that among Tzeltal at least, "with increasing age comes an expansion of the individual's repertoire of cultural information ... relating to plants" (Stross 1969:9). Similarly, to the extent that a division of labor requires differential performance by a member of a particular age group or sex, or a person with special talents or abilities, thus might differences in cognitive maps be not only tolerable, but serve in a system of complementarity (cf. Wallace 1970:34-36).

Finally, differences may occur and persist among individuals' conceptualizations of a given domain, not because of age or sex or role allocations, but because some variation is inevitable, although subject to indirect constraints. Thus, because of socialization patterns, more, less, or simply different information may be transmitted in one family than in another, as in a case cited by Rosaldo: "when two men called

one plant by different names and I asked for an explanation, they answered that each had learned the words from his own father -- of course they didn't agree!" (1972:86). Or, differences in personal experience, indirectly resulting from these other social factors, might result in opportunities to learn more, or conversely, restrictions on what one can learn. Bulmer attributes the relative lack of knowledge of birds among Kyaka Enga men (as compared to that of men in other Highland New Guinea societies) at least in part to the fact that they "do not on the whole travel any very great distance, but spend almost all their time in the very limited territories of their own clan and its immediate neighbours, which limits the number of species of which they can have first hand knowledge" (Bulmer 1957:229).

The above considerations led, then, to a hypothesis which might account for individual differences in cognitive maps of a domain such as "plants":

HYPOTHESIS 2: Variation among individual conceptualizations of the plant domain in Ndumba is less substantial than agreement among the individual "cognitive maps." What variation does exist is patterned among individuals along lines of age, sex, division of labor, and other specifiable social factors.

Thus, with respect to such matters as size of individual plant name lexicons, or assignment of specific names to plants (indicating familiarity with the category of which it is a referent), women might exhibit a pattern of knowledge as shared more among themselves than with men; or the degree of

comprehensiveness of individual lexicons might accord with a direct age gradient, and so on.

In addition to regularities in the ways individuals differ from each other in their conceptualizations of the plant world, it would also seem possible that the variation would center on some plants more than on others. That is, there might be a substantial number of plant categories about which there is virtually total agreement across all informants: with regard to their existence, their taxonomic relationships, their linguistic labels, and physical features by which they recognized. Most of the individual variability in knowledge, then, might involve only an identifiable subset of plant categories, whose ambiguity is reflected in variable statements about them and applications of their names to plant specimens. This ambiguity, furthermore, might be directly related to the differential cultural importance of the categories in question, rendering variation in knowledge of them inconsequential in actual fact.

Goodenough has noted with regard to the Trukese that the amount of variation they accept in one another's behavior differs from one subject matter to another and from one kind of situation to another. For some subjects and situations, they are concerned to reduce the variance as much as possible and to achieve a sense of agreement as to what the standards are. They want no misunderstanding.... Where concern is high, the standards become explicitly formulated as precepts. [1970:99-100]

Similarly, Harris, who elsewhere (1970) has argued for the existence of cultural domains whose most salient character-

istic is their ambiguity, earlier suggested that "in certain adaptively crucial areas of behavior, it must be assumed that natural languages possess a hard core of intersubjectivity" (1964:158).

It seemed justifiable to presume that in a horticultural society directly dependent on plants for many of their needs, such as Ndumba promised to be, the selection of the domain of "plants" for a study of individual variation would be especially felicitous. It would likely be an "adaptively crucial" domain, and eminently subject to these kinds of pressure on sharing of knowledge.

In the first place, an association between the cultural importance of a domain and the degree of terminological elaboration regarding it has long been postulated. Sapir, e.g., suggested that

One who is not a botanist, or is not particularly interested for purposes of folk medicine or otherwise in plant lore, would not know how to refer to numberless plants that make up part of his environment except merely as 'weeds,' whereas an Indian tribe very largely dependent for its food supply on wild roots, seeds of wild plants, and other vegetable products, might have precise terms for each and every one of these nondescript weeds.
[1912:229]

In psychological terms, the argument has been put that perceptual categorizations which are used with high frequency, as would be the case in "important" plants which would be collected or otherwise manipulated often, have a generally greater "availability" (Brown and Lenneberg 1954:455-456) or, as Werner has phrased it:

frequently used items [of information] tend to be more in focal awareness and hence more easily accessible than little-used items. Items ... are moved up to a more focal position every time they are used for retrieval or in deductions. [1972: 296]

The same idea was expressed by Fraake in terms of communication requirements in that

the greater the number of distinct social contexts in which information about a particular phenomenon must be communicated, the greater the number of different levels of contrast into which that phenomenon is categorized....

... [Thus] if the botanical taxonomy of tribe A has more levels of contrast than that of tribe B, it means that the members of tribe A communicate botanical information in a wider variety of socio-cultural settings. [1961:121-122]

In fact, several ethnobotanical studies have produced evidence which supports this line of argument regarding the higher cognitive salience of culturally important plant categories. In his developmental studies, Stross (1969) found that the general pattern of age-linked learning of progressively lower level plant taxa and their names was subject to qualification primarily because the names for the most important Tzeltal plant categories were learned early regardless of their taxonomic levels. Also in Tzeltal, plant categories of highest cultural importance tend to be labeled with linguistically simple lexemes, following a sort of Zipf's Law (Berlin et al. 1973; cf. Brown and Lenneberg 1954:455). A final example from Tzeltal may be cited in a study of cognates in Tzeltal and Tzotzil, which are known to have descended from a common parent language. The highest percentages of

cognates were found in the names for the more important plants, leading to the conclusion that "names for plants of high cultural importance represent the most conservative names in the ethnobotanical lexicon of the two languages" (Berlin, Breedlove and Laughlin 1970:16).

Aside from the Tzeltal data, Rosaldo has suggested that, so far as variation in Ilongot naming of plants is concerned

the amount of lexical variation corresponds to the importance and stability of contrastive contexts. Words make distinctions as contexts require; reference becomes stable only when it is necessary that a particular discrimination be made....

... The magical practitioner has no need to discriminate kinds of orchids; he uses orchid names largely to signify the number of plants in his set.... On the other hand, the distinction between poisonous and edible peas cannot be loose or ambiguous. In cases like this, there is no question about the well-known referents of names.
[1972:87; her emphasis]

These considerations led to my expectation that in Ndumba, the ambiguity, inferred from variability in informants' knowledge, of plant categories would be directly related to their respective cultural importance. Thus, those plant categories which were most important would be learned (along with their names) early in life, communicated about frequently, their referents encountered often, and, for these reasons, ambiguity about them would be subject to many opportunities for clarification. On the other hand, those plant categories of least importance would be learned largely by chance, seldom discussed, and instances of them seldom encountered or noted; the result would be that these ambiguous categories would have little chance of clarification, with

variable understandings of them persisting largely because such variance is inconsequential.

The third working hypothesis of the Ndumba project may thus be stated:

HYPOTHESIS 3: Assigning each Ndumba plant category a "cultural importance score" on the basis of its uses as stated by informants and observed in practice, and an "ambiguity score" based on variable knowledge of its label and inconsistent applications of the name, a direct relationship obtains between the two scores indicating that individual variability in knowledge of a plant category is a function of the importance of that category in Ndumba society and culture.

On the other hand, such an argument as the above may miss the mark. While not phraseable as a hypothesis, except as the negative form of the above, Levi-Strauss and others have argued for a non-utilitarian explanation of elaborate folk taxonomic systems. Levi-Strauss suggests that "the universe is an object of thought at least as much as it is a means of satisfying needs" (1966:3) and that "animals and plants are not known as a result of their usefulness; they are deemed to be useful or interesting because they are first of all known" (1966:9). Thus, classifying "has a value of its own," which is to satisfy a "demand for order" (1966:10).

Following Levi-Strauss, Wijeyewardene, in his discussion of rhinoceros-beetle fighting in Northern Thailand, concludes that the use of such an "apparently trivial piece of knowledge about insect ethology" represents a "quirk of folk knowledge...

acquired through man's generalized innate inquisitiveness" (1972:198-199). Such a non-functionally-based curiosity, he argues, leads man to gather

a catchbag of facts about nature, such acquisition being an exercise which gives pleasure for its own sake. Sometimes such knowledge is directly adaptive.... At other times knowledge could be really useless, or a piece of relevant knowledge might not be acquired. [1972:199-200]

Should such a view of folk classification systems be correct, its empirical consequences were difficult to anticipate except for the possibility that a considerable number of such "junk knowledge" categories and names would be discovered. But operationally distinguishing such "quirk" categories, whose referents have no discernible use, from those which exist and are named for perhaps historical or other reasons, is not an intuitively obvious procedure. Both kinds of categories might well be variably known except that, if Levi-Strauss and the others are right, much "junk knowledge" might also be shared, since it would presumably be discussed and taught as well as the more directly "useful" knowledge. The effect of such a view, at the inception of the research, was to make me cautious in my determinations of "cultural importance," as will be discussed below, for is not a plant category whose sole purpose is to satisfy a "demand for order" thus culturally "important"?

Field Procedures and Techniques

In my investigation of individual variation in botanical knowledge in Ndumba, five principal procedural tasks required

attention: (1) delimiting the cultural domain of "plants"; (2) selecting a sample of the study population; (3) eliciting names for plant categories and statements of their semantic relationships, from which to construct folk taxonomic models; (4) determining the referential meanings of the plant names; and (5) obtaining information on uses and other ideas associated with the plant categories and names.

It would be misleading to imply that these five tasks were accomplished in the sequence shown. To the contrary, all were interrelated, and conclusions from each were continually feeding back to the others, suggesting new lines of inquiry and interpretation in a dynamic which continues even now that the field research is completed. For purposes of exposition, however, these five aspects of the study may be discussed separately.

(1) Delimiting the cultural domain of "plants." As has already been mentioned in an earlier section, one of the first tasks in semantic ethnography is to discover the conceptual domains of a culture. Basically, what is meant by a domain is a system of concepts in a culture, interlinked through the sharing of critical features of meaning; i.e., they all have to do with "the same subject matter."

Ethnosemanticists have often insisted upon the need to discover, rather than presume, cultural domains, but it has never been entirely clear by what formal procedures one might do this. It is clear, on the other hand, that they are rejecting the arbitrary restriction of one's consideration to those phenomena which seem to "go together" in Western cultur-

al categories or under the rubrics of ethnology. Such pre-somptions, as Hallowell and others long ago warned, can lead to such distinctions as "natural/supernatural" which may not be meaningful in a given culture.

In actual practice, even the most rigorous methodologist begins his inquiries with Western categories, viewed as heuristic devices which can be discarded after initial data are obtained. It is from these data, and systematic probing on the basis of them, that the boundaries of the domain under investigation are revealed as he proceeds (Black and Metzger 1965:141-142).

Thus I began my research assuming that my own cultural domain of "plants" would have a counterpart in Ndumba culture. I did not assume that the categories of the two systems, nor the beliefs associated with them, nor their empirical boundaries, would be isomorphic. My only assumption was that 'plants' would be a culturally meaningful gloss for my informants as it was for me, and nothing that I observed or otherwise learned in fifteen months there has convinced me that I was mistaken.

Indeed, some evidence may be cited to directly support the postulation of such a domain in Ndumba culture. For example, in the course of discovering over one thousand lexemes which were subsequently validated as plant names, I never encountered uses of these expressions as labels for anything which I would not consider to be plants, except as they were also used to name products of those plants (e.g., sa'tari, which may be glossed 'tree or shrub' or 'wood'). By the same

token, nothing I considered to be plants, except for 'mushrooms and bracket fungi' (toza), was ever labeled with a lexeme which could not be meaningfully inserted in the elicitation frames in the same ways as could plant names.

Furthermore, in the course of slip-sorting tests with my only literate informant (Kwaa'keso) in attempts to derive "covert categories" (cf. Berlin et al. 1968), his performances consistently indicated just such a category which, although not labeled, may be glossed 'plants' (with the exceptions noted). I explained to Kwaa'keso in Neo-Melanesian ("Pidgin English") that I wanted him to read some slips of paper upon which I had printed Tairora lexemes whose rough glosses I was sure of by this time (December 1971). He was then to sort them into piles according to things which 'go together' or 'are similar' or 'are brothers,' all of which were phrasings he had himself offered on plant collecting trips when I would ask whether two particular plants were identical. The sixteen slips read:

<u>faahi</u>	'rat'	<u>mauna</u>	'herb'
<u>fai</u>	'marsupial'	<u>muso</u>	'grass'
<u>hovu</u>	'star'	<u>naam'bu</u>	'water'
<u>qia'vaati</u>	'man'	<u>nraase</u>	'woman'
<u>qikau</u>	'stone'	<u>sana</u>	'vine'
<u>kaapa'raara</u>	'snake'	<u>sa'tari</u>	'tree'
<u>kuri</u>	'bird'	<u>to'vendi</u>	'insect'
<u>mmaata</u>	'soil'	<u>toza</u>	'mushroom'

During practice runs in which he was asked to sort actual objects into piles (sweet potato tubers, dishes, feathers,

books, tomatoes, etc.), I discussed with him the conclusion he had reached independently, viz., that the same things could be sorted in many different ways. I then suggested that he sort the slips in the way he had distinguished similarities and differences among plants in the forest with me, or other objects on other occasions. Trying not to suggest to him any particular criteria to use, I then allowed him as much time as he liked as he shuffled the slips back and forth, changing his mind frequently. The first sort he produced with which he was satisfied was one including five piles:

'man'	'rat'	'grass'	'soil'	'star'
'woman'	'marsupial'		'stone'	
	'bird'			
	'mushroom'			
	'herb'			
	'tree'			
	'vine'			
	'water'			
	'snake'			
	'insect'			

I then asked him to sort the slips again, making fewer piles; he responded by placing 'grass' in pile 2, and left it at four piles. He claimed to be unable to sort into any fewer piles than these four, and, suggesting to him that I try as an experiment in my understanding of Tairora, I arranged the slips in three alternative arrangements of four piles each, asking him to indicate the arrangement which was 'most

correct.' The alternatives consisted of placing all slips with "plant names" in the same pile with 'grass' and then varying the position of 'mushroom,' in two cases placing it with the "plants" and once with the "animals." He unhesitatingly rejected the two arrangements with 'mushroom' placed with "plants," and chose the following as the 'best of all' sorts:

'herb'	'bird'	'soil'	'man'
'grass'	'insect'	'stone'	'woman'
'vine'	'rat'	'star'	
'tree'	'snake'	'water'	
	'marsupial'		
	'mushroom'		

While repeated efforts failed to elicit the criteria by which Kwaa'keso determined these groupings (none of which was claimed to have an all-inclusive name), throughout all of my slip-sorting sessions (about a dozen) in succeeding months, he was able to state reasons for groupings within groupings; e.g., 'soil' and 'stone' were 'the same thing, except stone is hard.' The larger groupings, especially when I later conducted tests for "covert categories" within 'trees' and 'herbs' (see discussion below), seemed consistently to be based not on general similarities, but on a kind of "chain" effect. Thus, x might be placed with y because the leaf shapes of the two were similar, and y with z because the stems were thick on both, while x could not be clearly related to z on the basis of any single feature (cf. Hunn 1973:115-116 for similar

"chaining" in Tzeltal folk zoology).

The Tairora language does not contain such features as numeral classifiers, which in Tzeltal have made the demarcation of a domain of plants formally more justifiable than is my reasoning on the basis of the kind of information presented above (cf. Berlin et al. 1968:219). Nevertheless, the evidence so far cited could be augmented with more informally-acquired information which supports my postulation of such a domain in Ndumba culture. Aside from its exclusion of most fungi (while it does include some fungi, bryophytes, algae and lichens), the domain "plants" in Ndumba corresponds quite closely with what Westerners usually mean by that term. These outlines were not totally clear, however, until the content could be filled in -- a task requiring great effort under any circumstances, which was raised to at least the tenth power by my systematic use of a controlled sample.

(2) Selecting the sample. In researching the matter of individual variation, as I have stated earlier, the point was not simply to show that informants vary in their behavior or knowledge. Rather, it was to discover consistencies or patterns in such variation, and to do so required the use of the same group of informants throughout the research period. By focusing on specific individuals and asking them to answer precisely the same questions, perform identical tasks, and in every other way possible to provide comparable data, I believed that I would gain a more accurate perspective on variation in knowledge than would be the case had I employed a few

"key" informants augmented by whatever other individuals happened to be present on given occasions. Furthermore, employing the same informants throughout the project enabled me to get to know them as individuals, with an appreciation for their varying moods, temperaments, daily activities, personal histories and any other factors which might ultimately be relevant in evaluating their differences and similarities as reflected in the ethnobotanical data themselves.

I had no prior conviction as to what the number of informants in my sample should be. The fairly common practice of using only a very few informants in ethnosystematic research (see Chapter I) seemed too restricting for my purposes. Yet I also felt that it was more important to gain a deep understanding of a small number of informants than a superficial one of a larger set. My primary concern was that the sample I chose be adequate to my ethnographic purposes; the kind of adequacy I had in mind has been well expressed by E.R. Heider (and previously quoted in Chapter I), who contends that an adequate sample "is one which includes enough informants to enable the ethnographer to recognise idiosyncratic usages as such, to discover low-frequency usages, and, most importantly, to document real variations of usage in the population" (1972: 448).

The sample ultimately employed, consisting of ten adults⁶, I regard as adequate in this sense. At no time did I feel, during the research or subsequently, that the addition of more informants would have resulted in qualitatively different patterns in the data, and these were the objects of my inquiry

into variation, not to chart the total range of such differences. Nor would it have been possible in practical terms to have worked in such depth with a larger sample; the data for each of the ten informants represent approximately two hundred hours of eliciting, naming tasks and interviews. Given the additional time required for in-the-field analysis and the other requirements of the project, this number could not have been increased. In any case, I am not here attempting to describe "the culture" of the entire population; thus my informants are not intended to be a sample in the statistical sense of the term.

Aside from the number of informants, the composition of the panel was a major initial concern. I limited my scope to Ndumba adults since I was interested generally in the relationship between "knowing" and "doing," neither of which is expected to any large degree of Ndumba children or adolescents (see Chapter II above). There is, on the other hand, a set of responsibilities expected to be fulfilled by all Ndumba adults. My problem, then, focused on the extent to which, within the domain of plants, ten fully-active adults performed their common tasks with a common culture as a starting point.

Given a major division of labor and responsibilities on the basis of sex in Ndumba, I chose to include five males and five females in the sample; I also tried to achieve comparability in the ages of the informants of the two sexes, in case that should prove to be an important variable. Little in the way of "occupational specialization" was evident in the first few months of the field stay, although the statuses of 'big man'

and 'big woman' are important in Ndumba and the former is represented by Fai'ote, an influential man in decision-making and a formerly renowned warrior. Unfortunately, no persons locally regarded as skilled "curers" were included and, indeed, I did not learn of the existence of this status until well into the project, my previous questions on this topic always being met with denials that there were such people. Upon learning of such individuals, I attempted to work with two curers, a male and a female, but the eyesight of both was too poor to examine my plant specimens closely and their inclusion was terminated.

Since I was trying to ascertain the range of botanical knowledge that might exist in such a community, I also wished to include in my panel those individuals who were reputed to know substantially more or less about plants than others. Believing that a reputation as a "good" or "bad" hunter, or gardener, and so on, might reflect differential knowledge of and familiarity with the natural environment, I casually inquired in the community about who such people were so that they could 'teach me what they knew.' This was unproductive, in a sense, because the answers I got were consistent: "Older people know more than younger ones," and "Men know more than women, at least with respect to plants." It was possible, however, to use anecdotal information and other impressions to some degree, and some of these are mentioned below in the descriptions of the individuals finally selected.

A final, but crucial, consideration was related to the

degree of commitment, interest and involvement in the project necessarily required of my informants. Intending to stay in Ndumba for over a year, I had to judge the likelihood of any individual's departure from the community before the project was completed. Thus, e.g., a woman who was likely to marry and take up residence in another community, or a man who was planning to leave in the near future for wage-labor on the coast, could not be included because of the need for all members of the sample to be available until the very end of the field period.

Fortunately, all of the above criteria were met by ten men and women in Ndumba, who remained cooperative and generally excellent informants. A brief sketch of the ten may now be submitted:

(A) Kwaa'keso -- a young man of Soamana sib in his early 20's, unmarried but expected to marry in the near future. He has spent two years working on the coast for the S.E.B. Mission, which counts him among their converts. Like other males his age, he spends a good deal of his time hunting in the forest, but is probably atypical in his great interest in plants and animals. He sometimes has kept butterflies in his house he shares with several other young men, just to 'look at them' and catches spiders to watch them spin their webs. This kind of curiosity, his ability to read and write in Neo-Melanesian and his general availability for work (having no real gardening responsibilities) led me to select him as my field assistant on plant collecting trips, as well as a panel member. His literacy has also made it possible for me to correspond with

him, providing an opportunity for further data collection.

(B) Fetaqu -- a married man of qUpiruna sib, in his late 20's, and father of one daughter (a previous child having died shortly after birth). He lives in a small house with another man about his age and has never been to work on the coast, although he did visit Port Moresby on one occasion. Less independent than many men, he spends a good deal of his time working in his wife's gardens as well as on his own coffee plantings. Having had two children he, like other fathers, has spent extensive periods hunting and trapping in the forest (see Chapter II). Thus, while a different kind of person from Kwaa'keso, he is fairly typical of his age group.

(C) qUnggai -- a married Soamana man with five children by two wives. He is about 31 years old, the son of a 'big man' and in pre-contact times probably would have been an important warrior. He participated in the last retribution killing, which resulted in a five-year jail term in Lae; otherwise, he has had no work experience away from Ndumba. Because of changes which occurred in Ndumba during his absence, he has had to work hard to catch up with other men in coffee planting and raising a pig herd. Perhaps arising from this lost time, he seems to spend more time than most men working in gardens, although he also hunts a considerable amount.

(D) Nauwenta -- a middle-aged (c. 42) man of Saaqia sib, married with one wife and four children. He lives in a men's house, but not the same one as qUnggai, with approximately ten other men and, while not a 'big man,' he is an active

participant in all men's affairs. He has never been away to the coast for wage-labor and speaks no Neo-Melanesian, being in some ways less Western-oriented than any of the three men just described.

(E) Fai'ote -- a 'big man' of Taapi'sana sib, in his late 70's, long married with several living children and grandchildren. He lives in yet another men's house, mostly with older men, but occasionally sleeps in a house at an old hamlet site near some of his gardens. He spends most days in gardens, seldom hunting due to his age, but is still a very important participant in Ndumba affairs. Neither speaking nor understanding Neo-Melanesian, he is much more oriented to continuing traditional Ndumba ways than is any other male member of the sample.

(F) qIloqio -- an unmarried woman about 19 years old, of qOravai sib. She lives with her mother and younger sisters, and works a considerable amount in her mother's and brother's gardens. She spends virtually no time in the forest, speaks very little Neo-Melanesian, and is fairly typical of young unmarried women whose prospective husbands are away from Ndumba on plantation work.

(G) Vetavua -- a married woman with no children although in her late 20's, a member of Soamana sib and a sister of Kwaa'keso (Informant A). She lives with her mother and younger sister, but spends little of her time in gardens as her husband does not accept food from her, and her mother largely takes care of her needs. She speaks no Neo-Melanesian and associates mainly with other women younger than she, help-

ing to care for their children.

(H) qIrainau -- a Taapi'sana woman, about 30 years old, second wife of qUnggai (Informant C) and mother of two children by him. She lives alone except for her small children and, despite her reputation as a lazy gardener, has the responsibility of feeding her children and qUnggai, although he generally obtains food from his mother. She occasionally goes to the forest (as do other married women) to collect fence posts cut by her husband. Speaking no Neo-Melanesian, she is a fairly typical married woman of her age.

(I) Ve'taago -- older sister of qIrainau, also a Taapi'sana, and about 40 years old. Until quite recently she lived with her young son (initiated as an gummaana and moved to a men's house during the field stay), and feeds both him and her husband, an important man who has another wife with whom Ve'taago fights frequently. She speaks no Neo-Melanesian and is typical of the middle-aged married woman of the past, if not the present. A reliable food-producer, she works as hard and as long in the gardens and low forest as any woman.

(J) Paamu -- the only member of the sample not born and raised in Ndumba, a woman in her late 50's from Ahea (where another dialect of Tairora is spoken), who married a 'big man' and moved to Ndumba in her late 20's. A mother of several children including qUnggai (Informant C), she lives alone in a house where her husband and some of her sons come to eat in the evening. With these responsibilities, she spends perhaps more time in the gardens than any other Ndumba woman and is highly regarded as a midwife. While she is not a

Neo-Melanesian-speaker, she, like all other men and women, is an enthusiastic coffee planter.

On many occasions I employed other people in Ndumba as informants, relating to plants and other topics, but these ten adults constituted my main informants and provided (either originally or in verification of others' statements) all of the data reported in this dissertation. While it is not a random sample and thus cannot strictly be considered as representative of the Ndumba population, such representativeness was not a major goal of the project, nor is it a claim I make here, although I do feel that the interpretations herein could be accurately generalized to the larger community. The sample represents a range of variation along many lines, and that is its importance, regardless of the degree to which that range is isomorphic with that of the population as a whole. To phrase it differently, this dissertation does not claim to be a formal ethnography of Ndumba, based on data collected from a sample of informants; rather, it is a detailed description and analysis of a segment of Ndumba society, pursued in the hope of learning something about the nature of cultural systems, whatever the population involved.

(3) Eliciting plant names and taxonomic relationships.

As I viewed my task, before any systematic interviewing or discussions could be held, it was necessary for me to gain some facility in communication in general in Ndumba, from which base I could then proceed to explore the more particular language regarding plants. It had not been possible to a-

chieve more than a general impression of the Tairora language prior to my departure for the field. At that time little had been published (McKaughan 1964, 1966; Vincent and Vincent 1962) although some additional materials were made available to me from the New Guinea Micro-Evolution Project files by its principal investigator, Dr. James B. Watson. I was advised, however, by the author of those materials (since published as Vincent 1973a, b and c) that the dialect of Tairora spoken in Ndumba was sufficiently different from that described, especially in vocabulary, that close study of those materials would not be as useful as I had anticipated (Vincent, personal communication, 1970). Therefore, I examined the materials in an attempt to get a "feel" for the language, but gave most of my attention to learning Neo-Melanesian on the assurance that at least some Ndumba, according to Vincent, were fluent in that language.

Upon arriving in Ndumba in July, 1971, I immediately began work on the local dialect. Beginning on the first day of actual residence there, I started acquiring vocabulary through the use of Neo-Melanesian and the time-honored heuristic device of pointing at objects. I soon discovered a critically important query -- "Nraave?" ('What is it?') -- partly through its repetition by curious Ndumba inspecting such novelties as tape recorders, cameras and ketchup, and also by asking for a translation of the Neo-Melanesian "Em i wanem?" into Ndumba dialect. This query made it possible for me to expand my informal eliciting of vocabulary to the whole population, even in the absence of Neo-Melanesian-speakers.

It was also possible, through these means, to conduct informal discussions of taxonomic relationships among plant categories, the major focus of my interest. For example, in the company of one or more men and women, I would present a sweet potato tuber. Asking "Nraave?" or "Em i wanem?" responses included: "Kaukau" (Neo-Melanesian for 'sweet potato!'), "Kaamma" and "Kommunra." Then the question was asked: "Kain kain kaukau i stap?" ('Are there different kinds of sweet potato?'), to which the response was invariably "He'o" or "Yes." The same response was given to "Kain kain kaamma i stap?" This seeming interchangeability agreed with informants' statements that kaamma and "kaukau" were synonymous terms in Ndumba dialect and Neo-Melanesian, respectively, and I then tentatively regarded kaamma as a label for a category of plants which included 'sweet potato,' but whose exact range of referents and semantic content could not be presumed.

For one thing, there remained the expression kommunra. Was it synonymous with kaamma, "kaukau" and 'sweet potato'? Inserting it into the Neo-Melanesian query, "Kain kain kommunra i stap?" produced only negative responses, "gaagau" or "Nogat" ('No'), usually with elaboration as, "Nogat, em i wanpela kain kaukau (kaamma), tasol" ('No, it is merely one kind of kaukau (kaamma)'). This kind of construction, repeatedly occurring in discussions of 'sweet potatoes' as well as other objects I produced or pointed at, led me to infer that a "kind of" relationship, or the semantic relation of inclusion, was a meaningful one for my informants, at least in Neo-Melanesian discourse. This inference was further supported by the fact that the re-

quest "Kolim nem bilong kain kain kaukau (kaamma) i stap" ('Say the names of the different kinds of kaukau (kaamma) there are') produced a listing response, including kommunra and other expressions (see below). Finally, further discussion yielded statements that such expressions as kommunra were 'little names' and kaamma was the 'big name' for all of these.

By this point, still within the first month of actual field work, there was little doubt that categories labeled by such expressions as those above were linked in folk taxonomic systems, and that my research objectives could be pursued in Ndumba. It was necessary, however, to go beyond interviews conducted in Neo-Melanesian, first, because of the considerable difficulties involved in the semantics of translation, wherein exact isomorphism between categories labeled by expressions in two different languages not only cannot be assumed, but has been demonstrated in some domains not to be the case (e.g., Ervin 1961). Second, for practical reasons reliance on Neo-Melanesian would severely restrict my sample to include only men, and primarily only younger men. Thus, during the month of August I sought to construct valid eliciting frames in Ndumba dialect of Tairora.

Among the various techniques in data collection developed in ethnographic semantics, the use of substitution frame eliciting has been foremost. This procedure makes systematic the fundamental tool of the ethnographer, the asking of questions. More than that, however, it constrains the informants' responses in such a way as to minimize the potential

for ambiguity, both in the question and in the response. This point of constraint or control is well explained by Frake who suggests that informants use such a procedure themselves when they learn from each other:

by presenting an inquiry (e.g., 'What kind of tree is that?'), a native inquirer seeks to restrict the appropriate response to a given set of responses (e.g., tree names), so that the selection of a particular response (e.g., 'elm tree') by alter from the set conveys information significant to the inquirer.... An inquiry about a given topic also instructs alter to attend to certain features of the topic and to ignore others. Consequently, knowing the queries that can be appropriately posed about a given topic reveals the features of that topic that are relevant to the inquirer.
 [1964b:134]

Thus, by careful attention to the form of the question, one can go from that cited above, "Nraave?" -- which could yield as a response anything from "Kaamma" to "'What are you pointing at?'" or "'The ground'" -- to a more precise, more productive and less ambiguous "'What kind of sweet potato is that?'" to which the only appropriate response would be "Kommunra" or some other expression drawn from a set of responses, the members of which the ethnographer is really trying to discover.

Through repeated use of queries, carefully constructed for their semantic content, the ethnographer is in a position to generate enormous amounts of data, even before he has achieved sufficient knowledge of the language in question to interpret the responses. Thus, Frake continues

even if we cannot identify an instance of a 'tree,' if we learn the verbal response tree is interlinked with plant by one pair of queries, to elm, oak, pine, etc. by another, to leaf, stem, branch, trunk,

root, etc. by another, to lumber, firewood, etc. by another, then we have discovered some of the kinds of relationships that can exist among categories of things in a culture. [1964b:134; his emphasis]

In ethnosystematics, as in the rest of ethnography, some of the most fundamentally important queries are those which take the form of substitution frames. Two of the principal developers of the use of controlled eliciting in ethnography are Duane Metzger and Gerald Williams, who state:

By a substitution frame we mean an utterance or fragment thereof which constitutes a verbal environment within which variation and its limits may be examined, holding to the initial criterion of relevance. Thus, within such an utterance ... we may remove one or more forms at a time, and elicit substitutes.... [by asking informants] to provide such alternate forms in the same position as are permissible and appropriate. [Metzger and Williams 1963:1078]

Examples of such frames, in the form of questions, have already been given in the discussion above. For example, one productive frame in Neo-Melanesian is

(F) "Kain kain _____ i stap?"

Into this frame may be inserted various terms, of which "kaukau" is one example. Thus one can combine

(F) "Kain kain _____ i stap?"

(T) "kaukau"

into a query

(Q) "Kain kain kaukau i stap?"

or, using an alternate term,

(T) "diwai" ('tree')

the query

(Q) "Kain kain diwai i stap?"

The reiterated employment of such frames, inserting a different term each time, thus can provide the ethnographer with a systematic and unambiguous means of delimiting the set of expressions which, in the example cited, label categories which include others (through affirmative answers to the query) and those which label terminal categories (negative responses). Each of the terms which evokes an affirmative response can then be inserted in another frame, producing lists of the labeled categories which are included. Thus, using the example given earlier, the frame

(F) "Kolim nem bilong kain kain _____ i stap"

can be combined with the various terms so far discovered to produce lists of the 'kinds of' "kaukau," "diwai," and so on. The importance of such interlinked queries to the study of folk taxonomies is apparent when one considers that the lists produced thereby

are constituted of items which are mutually exclusive in some environment (i.e., that environment defined by the occurrence of the frame) in which all are appropriate. Thus the list constitutes a contrast set with respect to the defining environment. The organization of such sets, regularly displayed through the frames which elicit them, bear, we assume, a significant relation to the organization of informants' 'knowledge' ... [Metzger and Williams 1966:390; cf. Black and Metzger 1965:145-147.]

Finally, in addition to the production of data, the use of culturally meaningful frames can validate or render dubious inferences the ethnographer has otherwise drawn. Thus, if he believes that a certain relationship holds between two terms,

he need only insert them in a properly-constructed frame and pose the query to his informants. The response, indicating whether the proposition contained in the query is or is not acceptable or meaningful, thus plays a validating role in this ultimate test of ethnographers' hunches (cf. Werner 1972:276).

Having concluded that meaningful and productive substitution frame eliciting could be conducted in Neo-Melanesian, I had next to formulate equally valid frames in Ndumba dialect of Tairora. Proponents of controlled eliciting have recommended various means of "finding appropriate queries." Frake, in particular, suggests that the ethnographer "can listen for queries in use in the cultural scenes he observes" (1964b: 143). As a strategy in less highly-focused ethnography, this might be useful, but for my purposes a more direct approach seemed advisable; one could eavesdrop on Ndumba conversations for years before hearing such queries as "'What are the different kinds of x?'"

The alternative adopted was to "describe situations in the contact language and inquire how one would ask questions about features of the situation" (Frake 1964b:143). My initial attempt in this direction, however, was disastrous. Employing a fluent speaker of Neo-Melanesian, I explained to him that I wanted to learn all of the names of the different kinds of trees, grasses, flowers, crops, and so on -- all of the things that grew in the ground in Ndumba. I further explained that I wanted to ask different people to teach me these names and, as he knew, many people in Ndumba did not understand Neo-Melanesian. Therefore, I wanted to tell him the questions I wanted to

ask people, and he was to instruct me as to how these same questions could be asked in the local language. He claimed to understand completely and I meticulously recorded his translations of the queries I posed. For example, he translated the query

(Q) "Kolim nem bilong kain kain kaukau i stap"

as

(Q) "Kaamma nutu gwaa gio"

and the query

(Q) "Kolim nem bilong kain kain banana i stap"

as

(Q) "qEta nutu gwaa gio"

Upon presenting these to him as queries, exactly as he had given them, he responded with lists which were identical to the lists he had produced earlier, using the Neo-Melanesian queries. I concluded that a reliable listing frame in the local language was

(F) "_____ nutu gwaa gio"

A few minutes after this session ended, I had the opportunity to test my new frames with a woman who understood no Neo-Melanesian. I posed to her the query

(Q) "Kaamma nutu gwaa gio"

expecting a response consisting of a list of 'sweet potato' names. She responded with thirteen expressions which I later determined were legitimate names for kinds of sweet potatoes; but she also included in her list names for various edible greens, pumpkins, "native asparagus" and miscellaneous other food crops. Obviously, the query was more ambiguous than I

had thought, or at least it did not ask for what I wanted. To this day I do not know what that query meant; literally, it translates as 'sweet potato-name-one-enough.' The list produced as a response remains equally mysterious. As for the other frames my informant had provided, they evoked only a look of baffled silence from the woman. Nor did the employment of other Neo-Melanesian-speakers result in frames which worked any better.

Toward the end of August, I had begun to despair, finding some solace but little assistance in published accounts of comparable difficulties in taxonomic eliciting (Fowler and Leland 1967; Price 1967; Perchonock and Werner 1969). At the end of August, however, I was paid a visit by Alex Vincent, a Summer Institute of Linguistics missionary-translator who had spent some fifteen years in Northern Tairora and was fluent in dialects spoken there. I explained my problems to him and, through discussions with two young Ndumba men, Vincent suggested a number of eliciting frames to me. Anxious to test them, I employed several men and women, individually, and posed the queries, to which they responded consistently and unhesitatingly in ways which, at the time, seemed to make sense on the basis of what I had learned from eliciting sessions conducted in Neo-Melanesian.

The frames which had been discovered in this way were used throughout the remainder of the research period, even during visits to neighboring hamlet clusters. A set of four basic substitution frames and their responses were sufficient

to construct the folk taxonomic models which inform the discussion in this dissertation. I am confident that the use of these frames by any other investigator in Ndumba would produce virtually the same conclusions as my own, and the frames may be presented here exactly as they were used:

- (1) frame to establish the taxonomic level of a labeled category, i.e., terminal or higher level:

(F) Mo _____ mo _____ ve vaiso?
 ('another'-_____-'another'_____
 interrog.-'it is')
 ('Are there different kinds of _____?')

- (2) listing frame:

(F) Mo _____ mo _____ ve nutu qiane.
 ('another'-_____-'another'_____
 emphatic-'name'-'say it')
 ('Say the names of the different kinds
 of _____.')

- (3) frame to elicit higher-level category of inclusion:

(F) _____ naaqi'naintave vaiso?
 (_____-'what'-'thing'-interrog.-'it is')
 ('What kind of thing is _____?')

- (4) speculation frame:

(F) _____ ve vaiso?
 (_____-'interrog.-'it is')

('Is _____ a kind of _____?')

An example may be provided here of an actual eliciting sequence to make clearer the empirical foundation for the folk taxonomic models constructed. Thus, focusing at the moment on the contrast set including the different kinds of 'sweet potato' (kaamma):

(Q) Mo kaamma mo kaammave vaiso?

(R) He'o. ('Yes.')

(Q) Mo kaamma mo kaammave nutu giane.

(R) Soko'kora mo qaari'mera mo miang'gaira mo kkommunra mo ... gio. ('that's all.')

(check)

(Q) Soko'kora naaqi'naintave vaiso?

(R) Kaamma vaiso.

(Q) qaari'mera naaqi'naintave vaiso?

(R) Kaamma vaiso.

etc.

(check)

(Q) Soko'kora kaammave vaiso?

(R) He'o.

etc.

Then, each of the terms elicited through the listing query was substituted in the earlier frames, thus:

(Q) Mo soko'kora mo soko'korave vaiso?

(R) qAagau. ('No.')

or

(R) qAagau gwaa vaiso. ('No, there is only one.')

After analyzing the distribution of all terms across all frames and their responses when posed as queries, the conclusion may be presented graphically as a subsystem of a folk taxonomy:



In this way, working with each of the ten informants individually to avoid "coaching," all of the hundreds of expressions discovered either through listing queries, plant naming tasks or any informal means, were inserted into each of the substitution frames, no matter how unlikely the resulting query seemed (e.g., "'Is winged bean a kind of tree?'"), and this done repeatedly in continual updating of the tentative lexicon and cross-checking with each of the informants. Each new term was recorded separately in a Master Term File. together with the responses of the ten informants to each of the queries so that, as illustrated in Figure 2, I could tell at a glance, for the term in question: (1) its status as a label for a terminal or higher-level category; (2) its membership (or not) in a more inclusive category; and (3) the degree of agreement or disagreement among my informants regarding that name.

Especially with regard to those terms which evoked some disagreement among informants' responses, it was necessary to

FIGURE II
SAMPLE FROM MASTER TERM FILE

<u>soko'kora</u>		
<u>INFORMANT</u>	<u>HAS KINDS?</u>	<u>IS A KIND OF</u>
A	no	<u>kaamma</u>
B	no	<u>kaamma</u>
C	no	<u>kaamma</u>
D	no	<u>kaamma</u>
E	no	<u>kaamma</u>
F	no	<u>kaamma</u>
G	no	<u>kaamma</u>
H	no	<u>kaamma</u>
I	no	<u>kaamma</u>
J	no	<u>kaamma</u>

go beyond the basic four frames in more intensive interviewing. It was possible, through the aid of Vincent and through discussions in Neo-Melanesian with informants whose understanding of my project increased over time, to formulate additional valid frames. One particularly important frame allowed me to discover synonymous terms, i.e., multiple terms which labeled a single category, whose existence accounted for many cases of seeming disagreement on plant naming tasks (see below). The frame which sufficed to establish synonymy was:

(F) _____ vaga gwaave vaiso?
 (_____ - _____ - 'and' - 'one' - interrog. - 'it is')
 ('Are _____ and _____ the same?')

Thus, e.g., within the set of terms which label kinds of kaamma, this frame yielded two synonymous pairs, agreed upon by all ten informants: ka'saura = qaanam'berora, and kong'go = miang'gaira. In other cases, however, informants disagreed,

some saying that two terms were synonymous, others claiming that they labeled two distinct things.

Other sources of disagreement included the occurrence, in listing responses or in naming tasks, of descriptive phrases (e.g., 'a thing that grows in the water'), and expressions which label parts of plants or stages of growth. These were characterized by substantial lack of agreement among informants with regard to queries involving these terms, especially when many informants would respond to a query with claims of 'not understanding.' By discussing these terms individually with Neo-Melanesian- speakers, followed by intensive interviewing of each informant, these terms were eliminated from the plant name lexicon. There remained a large number of terms, however, which all but a single informant reported as meaningless. Those which could not be determined as one of the above types of expression but, rather, were insisted upon and even described as legitimate labels for plant categories by particular informants, were retained as idiosyncratic terms.

A final readily-identifiable source of variation among informants' responses to queries was the existence of polysemous expressions. These may be divided into two types, of which the first was less problematic, viz., "type specifics." Berlin suggests that the phenomenon I encountered in Ndumba ethnobotany is a general principle of folk taxonomic systems:

In general, one specific category, because it is most widespread, larger, best known, or the like, will always be recognized as the typical species of the folk genus. This taxon can be referred to as the type specific, the archetype, or the ideal type. [Berlin 1972:59; his emphasis]

Thus, in many contrast sets, a subordinate taxon would be labeled with an expression identical to that which labeled the superordinate taxon. For example, the contrast set labeled by nrauhi consist of two members, one of which is labeled nrauhi and the other pi'tu. In some eliciting sessions, this was a source of confusion, since the informant could not be certain which of the categories was being discussed. However, possibly in order to avoid such potential confusion themselves, such type specifics may be marked with an attributive-like expression tuana'nraana, which is best glossed as 'genuine' or 'real' (cf. Berlin 1972:60-62). Thus, if one wished to distinguish between the two kinds of nrauhi, one could refer to pi'tu and to nrauhi tuana'nraana. Once this was discovered I was able to avoid this kind of confusion by marking such polysemous expressions when appropriate.

A second kind of polysemy was much more difficult to deal with, and may be illustrated with the lexeme mauna, whose elucidation came to symbolize for me while in the field the key to understanding Ndumba plant taxonomics. In my initial attempts to discover plant names, a frequent response to my pointing gestures was "mauna." The frequency of its occurrence led me to believe that it, like foringa, muso, sana and sa'tari, was either a label for a very high level category or the label for a category with an extraordinary range of referents. On the basis of all of the data available, I concluded that foringa was best glossed as 'moss, lichen or fungus'; muso as 'grass'; sana as 'vine'; and sa'tari as 'tree or

shrub.' Similarly, I had decided that mauna was indeed the label for an extremely high level category, and might be glossed 'herbaceous plant.'

In eliciting sessions, however, this seemed not to be adequate. With respect to any of hundreds of terms, the frame

(F) _____ naaqi'naintave vaiso?

would yield as a response either foringa, mauna, muso, sana or sa'tari. However, for a great many of the terms, the frame evoked both mauna plus one of the other four; i.e., a given term would be considered as a label for a category included in mauna, but also in foringa, muso, sana or sa'tari. It seemed that these five terms might not be mutually exclusive after all, yet my intuitions led me to believe that they were.

I had encountered a similar problem with sa'tari, which was sometimes paired with sana, but never with muso or foringa. Largely through conversations in Neo-Melanesian with informants, I came to the realization that I was dealing with a case of polysemy, in which sa'tari could be used as a label for all 'trees and shrubs,' but could also function as an attributive glossed as 'woody.' Thus a strong, woody vine could be called sa'tari sana ('woody vine'); on the other hand, there were no 'woody mosses' or 'woody grasses,' except for stiff cane grasses which, I was told, were 'easily broken' and the expression sa'tari muso made no sense.

Again through conversations at great length, I concluded that mauna was also being used sometimes as an attributive, although with a variety of meanings. Thus, upon asking why a

particular shrub could be called mauna sa'tari, informants responded that it was a sa'tari ('shrub') whose leaf was used as medicine, thus it was 'good' and could be called mauna too. In other cases, however, I asked: 'How can this shrub be called mauna, since its leaf is not used as medicine?' to which the response was, 'Its flower makes an attractive body decoration for dances, so it can be called mauna.' On yet other occasions, a shrub, tree, vine, grass or moss was also called mauna because part of it was used as food, or decoration for arrows, or some other function other than that of the plant as a whole.

The conclusion that I ultimately reached was that there was a large high-level taxon unambiguously labeled by the expression mauna, which, in this case, may be glossed 'herbaceous plant' with the caution that some ferns are also included. Those cases where the expressions mauna foringa, mauna muso, mauna sana and mauna sa'tari were used, on the other hand, reflected the polysemous nature of the expression wherein mauna was being used as an attributive indicating 'usefulness' in some sense. This was further supported by the fact that many plants could be called qaati'mauna ('nothing mauna'), indicating their uselessness, while they would still be considered kinds of mauna. To say, on the other hand, qaatimauna foringa, qaatimauna muso, qaatimauna sana or qaati-mauna satari was meaningless.

Through the use of such procedures as just described, a

total lexicon of 1,249 plant names was obtained from the ten informants. It is possible that further research would disclose additional names, but, given the progressively diminishing returns in this regard toward the end of the field period, I believe that the inventory approximates closure, at least for the ten informants employed.

Of these 1,249 expressions, 938 are known to all ten informants and agreed-upon as to the taxonomic status of the categories they label; these constitute what may be called the "core" of plant names. Of these names, 172 are agreed-upon synonyms, leaving a balance of 766 mutually-exclusive plant names. Analysis of the distribution of these terms across all substitution frames constructed to elicit statements of relations of inclusion among the categories labeled, allows the inference of a common taxonomic structure consisting of 766 named folk plant taxa. Postulation of a "covert" (i.e., unlabeled) category, which may be referred to here as 'plants' (see discussion of domain delimitation above) as the unique beginner of the taxonomic structure, brings the total number of agreed-upon folk taxa to 767.

The remaining 311 lexical expressions display informant variability with respect to elicited responses to queries. In some cases, not all of the ten informants recognized the expressions as plant names; in others, there was disagreement as to the status of the taxa labeled by the names; in still others, informants varied in both regards. In the interest of imposing reasonable space limitations on the presentation

here, no attempt will be made to depict graphically the ten individual folk taxonomic models which can be constructed from the data presented in Appendices 2 and 3. Patterns in such variation are examined in detail in Chapter IV below.

(4) Determining the referential meaning of the plant names. Even in the earliest stages of the research it was possible to gain some understanding of the referential or denotational meanings of the lexical expressions I was tentatively recording as plant names in my general acquisition of vocabulary in Ndumba. Given, for example, the consistent responses of informants to my query, "Nraave?" upon pointing at a sweet potato tuber, to which the expression kaamma or another which, on the basis of relations of inclusion, could be alternatively given as a response, I had good reason to infer that the expression kaamma labeled a taxon whose signification corresponded to those objects which I called "sweet potatoes." At this stage of the inquiry, my efforts were identical to those used by the earlier ethnobotanists described at the beginning of the present chapter.

This method of getting "words for things" was not sufficient, however, because it did not provide adequate opportunities to discover whether, in fact, kaamma could also be used to name objects other than sweet potatoes, which would then have to be included in the referential meaning of the expression, or whether the same objects could be labeled by other expressions as well, including some which did not simply reflect varying levels of specificity in naming (cf. Bulmer

1970:1075). It was necessary, then, to systematize my attempts to discover the empirical content of the folk taxonomic systems I was trying to discover in order to more adequately define the plant names I was acquiring, and to ascertain to what extent my informants agreed in the assignment of particular names to particular objects. Thus, data regarding variable knowledge of the "language of plants" (cf. Appendices 2 and 3) could be supplemented with data pertaining to variable knowledge of the plant categories which these names signified, and the two could be analyzed together.

Toward this latter end, I made a total of twenty-two plant collecting trips, beginning in late August, 1971, and the last occurring only three days prior to departure from the field in early October of 1972. During the first four of these trips I employed various Ndumba men and women as field assistants, but never including more than one member of my sample on any one occasion. Beginning with the fifth trip, and continuing thereafter, I employed Kwaa'keso (Informant A) whom I trained in techniques of plant collection and who proved to be an exceptionally able and interested companion.

My strategy on the whole was to sample all of the possible eco-niches within the various vegetation communities of Ndumba territory, trying to make my collections as broadly representative of the local flora as possible within my limited resources. Collections ranged from the riverbank vegetation at 5,300 feet through the grasslands and secondary vegetation near gardens and hamlets, and ascending forest communities to

the summit of Mount Piora at 11,350 feet. Knowing that a complete inventory was beyond my ability, I attempted to collect as many different plants as possible, concentrating on any given trip upon those plants which had not previously been collected. Some plants were collected more than once unintentionally, due to my faulty memory; others were deliberately sought in order to resolve my own curiosity about certain inconsistencies in informants' naming responses (see Chapter IV below). Given more time and energy, I would highly recommend more of these multiple collections.

Each plant collection was given an identification number and placed between newspapers (in sheets of four or five whenever possible) in a field press. When approximately thirty such collections had been made on a given day, I returned to my house; the trip itself consumed an average of five hours and, given the procedure to be described presently, more extensive single-day collections were not feasible, although they would have been desirable.

As each member of my sample became available (i.e., returned from gardens, responded to my summons, etc.), he or she was brought into my house and shown the plants in the absence of any other Ndumba (except for infants and small children sometimes brought along) so that the informant was able to call upon only his or her own knowledge in performing the naming tasks. The field press was opened and in natural light if still daytime, or under the light of a strong pressure lamp in the evenings, the plant collections were displayed

one at a time. The informant was asked to name the plant, being allowed to examine it in whatever manner (feeling, smelling, etc.) and for however long desired. When the name given was known by me to label a taxon which included others (based on eliciting performances), a name of greater specificity was requested by asking

- (F) "Nraa _____ ve?"
 ('what' - _____ -interrog.)
 ('Which _____ is it?')

When the informant had decided on a name for the plant specimen, at the greatest degree of specificity possible, the next plant was displayed, and so on. At the conclusion of the session (including opportunities for re-examination of any particular plants), the informant was compensated with a standardized fee, asked to leave, and another informant was called.

When all members of my sample had named the plants (including my collecting assistant, who named the plants as they were collected and again in the house), the sheets were pressed for twenty-four hours, after which they were placed in plastic tubing, soaked with ethyl alcohol, and sealed for later transmittal to the Department of Forests in Lae, where they were identified by Mr. J.S. Womersley and his staff (cf. Womersley 1969:1-37 for collection and preservation techniques).

By this process, 517 plant specimens were named by the ten informants (excepting the absence of single informants on three occasions), resulting in a total of 5,104 naming responses. The responses, together with pertinent data regard-

ing each plant's provenience and scientific determination, were recorded on sheets which together constitute the Collection File, an example from which is shown in Figure III.

FIGURE III
SAMPLE SHEET FROM COLLECTION FILE

Determination:

Collection No. 024

Ericaceae
Rhododendron multinervium Sleum.

Collection Date: 31 August, 1971

6,200 feet
secondary vegetation along river banks.
shrub -- growing on steep bank of river, amidst dense
cane grass; estimated height 6 feet.

<u>Informant</u>	<u>Name</u>
A	<u>nro'nrora</u>
B	<u>nro'nrora</u>
C	<u>nro'nrora</u>
D	<u>nro'nrora</u>
E	<u>nro'nrora</u>
F	<u>qu'rauga</u>
G	<u>saaku'nra</u>
H	<u>nro'nrora</u>
I	<u>nro'nrora</u>
J	<u>nro'nrora</u>

As can be seen from the sample sheet, informants sometimes varied in their final assignments of names to the plant collections. In some cases, the variation involved only differential use of synonymous names; in others, informants responded with names at different taxonomic levels (cf. "tree," "maple" and "red maple" for a hypothetical sample of American

informants); in still others, labels for mutually-exclusive plant categories were given, indicating a more significant type of variation (cf. "maple" vs. "oak"). A general impression of this variation may be gained from Table VI below.

TABLE VI
FREQUENCY OF VARIATION IN PLANT NAMING RESPONSES

NUMBER OF DISTINCT RESPONSES (Synonyms Combined)	NUMBER OF PLANT SPECIMENS	%
1 (Total agreement)	136	26.3
2	86	16.6
3	81	15.7
4	93	18.0
5	52	10.0
6	42	8.1
7	19	3.7
8	6	1.2
9	2	0.4
10 (Total disagreement)	0	0.0
	TOTAL	517
		100.0

Since I will be concerned in Chapter IV with patterns of variability across informants as well as across plant categories, the Collection File assumes critical importance in that it allows the determination of the degree to which any particular subset of informants agree with each other in their naming responses, thus providing direct evidence for assessing the degree of shared knowledge. Detailed discussion along this line is deferred to the next chapter, but the reader is

referred to Appendix 4, where these data are presented.

Furthermore, the data in the Collection File allow the analyst to compare the ranges of responses to multiple collections of the "same plant" (i.e., according to scientific determinations), or to closely related plants (e.g., two species of the same genus). By such comparisons, the consistency of each individual's responses may be gauged, illuminating an important question, viz., that of "mistaken" identifications by informants. An example of this kind of data, which informs the discussion of these and other matters in Chapter IV, is provided in Figure IV.

FIGURE IV

COMPARISON OF RESPONSES TO MULTIPLE COLLECTIONS

Inf.	Coll. 180 <u>Setaria montana</u>	Coll. 252 <u>Setaria montana</u>	Coll. 331 <u>Setaria palmifolia</u>
A	<u>faahi'mme'saara</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
B	<u>mmutate_r</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
C	<u>faahi'mme'saara</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
D	<u>faahi'mme'saara</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
E	<u>mmutate_r</u>	<u>mmutate_r</u>	<u>kaa'mmunga</u>
F	<u>muso_r</u>	<u>muso_r</u>	<u>kaa'mmunga</u>
G	<u>mmutate_r</u>	<u>mmutate_r</u>	<u>kaa'mmunga</u>
H	<u>faahi'mme'saara</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
I	<u>mmutate₂</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>
J	<u>faahi'mme'saara</u>	<u>faahi'mme'saara</u>	<u>kaa'mmunga</u>

In addition to the Collection File, a further ordering of the data as they were acquired was useful, and may be called the Identification File.⁷ This File when completed consisted of 652 sheets, corresponding to the number of distinct naming

responses which occurred (not counting phonological variants). An example of such a sheet is provided in Figure V, which depicts all of the instances in which the expression gaa'herara occurred as a naming response to a plant specimen. A close analysis of these data (provided in full in Appendix 5) allows conclusions regarding the range of empirical referents denoted by particular expressions. Beyond this, however, the referential ambiguity of any particular expression, for any particular informant or for subsets of the sample, may be judged on the basis of the degree to which the ranges of applicability of the expression are similar or dissimilar. Such judgments will be discussed in more detail in Chapter IV.

FIGURE V

SAMPLE SHEET FROM IDENTIFICATION FILE

Plant Name:

gaa'herara (gaa'hera, gai'erara, gai'hera, gairara)

<u>Coll. No.</u>	<u>Informants</u>	<u>Determination</u>
263	G I	<u>Impatiens balsamina</u>
002	BC GHI	<u>Impatiens hawkeri</u>
003	EFG	<u>Impatiens hawkeri</u>
011	C FGH	<u>Impatiens hawkeri</u>
188	ABC EFGHI	<u>Impatiens</u> sp.
301	G	<u>Impatiens</u> sp.

By no means all of the plant names discovered in Ndumba occurred as naming responses; indeed, out of the total lexicon of 1,249 names which might have been applied to the plants collected, only 602 actually were applied. (i.e., 652 distinct

naming responses, less 50 descriptive phrases). Had the objective of the study been to compile a dictionary of Ndumba plant names, this would be a significant defect, since systematic determinations were made of the referential meanings of less than half of the terms. However, while I hoped to determine the referents of as many names as possible, an exhaustive study of that type was not my primary goal, nor would it have been possible without abandoning the intended aims.

On the other hand, the number of collections actually made and the number of names applied to them should be viewed in proper perspective. In virtually any ethnobiological study, complete representation of the local flora or fauna is practically impossible. Thus, in one's attempts to discover referential meaning through systematic collections, there is bound to be a pool of names which are not accounted for.

Some investigators have supplemented naming tasks with elicited "folk definitions" which allow some inferences to be drawn regarding the denotata of terms (cf. Casagrande and Hale 1967:188-190; Hunn 1973:49-54). While Ndumba informants did not readily articulate such definitions or even descriptions of the uncollected plants, I was nevertheless able to obtain a considerable amount of information about these, as well as all other plants, through the employment of some additional systematic queries. Particularly important were three:

(Q) "Daagive niovizo?"

('where'-interrog.-'arise'?)

('Where does it grow?')

(Q) "Nainiovinai zizo?"

('it itself'-'arise'-'does it?')

('Does it grow wild?')

(Q) "Vaintivano tutaa'naave zizo?"

('person'-subject-'plant'-interrog.-'does he?')

('Do people plant it?')

By using these queries, asking whether it was used for food or in what other manner, and through informal observation and guided tours of gardens, I was able to identify, e.g., those plant names which referred to food crops, and determine the botanical identifications of their common referents with the aid of various reference works (e.g., Massal and Barrau 1956). Thus, although they did not occur as naming responses to collected plant specimens, I am confident of the referents of some 249 plant names in addition to those in Appendix 5. These are presented in Table VII for the reader's information only, since they were not obtained systematically under controlled conditions, thus cannot be considered with the main body of data to be analyzed in Chapter IV.

Thus, the total number of names (including synonyms) for which some data exist regarding their empirical referents reaches 851 (or, 68.1% of the total lexicon), leaving the "totally unknown" quantity in Ndumba ethnobotany considerably smaller than was earlier indicated. Moreover, this indeterminacy was further reduced by some additional data from one of my informants (Kwaa'keso, Informant A). I showed him the

TABLE VII
PROBABLE REFERENTS OF PLANT NAMES NOT OCCURRING IN
NAMING TASKS

<u>Plant Class</u>	<u>Names*</u>	<u>Taxa*</u>	<u>English Gloss</u>	<u>Determination</u>
<u>qaanrava</u>	1	1	'common pea'	<u>Pisum sativum</u>
<u>qaanigaani</u>	1	1	'shallot'	<u>Allium</u> sp.
<u>bum'buri</u>	1	1	'cassava'	<u>Manihot esculenta</u>
<u>geta</u>	15	14	'banana'	<u>Musa</u> spp.
<u>fa'ruti</u>	1	1	'passion fruit'	<u>Passiflora</u> sp.
<u>feva</u>	12	9	'black palm'	?
<u>haanra</u>	1	1	'ginger'	<u>Zingiber</u> sp.
<u>haang'guma</u>	8	7	'corn'	<u>Zea mays</u>
<u>hanra</u>	3	3	'marita'	<u>Pandanus conoideus</u>
<u>kaa'mma</u>	17	15	'sweet potato'	<u>Ipomoea batatas</u>
<u>kaa'roti</u>	1	1	'carrot'	<u>Daucus carota</u>
<u>kaa'visi</u>	1	1	'cabbage'	<u>Brassica oleracea</u>
<u>kopi</u>	1	1	'coffee'	<u>Coffea arabica</u>
<u>kosa</u>	9	7	'native asparagus'	<u>Setaria palmifolia</u>
<u>kwaanru</u>	6	6	'edible pitpit'	<u>Saccharum edule</u>
<u>manaku'haa</u>	1	1	'coconut'	<u>Cocos</u> sp.
<u>mmunri_b</u>	1	1	'lemon'	<u>Citrus limon</u>
<u>nraa'mmunra</u>	5	4	'native spinach'	<u>Amaranthus</u> sp.
<u>nraa'viga</u>	1	1	'peanut'	<u>Arachis hypogaea</u>
<u>nra'nraasa</u>	1	1	'pineapple'	<u>Ananas</u> sp.
<u>nrauhi₂</u>	1	1	'kunai'	<u>Imperata cylindrica</u>
<u>popo_b</u>	1	1	'papaya'	<u>Carica papaya</u>

TABLE VII
(cont'd)

<u>re'risi</u>	1	1	'lettuce'	<u>Lactuca sativa</u>
<u>saagaa</u>	21	19	'sugar cane'	<u>Saccharum offici-</u> <u>narum</u>
<u>sara</u>	26	23	'taro'	<u>Colocasia</u> sp., <u>Xanthosoma</u> sp.
<u>taana</u>	20	19	'yam'	<u>Dioscorea</u> spp.
<u>taagu</u>	18	12	'bamboo'	<u>Bambusa</u> spp.
<u>tepi</u>	6	6	'winged bean'	<u>Psophocarpus</u> <u>tetragonolobus</u>
<u>to'maato</u>	1	1	'tomato'	<u>Lycopersicon</u> <u>esculentum</u>
<u>tu'nraana</u>	8	7	'rattan cane'	<u>Calamus</u> sp.
<u>waahe</u>	1	1	---	<u>Hibiscus manihot</u>

+ 58 names variably known for members of above

Total	249	168
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* The plant name given in the left-hand column is in many cases the "cover term" for a polytypic taxon. The "number of taxa" shown includes those taxa which are included in this larger taxon, and the "number of names" includes all of those names and synonyms which did not occur as naming responses in naming tasks but which label these taxa (cf. Appendix 2).

plates (printed pen and ink drawings, not life-size) in a reference work on New Guinea grasses (Henty 1969) and asked him to provide names for all that he could. While this task was not performed by the other informants and cannot be assumed to provide a stimulus equivalent to that of actual plant specimens⁸, the results are presented in Table VIII,

which the interested reader may wish to compare with the data in Appendix 5.

TABLE VIII
RESULTS OF NAMING TASK EMPLOYING PRINTED DRAWINGS
(Single Informant)

<u>Plant Name Response</u>	<u>Determination</u>	<u>Source</u> (Henty 1969)
<u>faahi'mme'saara</u>	<u>Erneapogon pallidus</u>	Plate 28
	<u>Sacciolepis indica</u>	" 63b
	<u>Setaria pallide-fusca</u>	" 67
<u>ga'raa'hora</u>	<u>Paspalum conjugatum</u>	" 54
<u>gunri</u>	<u>Ophiuros tongcalingii</u>	" 30b
	<u>Rottboellia exaltata</u>	" 31a
<u>heqara'mmutate</u>	<u>Digitaria longiflora</u>	" 25a
<u>kaa'mmungga</u>	<u>Garnotia mezii</u>	" 38
	<u>Setaria palmifolia</u>	" 66
<u>kunggura₂</u>	<u>Coix lachryma-jobi</u>	" 16
<u>ku'raasa</u>	<u>Arundinella setosa</u>	" 5
<u>muso₂</u>	<u>Microlaena stipodes</u>	" 50
<u>mmutate_r</u>	<u>Arthraxon ciliaris</u>	" 4
	<u>Axonopus affinis</u>	" 6
	<u>Axonopus compressus</u>	" 7
	<u>Brachiaria subquafripara</u>	" 10b
	<u>Brachiaria reptans</u>	" 10a
	<u>Echinochloa colonum</u>	" 27a
	<u>Ichnanthus vicinus</u>	" 44
	<u>Isachne confusa</u>	" 45a
	<u>Isachne myosotis</u>	" 45b

TABLE VIII
(cont'd)

<u>mmutate</u> _x	(cont'd)	<u>Leptochloa virgata</u>	Plate 49
		<u>Oplismenus compositus</u>	" 52a
		<u>Oplismenus hirtellus</u>	" 52b
		<u>Panicum sarmentosum</u>	" 53
		<u>Poa saruwagedica</u>	" 57a
		<u>Pseudechinolaena polystachya</u>	" 60
		<u>Stenotaphrum micranthum</u>	" 70b
<u>mwaanda'kunggura</u>		<u>Coix gigantea</u>	" 17
<u>rotu'muso</u>		<u>Eragrostis tenuifolia</u>	" 32
<u>tugan'daira</u>		<u>Chloris tenera</u>	" 14
		<u>Eleusine indica</u>	" 29

N.B. Some 40-odd additional plates were rejected by the informant as portraying grasses which 'do not occur in Ndumba.'

(5) Obtaining information regarding plant uses and additional data. It would be difficult to overstate the place of plants in Ndumba social life. It is almost impossible to cite activities which do not involve plants in some manner, directly or indirectly. This domain was chosen for research purposes, in fact, precisely because it was one which had relevance for every individual living in Ndumba; no esoteric concern of a few specialists, knowledge of plants would seem to be a prerequisite to the very business of living there.

This is not to imply, however, that all plants are important in Ndumba; not all are utilized, nor are all given

distinctive names. But, from the time the neonate drops onto a cushion of saamma until he is wrapped in a shroud of faapa bark cloth and buried beneath a taro plant, the Ndumba individual is in almost constant contact and interaction with his botanical surroundings. In these circumstances, it would be difficult to imagine that familiarity with plants, their names, and their uses would not be widespread and substantial across the population.

It is also true, however, that knowledge regarding these matters varies considerably within the population, if my informants are at all representative of the general pattern. Among the several possible consistencies in this variation, it seemed intuitively reasonable to hypothesize that such knowledge would co-vary with the relative importance or significance of particular plants (cf. Hypothesis 3 above). It was necessary, then, to determine the usefulness or importance of each plant as exhaustively and systematically as possible.

Two principal techniques were employed in collecting information regarding plant uses: observation, and interviewing of informants. With regard to the first, I tried to remain open throughout the research period to any source of observational data, since it seemed to me that actual observations of plants in use produced data which were intrinsically more valid than informants' verbal reports that plant x was used for a, b and c, and so on. Thus, e.g., while measuring gardens I would ask whoever was present to name each kind of plant in the garden and explain what purpose it served there;

or, during an initiation ceremony I would ask for the name of each plant and note its reported and observed uses in that context; or, if I happened to see a man making an arrow, I would interrogate him about each part of the arrow, what plants were used, why these particular choices, and so on. A great deal of such information was also obtained through household surveys of material goods and inquiries into their manufacture.

Through this observational means I was able to compile a considerable body of information concerning plant uses, as well as a deeper understanding of Ndumba economics. A file containing all of the plant names acquired in the course of this study together with this information and data regarding their habitats and means of propagation continually grew. Strict reliance on observation, however, would have resulted in an incomplete record as many plants were never observed, either in use or otherwise. It was necessary, therefore, to supplement observation with extensive interviewing.

Ideally, I would have queried each member of my sample on the uses associated with each plant name he or she knew. This was impossible, however, due to the enormous amount of time required by such inquiries and also because of my lack of fluency in Tairora. The result was that nearly all of my elicited plant use data were obtained from three men (Informants A, B and C), with some information from women and other men acquired late in the research period. Most of the data were collected during extensive interviewing sessions held

separately with each of the men in Neo-Melanesian, at least initially. I began by explaining that I wanted to know 'all of the things that one could do with' a given plant, or 'all of the things it was good for.' Each plant name was then offered and the informant responded with a list of the various uses or noteworthy facts with which he was familiar. This procedure was followed with all three of the men for every plant name, and supplemented with specific questions for each, e.g., 'Does one use kaam'baa for fencing material?' and so on.

Well into the study I was able to use queries in Tairora to serve much the same purpose, while also allowing me to extend my sample of informants, although not as exhaustively as I wished. I was never able to formulate a general listing frame of the sort "'How is _____ used?'" Instead, I had to employ a series of specific frames, e.g.,

(F) " _____ vano nraa'nraive zizo?"

(' _____ -subject- 'eat' -interrog.- 'does one?')

('Does one eat _____?')

(F) " _____ vano nrau'hogaanai zizo?"

(_____ -subject- 'house' -'build' -'does one?')

('Does one build a house with _____?')

(F) " _____ vano fu'haave vaiso?"

(_____ -subject- 'medicine' -interrog.- 'it is'?)

('Is _____ used for medicine?')

The Plant Use File in which these types of data (observations and responses to queries) were recorded is exemplified

in Figure VI below. There all of the named taxa which constitute the contrast set labeled faa'nresa (see Appendix 2) are presented along with the various uses or other ways in which they are "culturally significant." The analyst or reader can see at a glance how various plants, all considered by informants to resemble each other sufficiently to be placed in the same taxonomic category, are similar or diverse in their relative importance, a point to which I will return in Chapter IV.⁹

FIGURE VI

SAMPLE SHEET FROM PLANT USE FILE

	<u>faa'nresa</u>			
	<u>Body Ornament (Flower)</u>	<u>Leaf Skirt at <u>gia'vaati</u> Initiation</u>	<u>Leaf Cooked and Eaten at Counter- Sorcery Feast</u>	<u>Birds Eat Fruit</u>
faanresa ₂	+	-	-	+
faanresa _r	+	-	-	+
fekwa'so'vainranra	+	+	-	+
kaare'vora	+	-	+	+
ki'ringga	+	-	-	+
ki'saasa	+	-	-	+
mmondira	+	-	-	+
paata'faanresa	+	-	-	+

Some comment is required here regarding what is to be meant by such phrases as "cultural importance" or "usefulness" or "significance." In the earlier discussion of the hypotheses developed for this study, I have already alluded

to the common presumption in ethnosystematics of a functional basis of folk classification systems. Thus, various writers have argued that differential lexical elaboration of subsystems of folk taxonomies reflects varying "cultural significance" of the plants or animals involved, or similar functionalist interpretations of knowledge and belief systems. Against these, on the other hand, Levi-Strauss (1966) and others have argued for an "intellectual" besides a "utilitarian" motivation for systems of the complexity of the Ndumba material described in this dissertation.

However the opposition of these two views may ultimately be resolved, probably through some combination of both, a problem which has seldom been clearly addressed pertains to the measurement of "importance" or "utility." The three most conscientious, but unsatisfactory, attempts have all been made by Berlin and his colleagues in their investigations of Tzeltal ethnobotany.

In trying to ascertain the relationship between Tzeltal lowest-level, or terminal, taxa and scientific species, Berlin, Breedlove and Raven used a sample of 200 plant taxa and scored them

in terms of high, moderate, and low cultural significance. Assignment was made as follows: category 1, plants of low cultural significance, includes plants of little or no utility for the Tzeltal; category 2, plants of moderate cultural significance, includes species used for food, firewood, or other purposes but not cultivated; and category 3, plants of high cultural significance, encompasses all plants intensively cultivated by the Tzeltal -- such as corn, beans, chilis, and squashes. These plants are primarily food or cash crops and clearly are of great im-

portance. [Berlin et al. 1966:273]

In essence, judgments of cultural significance according to this scale are based, not on the differential uses to which plants are put, but the varying degrees of human action involved in their propagation. Thus, "low cultural significance" may be translated as "not used and not cultivated"; "moderate" as "used, but not cultivated"; and "high" as "used and cultivated."

In a later formulation (Berlin, Breedlove and Laughlin 1970), a fourth category was added to accomodate those plants which, while "critically important" (e.g., avocados and other food plants) are, nevertheless, not cultivated but merely "protected," i.e., they "would not be as abundant without the intervention of man" (1970:4). The resulting typology contains four classes: "(1) cultivated, (2) protected, (3) wild but having important cultural utility and (4) wild plants with low cultural significance" (1970:4). The latest version of the typology (Berlin et al., n.d., Chapter 5) involves only word changes, thus: (1) "cultivated," (2) "protected," (3) "significant," and (4) "unimportant."

As with any typology, of course, one may raise objections of excessive "splitting" or "lumping," proposing that fewer or more classes be distinguished. For example, I have difficulty in finding the class "protected" plants of real utility in discussing Ndumba ethnobotany since, so far as I know, the only instances would involve such cases as trees which are deliberately not felled (e.g., nraamma'saasira, the cutting of

which would 'cause women's breasts to dry up') or other plants which are assiduously avoided because of their various magical and catastrophe-producing properties. This kind of "protection" seems to be based on a very different kind of "usefulness" from that of Tzeltal avocados and native tomatoes.

It seems to me that the real issue involved in such typologizing, at least for purposes of this dissertation, has to do with what may be characterized as "differential responses" to plants. Thus, when one encounters a plant, one might appropriately behave in various ways: ignore it as a "useless weed," harvest its tubers for food, collect its leaves for later use as medicine, avoid it because of beliefs about its supernatural powers, note its presence as a cue that the soil is exceptionally fertile (or poor), and so on. In fact, a plant may be responded to in any of myriad ways, not all of which are indicated by its usual means of propagation, nor even by a list of "uses." Bulmer offers a cautionary tale which is relevant to literally hundreds of Ndumba plant taxa:

a tree or plant may have no direct use for food or technology, but the ability to recognize it and the knowledge that its blossom, fruit, foliage, epiphytes or the insects which are found in it regularly provide food for certain kinds of birds or mammals, or that it regularly provides shelter from them, are highly relevant to the hunter. [1968a:316]

Thus, e.g., in Ndumba the tree named po'nraunra is, in nearly all respects, an unremarkable tree. It is used for firewood, trap construction, and various other purposes which are served by a large number of trees. Yet, it is be-

lieved by Ndumba men that the tree kangaroos which are prized so highly for their fur and meat prefer to sit on the branches and eat the leaves of po'nraunra above all other trees; for the Ndumba hunter seeking a tree kangaroo, then, familiarity with po'nraunra is "culturally important" as its presence is a cue to the possible presence of tree kangaroos.

The problem of determining, and then measuring, the relative importance or significance of plants becomes, then, much more complex than a simple typology based on differential treatment or a tabulation of observable "uses" would suggest. To attempt to correlate variable knowledge of plant names, or recognition of their referents, with differential cultural importance -- one of the main objects of this dissertation -- requires a broader view of "usefulness" than has previously been employed. If informant variability regarding knowledge of plants is to be accurately judged as it relates to variable significance of plants, then this wider perspective must be adopted.

Accordingly, I tried throughout the study to obtain the most complete information possible concerning differential responses which one might make to a plant, including such responses as avoidance, use as cues, and even repugnance (in the case of a shrub which was avoided by men while hunting in the bush because it had such a strong, undesirable odor). Incorporating these more elusive ways in which plants can be "significant" with the more obvious "uses" of plants, I arrived at a total of 269 distinct ways in which plants might be

considered "culturally significant" to Ndumba in the sense of calling for differential responses. These "plant uses" are listed, together with the number of folk taxa with which they are associated, in Appendix 6. Further discussion and analysis of the matrices such as already shown in Figure VI above will be reserved until Chapter IV.

CHAPTER IV: PATTERNS OF VARIATION AND VARIATIONS IN PATTERNS: THE DISTRIBUTION OF PLANT KNOWLEDGE IN NDUMBA

In the preceding chapters the discussion of my research in Ndumba has been informed by two principal objectives of this dissertation: (1) to provide a partial ethnographic report of Ndumba culture, focusing on the domain of plants; and (2) to explore the implications for the form such a report must take when the fact of informant variability is made an integral part of the description rather than ignored in a search for generalizations.

My goal so far as reportage is concerned has been to describe, within stated limits, the botanical environment of Ndumba and how it is manipulated by the resident population, and to identify certain formal aspects of folk conceptualizations of this plant world which underlie these manipulations. Much of the material relevant to this objective has been provided in Chapters II and III, the data required to complete the task being contained in the appendices with only one or another kind of ordering of them remaining.

It is with regard to this question of alternative orderings and analyses of the primary data, however, that the appendices take on special importance. Appendices seldom constitute a central part of a work; rather, as is indicated by their label, they are "added to" the main body of a monograph, referred to in the text, and otherwise left for the (extraordinarily) interested reader to consult according to inclination. The appendices to this dissertation are thus an excep-

tion, with bulk proportional to their importance in relation to my second main objective. In this other light the detail in which I have presented certain field data (especially in Appendices 3,4 and 5) may be judged less excessive than if they were intended only as reference points for a descriptive account.

The adequacy of the data themselves may be assessed by examination of the procedures by which I obtained them, set out in detail in Chapter III. The adequacy of any ethnographic statement I might offer, however, can only be judged in relation to these data and their interpretations rather than the assumed or demonstrated validity of the techniques. Thus, the appendices provide an ultimate check for the reader as well as an indispensable basis for the discussion and analyses which constitute this concluding chapter.

The inductive task facing me, as it does any ethnographer, is the problem of proceeding from the statements and other behavior of individual informants to meaningful generalizations about human groups -- in my case, the ten informants in my sample and, perhaps, beyond them the Ndumba population. Even with a restriction of focus to one domain rather than the entire culture, the challenge is formidable, as can be seen by casual inspection of the appended data. If my objective is to describe how and what "the Ndumba" or only ten Ndumba adults think about plants, how could such a description be formed, given the diversity, inconsistencies and contradictions in my informants' statements?

I have already discussed in Chapter I some possible resolutions of this dilemma which other ethnographers have conventionally chosen, and the general question will be readdressed at the close of this chapter. Rejecting approaches which reduce informant diversity to parenthetical qualifications (e.g., "Kwaa'keso denies this"), I have chosen to examine carefully the variability in my data, assuming that diversity as well as sameness is a part of the system whose portrayal is my responsibility. My analyses and discussion below will demonstrate that such a choice need not result in reductionism inimical to the aims of ethnography and ethnology. Rather, it is a choice which can result in the discovery of significant patterns and regularities, even within such seemingly unordered data as those I examine here. Indeed, I would argue, it is only through the faithful inclusion of such variability, both in one's notes and in final reports, that such cultural patterns with all their significance can be asserted with any confidence, however they might be discovered in other ways.

To seek and explain the patterns of distribution of plant knowledge among my informants an initial ordering of the data is required. The data will be considered in four principal interrelated classes as they pertain to: (1) plant name lexicon, or labels for posited equivalence classes of plants (plant folk taxa)¹; (2) statements of taxonomic relationships among the named folk taxa; (3) the inferred content of the categories so related, or the denotational or referential meanings of the plant names²; and (4) the relative cultural

importance or utility of the plant classes. The techniques by which these data were collected have already been described in considerable detail in Chapter III, and the data themselves are provided in Appendices 1-6 below. Each class of data may now be discussed in turn from the standpoint of whatever patterns of variation might be found among the ten informants.

Plant Name Lexicon

In Chapter III I described in detail the techniques used in compiling what I there called the "Master Term File," in which are included 1,249 Ndumba plant names. With the possible exception of the 35 names known only to single informants (hereafter referred to as "idiosyncratic names" or "idiosyncratics"), repeated cross-checking and observations of actual uses assured me that these were all legitimate plant names, as opposed to descriptive phrases or other improper responses to my queries (e.g., names for plant parts or stages of growth).

Of these 1,249 plant names, 971 (or 77.74%) were known to all informants, including the 938 names as shown in Appendix 2, plus 33 names recorded in Appendix 3 as known by all but "semantically ambiguous" (i.e., disagreement regarding taxonomic relationships). If the idiosyncratic names are excluded, reducing the total to 1,214 names, the percentage known by all rises to 79.98%. In either case this represents an impressive degree of sharing of vocabulary, although perhaps not surprisingly high in a domain as culturally salient to Ndumba as that of plants. These 971 plant names may be designated the "core"

plant name lexicon of the sample.

Aside from this core lexicon, however, there remain 278 plant names which are variably known to the informants, the distribution of knowledge of which is indicated in Table IX below. As can be seen there, a considerable range of variation exists among the informants with respect to individual plant name lexicon size. This range can be seen more clearly by rank-ordering the individuals as in Table X, with idiosyncratic names both included and excluded since their exclusion results in two slight changes in the ordering.³ The changes do not produce a difference in the rank orders which is statistically significant, however. Employing Goodman and Kruskal's Coefficient of Ordinal Association (G), which measures the "degree to which an individual's relative position or rank in one ordinal scale is predictable from his rank in another" (Freeman 1965:79), the two rank-orders produce a G of .911, with a p value of much less than .01 (Freeman 1965:249, Table E)⁴.

Rank-ordering the informants by individual lexicon size also lends itself to brief examinations of the possible associated variables of relative age and sex, which are the factors Ndumba themselves regard as determining the extent of individuals' knowledge of plants in general, as well as their names (see Chapter III, p. 155).

It is little more than a truism to state that vocabulary size in general is a function of age, at least until an individual has reached adulthood. More particularly, Stross (1969)

TABLE IX
INFORMANT VARIABILITY IN PLANT NAME LEXICON SIZE

Inf. Names	Add'l	%	Total*	%	Idio. Names	Net Add'l	%	Net Total*	%
			Names (N=278)		Names (N=1,249)	Names		Names (N=243)	
A	70	25.2	1,041	83.3	1	69	28.4	1,040	85.7
B	176	63.3	1,147	91.8	14	162	66.7	1,133	93.3
C	193	69.4	1,164	93.2	4	189	77.8	1,160	95.6
D	177	63.7	1,148	91.9	0	177	72.8	1,148	94.6
E	172	61.5	1,143	91.5	1	171	70.0	1,142	94.1
F	103	37.0	1,074	86.0	1	102	42.0	1,073	88.4
G	141	50.7	1,112	89.0	0	141	58.0	1,112	91.6
H	142	51.1	1,113	89.1	3	139	57.2	1,110	91.4
I	160	57.6	1,131	90.6	1	159	65.4	1,130	93.1
J	211	75.9	1,182	94.6	10	201	82.7	1,172	96.5
X	154.5	55.5	1,125.5	90.1	3.5	151.0	62.1	1,122.0	92.4

* Includes core of 971 plant names.

TABLE X

RANK-ORDERING OF INFORMANTS BY PLANT NAME LEXICON SIZE

Incl. Idiosyncraties				Excl. Idiosyncraties			
Inf.	Rank	Add'l Names	Total Names	Inf.	Rank	Add'l Names	Total Names
J	10	211	1,182	J	10	201	1,172
C	9	193	1,164	C	9	189	1,160
D	8	177	1,148	D	8	177	1,148
B	7	176	1,147	E	7	171	1,142
E	6	172	1,143	B	6	162	1,133
I	5	160	1,131	I	5	159	1,130
H	4	142	1,113	G	4	141	1,112
G	3	141	1,112	H	3	139	1,110
F	2	103	1,074	F	2	102	1,073
A	1	70	1,041	A	1	69	1,040

$$\underline{G} = .911 \quad (p < .01)$$

has demonstrated a regular increase with age in plant name lexicons among Tzeltal children, which also appears to be correlated with gradual expansion of the child's geographical range of experience, expanding outward from the house to the courtyard, gardens and finally the forest. A similar process of learning has been reported for a society more similar to Ndumba, the Dugum Dani:

By the time a boy is ten years old he has learned the names of most of the plants around him. Apparently the children learn in a casual way by accompanying older people on their frequent trips into the forest. Since so many of the material objects of Dani culture come from the forest, this expertise is not surprising. [K. Heider 1970:217]

Heider's description fits well the situation in Ndumba, where children gradually range farther from the hamlets and into the gardens and forest, often accompanying adults with whom they have the opportunity to observe and learn the names of the plants of these various eco-zones (cf. Chapter II).

However, while I suspect that a study of Ndumba children might reveal such an incremental pattern, I am dealing here with adult informants who have already completed this early enculturation. It is true, on the other hand, that "adulthood" is not a simple status in Ndumba; marriage, parenthood and variable participation in exchange and ritual activities all increase one's range of experience as well as responsibilities. With these increases also come additional opportunities to learn -- plant names among other things -- and this kind of life-long enculturation could result in age-

associated differences in knowledge of plant names among adults.

Thus it comes as no surprise that the two youngest members of the sample (Informants A, a male, and F, a female) have the smallest individual plant name lexicons, especially since neither is married and thus participates only marginally in ritual activities and has little in the way of food-providing responsibilities. On the other hand, Informant A is three or four years older than Informant F, contrary to what the substantial difference in their lexicons (33 names) would lead one to expect. Furthermore, Informant A is an avid hunter and spends a good deal of time in the forest where his opportunities to observe plants equal those of anyone else in the sample.

At the other end of the continuum, the largest plant name lexicon is possessed by Informant J, the oldest female in the sample and the only member who was not born in Ndumba. Having been a gardener for at least three decades and participated in every kind of activity open to women, one would expect her knowledge of plants and their names to be great. But Informant E (a male) is older than she, an enormously influential man in ritual and nearly all activities, and probably unsurpassed in accumulated experience among the sample; yet, he falls near the middle of the distribution and even below three men younger than he.

Without dwelling on additional individual cases, it is clear from Table XI below that there is a correlation, but not

a perfect one, between age and plant name lexicon size. Reversals in the expected orders such as those noted above account for a G -measure of only .600, which is substantially below perfect agreement, but still significant statistically.

TABLE XI

COMPARISON OF AGE RANK-ORDER
AND INDIVIDUAL PLANT NAME LEXICON SIZE

Incl. Idiosyncraties			Excl. Idiosyncraties		
	Age	Rank		Age	Rank
Inf.	Rank	Names Known	Inf.	Rank	Names Known
E	10	6 (1,143)	E	10	7 (1,142)
J	9	10 (1,182)	J	9	10 (1,172)
D	8	8 (1,148)	D	8	8 (1,148)
I	7	5 (1,131)	I	7	5 (1,130)
C	6	9 (1,164)	C	6	9 (1,160)
H	5	4 (1,113)	H	5	3 (1,110)
B	4	7 (1,147)	B	4	6 (1,133)
G	3	3 (1,112)	G	3	4 (1,112)
A	2	1 (1,041)	A	2	1 (1,040)
F	1	2 (1,074)	F	1	2 (1,073)

$$\underline{G} = .600$$

$$(p = .01)$$

$$\underline{G} = .600$$

$$(p = .01)$$

Another approach to the suspected relationship is to sup-

pose that, if increasing size of plant name lexicons were a simple function of age, then the informants should form a Guttman scale in terms of vocabulary sharing. That is, plant names that are known to Informant J (the next oldest) should also be known to Informant E (the oldest); those known to Informant D should be known to both E and J, and so on.

Put another way, in terms of the data presented in Appendix 3, those names which are known to only one informant should be idiosyncratic to the oldest informant, viz., E; those which are known to only two informants should be known to the two oldest, E and J. However, when the frequencies of sharing of plant names thus "expected" are compared with the frequencies actually occurring, the virtual lack of any such simple scalability is immediately apparent from Table XII, with only 10.79% of the expected sharing of plant names in fact appearing.

When age is examined together with the second variable of suspected importance, sex, a pattern does emerge. Since males and females throughout childhood and adult life in Ndumba have different ranges of experience and opportunities for learning about plants due to the sexual division of labor (see Chapter II above), it might be reasonable to suppose that separating the informants by gender would reveal a more definite relationship between relative age and knowledge of plant names. Suggestions to this effect have already appeared in Tables X and XI above, where Informant A (with the smallest individual lexicon) is immediately followed by four female in-

TABLE XII

COMPARISON OF PLANT NAME-SHARING
AND HYPOTHESIZED AGE-ASSOCIATED SHARING

	Informants	Expected	Observed
Idiosyncratic Names	E	35	1
	Others	0	34
Known to 2 Only	E J	27	1
	Others	0	26
Known to 3 Only	E J D	17	3
	Others	0	14
Known to 4 Only	E J D I	23	0
	Others	0	23
Known to 5 Only	E J D I C	31	2
	Others	0	29
Known to 6 Only	E J D I C H	23	1
	Others	0	22
Known to 7 Only	E J D I C H B	25	2
	Others	0	23
Known to 8 Only	E J D I C H B G	28	9
	Others	0	19
Known to 9 Only	E J D I C H B G A	69	11
	Others	0	58
Total		278	30
		0	248

$$\frac{30}{278} = 10.79\%$$

formants, almost consistently in order of ascending age.

These separated rankings are presented in Table XIII and, indeed, the association is evident with respect to the female informants, where the correspondence is perfect excepting the reversal of Informants G and H when idiosyncratic names are excluded. For the males, on the other hand, there is no statistically significant association between age and lexicon size, although there is a tendency in that direction when idiosyncratic names are excluded.

Continuing with this line of inquiry in Table XIV, when vocabulary sharing is examined as before, but with the two sexes treated separately, the hypothesis finds much more support with respect to expected share patterns, with 63.70% predictive success so far as the men are concerned and somewhat less, 53.15%, for the women (cf. Table XII above).

This pattern of association between gender and plant name lexicon is even more evident when we examine vocabulary sharing between each pair of individuals in the sample. The procedure followed is a simple one: each plant name in Appendix 3 (a total of 276, with idiosyncratic names excluded) is inspected, and each of the 45 possible pairs of individuals which actually knows the name is noted. For example, among those plant names known to only three informants, three pairs (B and C, B and G, and C and G) know the name rau'hosa'vira. After this is done for each plant name, the remaining nine informants can be ranked with respect to any one informant as to the number of names occurring in both of those individuals'

TABLE XIII

COMPARISON OF AGE RANK-ORDER
AND INDIVIDUAL PLANT NAME LEXICON SIZE
(SEPARATED BY SEX)

Incl. Idiosyncraties			Excl. Idiosyncraties		
	Age	Rank		Age	Rank
Inf.	Rank	Names Known	Inf.	Rank	Names Known
MALES ONLY					
E	5	2 (1,143)	E	5	3 (1,142)
D	4	4 (1,148)	D	4	4 (1,148)
C	3	5 (1,164)	C	3	5 (1,160)
B	2	3 (1,147)	B	2	2 (1,133)
A	1	1 (1,041)	A	1	1 (1,040)

$$\underline{G} = .200$$

$$(p > .05)$$

$$\underline{G} = .400$$

$$(p > .05)$$

FEMALES ONLY

J	5	5 (1,182)	J	5	5 (1,172)
I	4	4 (1,131)	I	4	4 (1,130)
H	3	3 (1,113)	H	3	2 (1,110)
G	2	2 (1,112)	G	2	3 (1,112)
F	1	1 (1,074)	F	1	1 (1,073)

$$\underline{G} = 1.000$$

$$(p = .01)$$

$$\underline{G} = .800$$

$$(p = .05)$$

TABLE XIV
COMPARISON OF PLANT NAME-SHARING
AND HYPOTHESIZED AGE-ASSOCIATED SHARING
(SEPARATED BY SEX)

	Informants	Expected	Observed
MALES ONLY			
Idiosyncratic Names	E	27	2
	Others	0	25
Known to 2 Only	E D	13	2
	Others	0	11
Known to 3 Only	E D C	23	13
	Others	0	10
Known to 4 Only	E D C B	83	76
	Others	0	7
Total MALES ONLY		146	93
		0	53

$$\frac{93}{146} = 63.70\%$$

FEMALES ONLY

Idiosyncratic Names	J	38	30
	Others	0	8
Known to 2 Only	J I	24	7
	Others	0	17
Known to 3 Only	J I H	33	9
	Others	0	24
Known to 4 Only	J I H G	48	30
	Others	0	18
Total FEMALES ONLY		143	76
		0	67

$$\frac{76}{143} = 53.15\%$$

lexicons; thus, the relative similarities in plant name lexicons can be judged for all pairs of informants.

I have previously designated a set of 971 plant names, including 33 names from Appendix 3, as the core lexicon, possessed by all ten informants and thus shared by all possible pairs. This core lexicon may be treated as a constant for present purposes and excluded from the analysis, leaving 243 names which are variably known and which directly reveal the differences and similarities among informants' lexicons. That there are substantial differences in what will be called the informants' "variable lexicons" has already been shown in Table IX above (p. 207); excluding idiosyncratic names, Informant A knows only 69 of these 243 names, B knows 162, and so on.

With respect to only these variably known names, we may determine how many of these are shared by any two informants through the inspection process described above. The resulting figures, shown in matrix format in Table XV below, indicate the number of plant names which are at the intersection of any two informants' variable lexicons.

These computations allow one measure of the similarity of informants' lexicons and a ranking of all informants in terms of this similarity. Thus, with respect to any particular informant, the other nine can be rank-ordered according to the number or percentage of the names in that individual's variable lexicon which are also known by the others. For example, in Table XVI below, it can be seen that Informant C

TABLE XV
VARIABLE LEXICON-SHARING BY INFORMANT PAIRS
(243 Plant Names)

Lex. Inf.	Size (69)	(162)	(189)	(177)	(171)	(102)	(141)	(139)	(159)	(201)
A	A	B	C	D	E	F	G	H	I	J
A	-	64	66	62	58	23	30	29	38	49
B	64	-	147	146	137	79	103	101	113	134
C	66	147	-	158	154	83	115	108	126	158
D	62	146	158	-	156	83	109	107	126	146
E	58	137	154	156	-	76	102	102	122	142
F	23	79	83	83	76	-	85	79	88	96
G	30	103	115	109	102	85	-	109	121	132
H	29	101	108	107	102	79	109	-	121	128
I	38	113	126	126	122	88	121	121	-	146
J	49	134	158	146	142	96	132	128	146	-

knows 66, or 95.7%, of the 69 plant names in Informant A's variable lexicon; Informant B knows 64, or 92.8%, of the 69, and so on. In this sense, Informant F is the least similar of all informants to Informant A, their respective variable lexicons sharing only 23 names (33.3% of 69).

It is important to note that this measure of similarity of informants' variable lexicons is not symmetrical. Thus, while Informant C knows more of the names in Informant A's variable lexicon than does any other informant, Informant A knows fewer of the names in Informant C's variable lexicon (66, or 34.9%, of 189) than does anyone else in the sample. In this light it is all the more interesting to note that the person who knows the largest number of names in Informant J's variable lexicon is Informant C, her son (158, or 78.6%, of 201); turning the pair around, she is one of two persons (the other being Informant D) who know the most names in her son's variable lexicon (158, or 83.6%, of 189). Other pairs of related informants show no such close similarity, however: Informants A and F (brother and sister) are in fact the least similar of all pairs; H and I (two sisters) are quite similar in one direction but not in the other; and C and H (husband and wife) are not strikingly similar in either direction.

It is difficult to discern any consistent pattern in the rankings, except that Informants A and F are the least similar to any one of the others, including each other. A general pattern does exist so far as the male informants are concerned, however, if Informant A is disregarded. That is,

TABLE XVI
RANK-ORDERING OF VARIABLE LEXICON-SHARING BY INFORMANT PAIRS
(243 Plant Names)

Inf.	A	B	C	D	E	F	G	H	I	J
	C	C	D	C	D	J	J	J	J	C
	(95.7%)	(90.7%)	(83.6%)	(89.3%)	(91.2%)	(94.1%)	(93.6%)	(92.1%)	(91.8%)	(78.6%)
	B	D	J	E	C	I	I	I	C	D
	(92.8%)	(90.1%)	(83.6%)	(88.1%)	(90.1%)	(86.3%)	(85.8%)	(87.1%)	(79.2%)	(72.6%)
	D	E	E	B	J	G	C	G	D	I
	(89.9%)	(84.6%)	(81.5%)	(82.5%)	(83.0%)	(83.3%)	(81.6%)	(78.4%)	(79.2%)	(72.6%)
	E	J	B	J	B	C	D	C	E	E
	(84.1%)	(82.7%)	(77.8%)	(82.5%)	(80.1%)	(81.4%)	(77.3%)	(77.7%)	(76.7%)	(70.6%)
	J	I	I	I	I	D	H	D	G	B
	(71.0%)	(69.8%)	(66.7%)	(71.2%)	(71.3%)	(81.4%)	(77.3%)	(77.0%)	(76.1%)	(66.7%)
	I	G	G	G	G	B	B	E	H	G
	(55.1%)	(53.6%)	(60.8%)	(61.6%)	(59.6%)	(77.5%)	(73.0%)	(73.4%)	(76.1%)	(65.7%)
	G	H	H	H	H	H	E	B	B	H
	(43.5%)	(62.3%)	(57.1%)	(60.5%)	(59.6%)	(77.5%)	(72.3%)	(72.7%)	(71.1%)	(63.7%)
	H	F	F	F	F	E	F	F	F	F
	(42.0%)	(48.8%)	(43.9%)	(46.9%)	(44.4%)	(74.5%)	(60.3%)	(56.8%)	(55.3%)	(47.8%)
	F	A	A	A	A	A	A	A	A	A
	(33.3%)	(39.5%)	(34.9%)	(35.0%)	(33.9%)	(22.5%)	(21.3%)	(20.9%)	(23.9%)	(24.4%)

apart from the intrusion of Informant J (the oldest female), for each of the male informants (B through E), the other three males know more plant names in that individual's variable lexicon than do any of the females. For the women, on the other hand, there is no such clear clustering.

At least the bottom ranks of this ordering are clearly predetermined by differences in individuals' variable lexicon sizes. Thus, Informant A is foredoomed to share a low percentage of any other informant's lexicon because his own is so small relative to the others. Similarly, Informant F, with the second-smallest lexicon in the sample, might well be expected to fall lowest or next-lowest in the rankings, as indeed she does. So long as only the number of shared terms is considered, then, any ranking cannot help but reflect this simple quantitative factor.

Of additional consequence to the rank-ordering of the informants is the fact that some informant pairs appear in Table XVI above to be equally similar in their variable lexicons while in fact they are not. For example, Informants D and J each knows 158, or 83.6%, of the 189 plant names in Informant C's variable lexicon; they are thus tied as the most similar to Informant C, their order for the purpose of the table being simply alphabetical. However, this tie does not take into account the non-symmetry of this measure of similarity, to which I referred earlier, which is itself a function of variable lexicon sizes. When the number of names shared is considered as a proportion of the combined lexicons

of two informants, a more accurate measure of lexicon similarity is achieved.

To continue with the present example, the 158 names known to both Informants C and D represent the intersection of their two variable lexicons which contain totals of 189 and 177 plant names, respectively. If we double the number of shared names (since they are included in each of the two totals) and divide this product by the sum of the two individual lexicon totals, we obtain the proportion of their combined lexicons which they share, or that percentage which is identical -- in this case, 86.34% :

$$\frac{2(158)}{189 + 177} = \frac{316}{366} = .8634$$

Performing the same operation for the informant pair C and J, we find:

$$\frac{2(158)}{189 + 201} = \frac{316}{390} = .8103$$

Thus we can conclude that Informants C and D are more similar so far as their individual variable lexicons are concerned than are C and J (86.34% vs. 81.03%), even though the number of plant names shared by both pairs is the same.

Since this is a more accurate measure of lexicon similarity than the one previously employed, I have performed these calculations for all informant pairs, and the resulting matrix is presented in Table XVII below.

Employing these percentages of shared lexicons, as opposed to simply considering the number of shared names, a new rank-

TABLE XVII
 PERCENTAGES OF COMBINED VARIABLE LEXICONS
 SHARED BY INFORMANT PAIRS
 (243 Plant Names)

Inf.	A	B	C	D	E	F	G	H	I	J
A	-	55.41	51.16	50.41	48.33	26.90	28.57	27.88	33.33	36.30
B	55.41	-	83.76	86.14	82.28	59.85	67.99	67.11	70.40	73.83
C	51.16	83.76	-	86.34	85.56	57.04	69.70	65.85	72.41	81.03
D	50.41	86.14	86.34	-	89.66	59.50	68.55	67.72	75.00	77.25
E	48.33	82.28	85.56	89.66	-	55.68	65.38	65.81	73.94	76.34
F	26.90	59.85	57.04	59.50	55.68	-	69.96	65.56	67.43	63.37
G	28.57	67.99	69.70	68.55	65.38	69.96	-	77.86	80.67	77.19
H	27.88	67.11	65.85	67.72	65.81	65.56	77.86	-	81.21	75.29
I	33.33	70.40	72.41	75.00	73.94	67.43	80.67	81.21	-	81.11
J	36.30	73.83	81.03	77.25	76.34	63.37	77.19	75.29	81.11	-

ordering of the informants in relation to any particular informant can be produced, as in Table XVIII below.

Again the same general pattern is seen as in Table XVI above (p. 220), but now truer of both sexes, especially if we disregard Informants A and F (the youngest of the two sexes), who still occupy the lowest ranks, again mostly a function of their relatively small lexicon sizes. Thus, the informants who share the most names, in terms of percentage of combined variable lexicons, with Informant A are the other four males; with Informants B through E, the other males excepting A; with Informant F, the other four females; with Informants G through I, the other females excluding F (but including F for Informant G); and Informant J being the exceptional case, with some males sharing higher percentages of lexicon with her than do some of the other females.

The clustering of informants by sex is more apparent, then, when proportions of lexicons shared are considered rather than simply the number of names shared. It should also be noted that, for any particular informant, the differences among the various percentages of lexicons shared with other members of the same sex tend to be small, followed by a drop of several percentage points to the most similar informant of the opposite sex.

This gender-associated pattern is revealed even more clearly when we calculate the number and percentage of plant names in variable lexicons shared by each informant with the "average informant," the "average male informant" and the

TABLE XVIII
 RANK-ORDERING OF VARIABLE LEXICON-SHARING BY INFORMANT PAIRS
 (Converted to Percentages of Combined Lexicons)
 (243 Plant Names)

Inf.	A	B	C	D	E	F	G	H	I	J
B	(55.41)	(86.14)	(86.34)	(89.66)	(89.66)	(69.96)	(80.67)	(81.21)	(81.21)	(81.11)
C	(51.16)	(83.76)	(85.56)	(86.34)	(85.56)	(67.43)	(77.86)	(77.86)	(81.11)	(81.03)
D	(50.41)	(82.28)	(83.76)	(86.14)	(82.28)	(65.56)	(77.19)	(75.29)	(80.67)	(77.25)
E	(48.33)	(73.83)	(81.03)	(77.25)	(76.34)	(63.37)	(69.96)	(67.72)	(75.00)	(77.19)
J	(36.30)	(70.40)	(72.41)	(75.00)	(73.94)	(59.85)	(69.70)	(67.11)	(73.94)	(76.34)
I	(33.33)	(67.99)	(69.70)	(68.55)	(65.81)	(59.50)	(68.55)	(65.85)	(72.41)	(75.29)
G	(28.57)	(67.11)	(65.85)	(67.72)	(65.38)	(57.04)	(67.99)	(65.81)	(70.40)	(73.83)
H	(27.88)	(59.85)	(57.04)	(59.50)	(55.68)	(55.68)	(65.38)	(65.56)	(67.43)	(63.37)
F	(26.90)	(55.41)	(51.16)	(50.41)	(48.33)	(26.90)	(28.57)	(27.88)	(33.33)	(36.30)

"average female informant," as in Tables XIX and XX below. There, too, the effects of the small lexicons of Informants A and F on such an averaging procedure are acknowledged and compensated for, illuminating even more clearly the pattern of gender-clustering in lexicon-sharing. In each case, for both the number and percentage of plant names shared, the degree of sharing is increased with the exclusion of Informant A or F, or both.

Finally, we may turn some of the preceding inquiries around, especially with reference to Table XVIII. There the informants were ranked according to relative similarity, measured in terms of the percentage of their combined variable lexicons which is shared, to any particular informant. In Table XXI below, each informant is shown in terms of his or her relative similarity to all of the other informants. Thus, e.g., Informant B is the most similar of all informants in one case -- to Informant A; he is the third-most similar of all to Informants C, D and E; and so on. It is strikingly apparent in this table that no informant is more similar to any informant of the opposite sex than he or she is to the other four members of the same sex. In some cases an informant ranks at the same level of similarity to members of both sexes, but there are no cases in which an informant of the opposite sex falls at a higher level in the table than do the other same-sexed informants.

While an age-associated pattern has been shown with respect to individual lexicon size (Table XI, p. 211), especially

TABLE XIX
AVERAGE NUMBER OF PLANT NAMES SHARED (BY SEX)
(243 Plant Names)

Inf.	A	B	C	D	E
$\bar{X}$	46.56	113.78	123.89	121.44	116.56
excl. A & F	49.50	125.86	138.00	135.43	130.71
$\bar{X}$ Male	62.50	123.50	131.25	130.50	126.25
excl. A	---	143.33	153.00	153.33	149.00
$\bar{X}$ Female	33.80	106.00	118.00	114.20	108.80
excl. F	36.50	112.75	126.75	122.00	117.00

Inf.	F	G	H	I	J
$\bar{X}$	76.89	100.67	98.22	111.22	125.67
excl. A & F	83.63	113.00	110.86	125.00	140.86
$\bar{X}$ Male	68.80	91.80	89.40	105.00	125.80
excl. A	80.25	107.25	104.50	121.75	145.00
$\bar{X}$ Female	87.00	111.75	109.25	119.00	125.50
excl. F	---	120.67	119.33	129.33	135.33

TABLE XX
AVERAGE PERCENTAGE OF PLANT NAMES SHARED (BY SEX)
(243 Plant Names)

Inf.	A	B	C	D	E
X	39.81	71.86	72.54	73.40	71.44
excl. A & F	41.42	75.93	77.81	78.67	77.00
X Male	51.33	76.90	76.71	78.14	76.46
excl. A	---	84.06	85.22	87.38	85.83
X Female	30.60	67.84	69.21	69.60	67.43
excl. F	31.52	69.83	72.25	72.13	70.37
Inf.	F	G	H	I	J
X	58.37	67.32	66.03	70.61	71.30
excl. A & F	62.30	72.48	71.55	76.39	77.43
X Male	51.79	60.04	58.87	65.02	68.95
excl. A	58.02	67.91	66.62	72.94	77.11
X Female	66.58	76.42	74.98	77.61	74.24
excl. F	---	78.57	78.12	81.00	77.86

TABLE XXI
 PROFILE OF RELATIVE RANKINGS BY INFORMANT
 (Percentage of Combined Lexicons Shared)

Inf.	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Degree of Closeness					
1st		A		B,C,E	D
2nd			A,B,D,E,J		C
3rd		C,D,E		A,J	B
4th				H,I	A
5th		F,H	G		I,J
6th			H,I	F,G	
7th		G,I,J	F		H
8th					F,G
9th	B,C,D,E,F, G,H,I,J				
Inf.	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
1st		F	I	G,H,J	
2nd		H	G	F	I
3rd		I	F		G,H
4th	G	J			B,C,D,E,F
5th				B,C,D,E	A
6th		B,C,D	E,J	A	
7th		A,E	B,C,D		
8th	B,C,D,E,H, I,J		A		
9th	A				

regarding the female informants (Table XIII, p. 215), the gender-associated pattern with respect to lexicon-sharing is even more striking, as the preceding analyses have demonstrated. Discussion of these findings should be deferred to the end of the next section, however, since a cautionary note must be entered here, the implications of which cannot be assessed until variability in individual taxonomic systems has been examined.

Throughout the above discussion I have been concerned only with the extent to which individuals do or do not know the same plant names as do others. While definite patterns have recurred in this kind of sharing of knowledge, it must be kept in mind that familiarity with plant names is not the same as familiarity with the plants themselves. Thus, sharing of vocabulary between individuals does not necessarily imply sharing of conceptual categories. That is, two or more individuals may know a given plant name, but have very different ideas as to what kind of plant is signified by that expression. Indeed, 83 examples of this lack of concept-sharing constitute what I have called "Semantically Ambiguous Plant Names" in Appendix 3.

It is necessary, then, to temper the above observations by determining to what extent the patterns already discovered, or different ones, may be found among informants' plant categories, one approach to which is through analyses of their statements regarding taxonomic relationships.

Taxonomic Relationships

The eliciting frames used to obtain the data necessary to construct individualized folk taxonomic models have already been described in detail in Chapter III above. There I also mentioned the existence of a number of cases of disagreement among my informants in their assignments of given taxa to superordinate taxa, and it is these disagreements that are of principal concern here.

For example, regarding nraa'mmunru -- one of those 83 instances listed as "semantically ambiguous" in Appendix 3 -- two informants (F and J) know the name, but disagree as to the nature of the taxon which it labels. For Informant F, nraa'mmunru designates a class of plants included in the higher taxon labeled mauna; thus its signification meaning includes the characteristic "herbaceous" (according to the most reasonable gloss of mauna). This reasoning is further supported by the fact that Informant F used the expression nraa'mmunru to denote two plant collections, Viola arcuata and Wahlenbergia marginata, both herbaceous plants (see Appendix 5 below).

For Informant J, on the other hand, nraa'mmunru designates a class of plants included in the higher taxon labeled sa'tari; thus its signification meaning includes the characteristic "woody stem or trunk" (cf. sa'tari glossed as 'tree or shrub'). Informant F repeatedly denied that nraa'mmunru had a woody stem; to the contrary, as in the examples of it I had collected, she insisted that it was a mauna ('herb').

Whatever mental images might be inferable from these statements, disagreements such as this led to the construction of variable folk taxonomies for the informants, depending on their differing statements regarding class inclusion or equivalence (in the cases of alleged synonymy). Rather than attempt to graphically depict these varying models, differences among them as well as whatever patterns may be found among these differences can be examined statistically by summarizing the data from Appendices 2 and 3 in several ways.

First, the ten informants may be compared and ranked as they vary in the overall sizes of their individual folk taxonomies. Here, again dealing only with linguistically-labeled categories, a distinction must be made between plant names (cf. Table IX above, p. 207) and folk taxa. Given the large number of names which are considered (some only idiosyncratically) by the informants to be synonyms for other plant names, the two totals are considerably different. Thus, in Table XXII below, each individual's plant name lexicon total (from Appendices 2 and 3), less synonymous expressions, yields the number of folk taxa (excluding "covert" taxa) in his or her particular taxonomy.

It may be useful to recapitulate the information regarding informant variability in total plant name lexicon size as compared to the variation in taxonomy size, as in Table XXIII. In this way it can clearly be seen that a large portion of the variation in plant name lexicon size discussed earlier involved only differential knowledge of synonyms,

TABLE XXII
INFORMANT VARIABILITY IN PLANT TAXONOMY SIZE

Inf.	<u>Idiosyncratics Included</u>				<u>Idiosyncratics Excluded</u>			
	Add'l Names	Add'l Syn's	Add'l Taxa	Total* Taxa	Add'l Names	Add'l Syn's	Add'l Taxa	Total* Taxa
A	103	34	69	835	102	33	69	835
B	209	90	119	885	195	86	109	875
C	226	109	117	883	222	107	115	881
D	210	103	107	873	210	103	107	873
E	205	87	118	884	204	87	117	883
F	136	76	60	826	135	76	59	825
G	174	92	82	848	174	92	82	848
H	175	90	85	851	172	90	82	848
I	193	101	92	858	192	100	92	858
J	244	113	131	897	234	110	124	890
$\bar{X}$	187.5	89.5	98.0	864.0	184.0	88.4	95.6	861.6
Range	103- 244	34- 113	60- 131	826- 897	102- 234	33- 110	59- 124	825- 890

* Includes core of 766 taxa (938 names, less 172 synonyms) from shared taxonomy (Appendix 2).

TABLE XXIII
COMPARISON OF INFORMANT VARIABILITY
IN PLANT NAME LEXICON AND TAXONOMY SIZE

Inf.	Including Idiosyncraties		Excluding Idiosyncraties	
	Number of Names	Taxa	Number of Names	Taxa
A	1,041	835	1,040	835
B	1,147	885	1,133	875
C	1,164	883	1,160	881
D	1,148	873	1,148	873
E	1,143	884	1,142	883
F	1,074	826	1,073	825
G	1,112	848	1,112	848
H	1,113	851	1,110	848
I	1,131	858	1,130	858
J	1,182	897	1,172	890
$\bar{X}$	1,125.5	864.0	1,122.0	861.6
Range	1,041 -	826 -	1,040 -	825 -
	1,182	897	1,172	890

surely a less consequential kind of variability than that concerning conceptual classes of plants (i.e., folk taxa). In fact, synonyms account for almost exactly one-half of the lexicon variability as the range of variation drops from one of 141 names to only 71 taxa (idiosyncraties included), or from 132 names to 65 taxa (idiosyncraties excluded).⁵

Rank-orderings of the informants can then be compared with respect to both relative lexicon and taxonomy size (Table XXIV). There one can see a statistically significant degree of agreement between the two rankings (with idiosyncraties included, $G = .777$, $p < .01$; excluding idiosyncraties, $G = .800$, $p < .01$), indicating that there is a general tendency for those who know more plant names to also distinguish more plant classes.⁶ Thus, while the overall variance among taxonomy sizes is less quantitatively than that among individual lexicons, the distribution across informants shows nearly the same pattern in both cases. In these senses, then, there is a fairly consistent distribution of plant knowledge within the sample.

It is also interesting to note that, apart from the question of variable sizes of individuals' taxonomies in overall terms, there are patterns with respect to the points within the taxonomic structures where expansion tends to occur, i.e., "expansion" simply referring to the addition of the variably-distinguished taxa to the common or core taxonomy of 766 named taxa held by all ten informants. These additions tend to cluster at particular folk taxonomic ranks.⁷

Table XXV below shows the number of taxa occurring at each of five taxonomic ranks (the "unique beginner" -- 'plant,' excluded for present purposes) in each of the ten individual taxonomies. As can be seen there, no additions occur at the highest named rank (life form) or at the lowest (sub-variety), and few at the second-lowest (variety) rank. Rather, the

TABLE XXIV

COMPARISON OF RANK-ORDERS OF INFORMANTS
BY PLANT NAME LEXICON SIZE AND TAXONOMY SIZE

Idiosyncraties Included				Idiosyncraties Excluded			
Rank		Rank		Rank		Rank	
Inf.	Lex. Size	Taxon. Size		Inf.	Lex. Size	Taxon. Size	
J	10 (1,182)	10	(897)	J	10 (1,172)	10	(890)
C	9 (1,164)	7	(883)	C	9 (1,160)	8	(881)
D	8 (1,148)	6	(873)	D	8 (1,148)	6	(873)
B	7 (1,147)	9	(885)	E	7 (1,142)	9	(883)
E	6 (1,143)	8	(884)	B	6 (1,133)	7	(875)
I	5 (1,131)	5	(858)	I	5 (1,130)	5	(858)
H	4 (1,113)	4	(851)	G	4 (1,112)	4*	(848)
G	3 (1,112)	3	(848)	H	3 (1,110)	4*	(848)
F	2 (1,074)	1	(826)	F	2 (1,073)	1	(825)
A	1 (1,041)	2	(835)	A	1 (1,040)	2	(835)

* Tie.

$$\underline{G} = .777$$

$$(\underline{p} < .01)$$

$$\underline{G} = .800$$

$$(\underline{p} < .01)$$

TABLE XXV

PROFILE OF INDIVIDUAL TAXONOMIC MODELS
(Number of Taxa by Rank)

Inf.	Life Form	Genus	Species	Variety	Sub-Variety	Total
CORE	5	385	350	24	2	766
A	+0	+ 45	+ 22	+ 2	+0	+ 69
	5	430	372	26	2	835
B	+0	+ 69	+ 48	+ 2	+0	+119
	5	454	398	26	2	885
C	+0	+ 60	+ 51	+ 6	+0	+117
	5	445	401	30	2	883
D	+0	+ 49	+ 54	+ 4	+0	+107
	5	434	404	28	2	873
E	+0	+ 63	+ 50	+ 5	+0	+118
	5	448	400	29	2	884
F	+0	+ 21	+ 39	+ 0	+0	+ 60
	5	406	389	24	2	826
G	+0	+ 33	+ 47	+ 2	+0	+ 82
	5	418	397	26	2	848
H	+0	+ 37	+ 45	+ 3	+0	+ 85
	5	422	395	27	2	851
I	+0	+ 43	+ 47	+ 2	+0	+ 92
	5	428	397	26	2	858
J	+0	+ 60	+ 62	+ 9	+0	+131
	5	445	412	33	2	897
X	+0	+ 48.0	+ 46.5	+ 3.5	+0	+ 98.0
	5	433.0	396.5	27.5	2	864.0

majority of additional taxa are of folk generic or specific rank, indicating that the distinctions informants are differentially drawing are neither the grossest nor the finest which are made in the system as a whole. Thus, the variable sizes of individual taxonomies are almost entirely the result of expansion at only two of the five ranks.

However, it must be pointed out that these additional taxa are distributed across the various ranks in nearly the same proportions as they manifest in the core, or shared, taxonomy. That is, as illustrated in Table XXVI, if the informants' added taxa are combined and average additions computed for each rank, the percentage of the additional taxa of any particular rank is nearly the same as the percentage of taxa of that rank in the core taxonomy.

On the other hand, the averaging of such a wide range of variation in additional taxa should not be allowed to obscure a gender-associated pattern with respect to the relative numbers of additional folk genera as contrasted with additional folk species. With only one exception (Informant D) for the male informants the number of additional genera they distinguish is greater (and for Informant A, substantially so) than the number of additional species. For the five female informants the imbalance is reversed, with more additional distinctions of specific rank than generic (again most substantially so for the youngest, Informant F). These disproportions are not numerically overwhelming, however, and further comments will be deferred until the discussion

TABLE XXVI
COMPARISON OF TAXON FREQUENCY BY RANK
IN CORE TAXONOMY AND AVERAGE ADDITIONAL TAXA

Rank	<u>Core</u>		<u>Additional</u>		
	Number	% (N=766)	Number Expected	Number Observed	% (N=98)
Life Form	5	0.653	0.640	0.00	0.000
Genus	385	50.261	49.256	48.00	48.980
Species	350	45.692	44.778	46.50	47.449
Variety	24	3.133	3.070	3.50	3.571
Sub-Variety	2	0.261	0.256	0.00	0.000
TOTAL	766	100.000	98.000	98.00	100.000

of the cultural importance of plants below.

One further point deserves immediate comment and that is that, with only one exception, all of the variability among individual taxonomies involves only horizontal expansion. That is, taxa which are known to fewer than all ten informants are virtually all additions to already-polytypic taxa (e.g., hoha'nrunra, known by only two informants, is for them simply a finer distinction than is made by the others within the complex and multi-membered taxon mauna). The exception concerns the taxon labeled qaanigaani (see Appendix 2) which for all ten informants is what Berlin would call an "unaffiliated generic," i.e., a taxon of generic rank which is not immediate-

ly included in any of the few life form taxa, thus occurring at level one of the taxonomic structure (Berlin et al. 1973: 216). For eight of the ten informants, qaanigaani is also a terminal taxon, but for Informants A and C, it is subdivided into two folk species, qaanigaani tuanra'nraanra (the type-specific) and rika, thus contrasting 'onions or shallots' with 'leeks.' These latter are a very recent introduction to Ndumba and I would expect the distinction to spread with increased familiarity with the new form.

While the variability among individual taxonomies is thus less extensive than that regarding lexicon, it is nevertheless of interest here to examine what diversity does exist, and we may begin by comparing the rank-ordering of informants in terms of taxonomy size with their relative age-ranking as in Table XXVII below.

As before with respect to lexicon size (Table XI, p. 211), there is a statistically significant correlation between age rank-order and individual taxonomy size, whether idiosyncratic taxa are included ($G = .644$, $p < .01$) or excluded ($G = .711$, $p < .01$). Again the two youngest informants (A and F) evidence a substantial gap between their relatively small plant taxonomies and those of the older adults, among whom there is less of a range of variation.

Moreover, when the informants are grouped by sex and compared to age-rankings, as was done previously regarding variable lexicon size, the result is the same as before, viz., a clear and consistent pattern among the female informants

TABLE XXVII

COMPARISON OF AGE RANK-ORDER
AND INDIVIDUAL TAXONOMY SIZE

Incl. Idiosyncraties				Excl. Idiosyncraties			
Inf.	Age Rank	Rank	Number of Taxa	Inf.	Age Rank	Rank	Number of Taxa
E	10	8	(884)	E	10	9	(883)
J	9	10	(897)	J	9	10	(890)
D	8	6	(873)	D	8	6	(873)
I	7	5	(858)	I	7	5	(858)
C	6	7	(883)	C	6	8	(881)
H	5	4	(851)	H	5	4*	(848)
B	4	9	(885)	B	4	7	(875)
G	3	3	(848)	G	3	4*	(848)
A	2	2	(835)	A	2	2	(835)
F	1	1	(826)	F	1	1	(825)

* Tie.

$$\underline{G} = .644$$

$$(p < .01)$$

$$\underline{G} = .711$$

$$(p < .01)$$

but no statistically significant correlation at all among the males (see Table XXVIII below; cf. Table XIII, p. 215), with nearly identical coefficients of association for the two sexes as before. Thus, as with lexicon size, the association

TABLE XXVIII

COMPARISON OF AGE RANK-ORDER
AND INDIVIDUAL TAXONOMY SIZE
(SEPARATED BY SEX)

Incl. Idiosyncraties				Excl. Idiosyncraties			
Age		Rank		Age		Rank	
Inf.	Rank	Number of Taxa		Inf.	Rank	Number of Taxa	
MALES ONLY							
E	5	4	(884)	E	5	5	(883)
D	4	2	(873)	D	4	2	(873)
C	3	3	(883)	C	3	4	(881)
B	2	5	(885)	B	2	3	(875)
A	1	1	(835)	A	1	1	(835)

$$\underline{G} = .200$$

$$(\underline{p} > .05)$$

$$\underline{G} = .600$$

$$(\underline{p} > .05)$$

FEMALES ONLY

J	5	5	(897)	J	5	5	(890)
I	4	4	(858)	I	4	4	(858)
H	3	3	(851)	H	3	3*	(848)
G	2	2	(848)	G	2	3*	(848)
F	1	1	(826)	F	1	1	(825)

* Tie.

$$\underline{G} = 1.00$$

$$(\underline{p} = .01)$$

$$\underline{G} = .900$$

$$(.01 < \underline{p} < .05)$$

between age-order and taxonomy size is due principally to the female informants, for whom the association is nearly perfect.

While the above discussion has revealed some interesting patterns in the variation of individual plant taxonomy sizes, one cannot yet draw any conclusions regarding similarities among the various taxonomies or this kind of plant knowledge. That is, no evidence has yet been offered with regard to the similarity of the content of the individual taxonomic systems. It is clear that similarity or difference in the number of taxa distinguished by different individuals does not necessarily imply similarity or difference so far as the taxa themselves are concerned. For example, one person might distinguish five different kinds of yams and two of sweet potatoes, while another distinguishes only two sub-classes of yams, but five of sweet potatoes. At least with regard to this limited portion of their respective taxonomies, we would see that they contain exactly the same number of taxa, but the contents of the two systems would be quite dissimilar. Therefore we must assess the extent of agreement among informants in statements of taxonomic relationships before any conclusions can be reached about sharing of plant categories.

As with the examination of lexicon-sharing in the previous section (p. 214 above), the procedure is to inspect the data in Appendix 3 (excluding idiosyncratic plant names, reducing the total to 276 names), and record each instance in which a pair of informants not only both know a particular plant name, but also agree as to the taxonomic status of the category it labels. The figures which result are presented in a matrix, indicating the number of plant names about which there is agreement of this type, in Table XXIX below.

TABLE XXIX
TAXONOMIC AGREEMENT BY INFORMANT PAIRS
(276 Plant Names)

Lex. Size Inf.	(102)	(195)	(222)	(210)	(204)	(135)	(174)	(172)	(192)	(234)
	A	B	C	D	E	F	G	H	I	J
A	-	80	80	80	73	39	45	45	51	67
B	80	-	157	157	148	91	120	114	122	140
C	80	157	-	174	170	99	134	120	136	168
D	80	157	174	-	165	98	128	122	135	156
E	73	148	170	165	-	91	117	116	127	148
F	39	91	99	98	91	-	104	98	101	111
G	45	120	134	128	117	104	-	126	132	144
H	45	114	120	122	116	98	126	-	133	139
I	51	122	136	135	127	101	132	133	-	153
J	67	140	168	156	148	111	144	139	153	-

The figures in Table XXIX do not provide a direct measure of similarity among individuals' taxonomies, however, since they include statements of agreement as to synonymy as well as to the existence of distinct folk taxa. An initial step toward a more illuminating measure is taken by examining those names about which any pair of informants agree, and determining the number of shared taxa these represent as opposed to synonyms. For example, Informants A and B agree in their taxonomic statements regarding 80 of the 276 plant names in Appendix 3. Of these 80 names, both agree that 25 are synonyms for plant names they both know, while 55 label taxa which are not included in the core, or fully-shared, taxonomy (Appendix 2). Thus, the number of shared named taxa in the variable portions of the two informants' taxonomies is 55.

These new figures for all informant pairs are provided in matrix format in Table XXX below, where I have also indicated the number of taxa distinguished by each informant which are not included in the core taxonomy. For example, Informant A has 69 taxa in what may be called his "variable taxonomy" (cf. "variable lexicon" above); of these, 55 also are held by Informant B in his variable taxonomy of 109 taxa, and so on.

It may be noted that Informant C's variable taxonomy also includes 55 of the taxa in that of Informant A, but this does not imply that they are the same 55 taxa as distinguished by Informant B, just as in the discussion earlier, sharing of identical numbers of plant names did not necessarily mean that lexicons were identical in content. Nor do the same numbers

TABLE XXX
VARIABLE TAXONOMY-SHARING BY INFORMANT PAIRS
(276 Plant Names)

Tax. Size Inf.	(69)	(109)	(115)	(107)	(117)	(59)	(82)	(82)	(92)	(124)
	A	B	C	D	E	F	G	H	I	J
A	-	55	55	52	53	21	31	29	34	40
B	55	-	86	82	85	44	64	60	66	72
C	55	86	-	87	94	44	67	60	68	82
D	52	82	87	-	90	42	62	61	68	76
E	53	85	94	90	-	44	62	64	71	80
F	21	44	44	42	44	-	45	38	42	48
G	31	64	67	62	62	45	-	57	61	68
H	29	60	60	61	64	38	57	-	63	65
I	34	66	68	68	71	42	61	63	-	76
J	40	72	82	76	80	48	68	65	76	-

of shared taxa mean that the taxonomies of informant pairs A and B, and those of A and C are equally similar, since there is a difference in size between the variable taxonomies of Informants B and C, and therefore different proportional similarity between their and Informant A's taxonomies.

To judge more accurately the relative similarity of the informants' variable taxonomies, as before with regard to variable lexicon similarity, we may combine the taxonomies of each pair of informants and calculate the percentage of this union which is shared by the two. Thus, in the example cited above, the 55 taxa distinguished by both Informants A and B represent the intersection of their two variable taxonomies which contain 69 and 109 taxa, respectively. If we double the number of shared taxa (since they are included in each of the two totals), and divide the product by the sum of the two individual taxonomy totals, we obtain the percentage of their combined taxonomies which they share, or that proportion which is identical -- in this case, 61.80%:

$$\frac{2(55)}{69 + 109} = \frac{110}{178} = .6180$$

Performing the same operation for the informant pair A and C, we find:

$$\frac{2(55)}{69 + 115} = \frac{110}{184} = .5978$$

Thus we can conclude that Informants A and B are more similar so far as their individual variable taxonomies are concerned than are A and C (61.80% vs. 59.78%), even though the number

of plant taxa shared by both pairs is the same.

In order to determine the relative similarity of the variable taxonomies of all informant pairs, I have performed these calculations which produce the matrix shown in Table XXXI below. Employing these percentages of shared taxonomies the informants can now be ranked in relation to each other informant as in Table XXXII (cf. Table XVIII, p. 225).

As was the case in lexicon-sharing percentages (see Table XVIII), the two youngest informants of the two sexes, A and F, occupy the lower ranks. Interestingly, there is a neat division between the two with respect to the lowest rank, with Informant F having the least similar variable taxonomy of all informants to any of the five males, and Informant A the least similar to all five females.

There is further evidence of gender-based patterning at the highest ranks, especially for the male informants. If Informant A is disregarded, with his relatively small taxonomy strongly influencing his ranking, the three informants who share the most taxa with respect to any of the males are the other three male informants. However, this pattern is not perfect so far as the females are concerned. Again disregarding the smallest taxonomy, held by Informant F, the three most similar taxonomies to those of Informants F and I are those of three other females; the two most similar to those of G and H are those of two females; but Informant J (the oldest female informant) does not manifest a simple gender-association at all.

Thus, when shared taxa are considered, the strong sex-

TABLE XXXI
 PERCENTAGES OF COMBINED VARIABLE TAXONOMIES
 SHARED BY INFORMANT PAIRS
 (276 Plant Names)

Inf.	A	B	C	D	E	F	G	H	I	J
A	-	61.80	59.78	59.09	56.99	32.81	41.06	38.41	42.24	41.45
B	61.80	-	76.79	75.93	75.22	52.38	67.02	62.83	65.67	61.80
C	59.78	76.79	-	78.38	81.03	50.57	68.02	60.91	65.70	68.62
D	59.09	75.93	78.38	-	80.36	50.60	65.61	64.55	68.34	65.80
E	56.99	75.22	81.03	80.36	-	50.00	62.31	64.32	67.94	66.39
F	32.81	52.38	50.57	50.60	50.00	-	63.83	53.90	55.63	52.46
G	41.06	67.02	68.02	65.61	62.31	63.83	-	69.51	70.11	66.02
H	38.41	62.83	60.91	64.55	64.32	53.90	69.51	-	72.41	63.11
I	42.24	65.67	65.70	68.34	67.94	55.63	70.11	72.41	-	70.37
J	41.45	61.80	68.62	65.80	66.39	52.46	66.02	63.11	70.37	-

TABLE XXXII
 RANK-ORDERING OF VARIABLE TAXONOMY-SHARING BY INFORMANT PAIRS
 (Converted to Percentages of Combined Taxonomies)
 (276 Plant Names)

Inf.	A	B	C	D	E	F	G	H	I	J
B	(61.80)	(76.79)	(81.03)	(80.36)	(81.03)	(63.83)	(70.11)	(72.41)	(72.41)	(70.37)
C										
D	(59.78)	(75.93)	(78.38)	(78.38)	(80.36)	(55.63)	(69.51)	(69.51)	(70.37)	(68.62)
E										
F	(59.09)	(75.22)	(76.79)	(75.93)	(75.22)	(53.90)	(68.02)	(64.55)	(70.11)	(66.39)
G										
H	(56.99)	(67.02)	(68.62)	(68.34)	(67.94)	(52.46)	(67.02)	(64.32)	(68.34)	(66.02)
I										
J	(42.24)	(65.67)	(68.02)	(65.80)	(66.39)	(52.38)	(66.02)	(63.11)	(67.94)	(65.80)
	(41.45)	(62.83)	(65.70)	(65.61)	(64.32)	(50.60)	(65.61)	(62.83)	(65.70)	(63.11)
	(41.06)	(61.80)	(60.91)	(64.55)	(62.31)	(50.57)	(63.83)	(60.91)	(65.67)	(61.80)
	(38.41)	(61.80)	(59.78)	(59.09)	(56.99)	(50.00)	(62.31)	(53.90)	(55.63)	(52.46)
	(32.81)	(52.38)	(50.57)	(50.60)	(50.00)	(32.81)	(41.06)	(38.41)	(42.24)	(41.45)

* Tie.

based pattern found earlier is not so impressive, although there is considerable evidence for it so far as the males are concerned. Additional, and even stronger, evidence may be seen by examining the percentage of taxa shared by each informant with various "average" informants divided in the same way as in Table XX above (p. 228). In Table XXXIII below, one can see that, with no exceptions, every informant shares more taxa with the average of the informants of his own sex than with either the average of the informants as a whole, or with the average of the opposite sex informants.

Finally, if we draw a profile of the relative rankings by informant in Table XXXIV (cf. Table XXI, p. 229), we see that in only two cases are any informants more similar to any informants of the opposite sex than to the other four members of the same sex. Informant E (the oldest male) is the 3rd most similar informant to J (the oldest female), while only 4th most similar to A, the youngest male; the special problems with Informant A's relatively small taxonomy should be recalled here, however. The other exception concerns Informant J, who is the 4th most similar to Informant C (a male) but only 5th most similar to two female informants, G and H. A probable factor in this, however, is the fact that Informant C is J's son and, given the early enculturation patterns in Ndumba, it is not surprising that they share a good deal of plant knowledge.

On balance, then, with exceptions such as the above noted and at least reasonable explanations for their occurrence, in

TABLE XXXIII
AVERAGE PERCENTAGE OF PLANT TAXA SHARED (BY SEX)
(276 Plant Names)

Inf.	A	B	C	D	E
$\bar{X}$	48.18	66.60	67.76	67.63	67.17
excl. A & F	50.10	69.32	71.35	71.28	71.08
$\bar{X}$ Male	59.42	72.44	74.00	73.44	73.40
excl. A	---	75.98	78.73	78.22	78.87
$\bar{X}$ Female	39.19	61.94	62.76	62.98	62.19
excl. F	40.79	64.33	65.81	66.08	65.24

Inf.	F	G	H	I	J
$\bar{X}$	51.35	63.72	61.11	64.27	61.78
excl. A & F	53.67	66.94	65.38	68.65	66.02
$\bar{X}$ Male	47.27	60.80	58.20	61.98	60.81
excl. A	50.89	65.74	63.15	66.91	65.65
$\bar{X}$ Female	56.46	67.37	64.73	67.13	62.99
excl. F	---	68.55	68.34	70.96	66.50

TABLE XXXIV
 PROFILE OF RELATIVE RANKINGS BY INFORMANT
 (Percentage of Combined Taxonomies Shared)

Inf.	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Degree of Closeness					
1st		A	B,E		C,D
2nd			A,D,J	B,C,E	
3rd		C,D,E	G	A,H	B,J
4th		G		I	A,H
5th		F		J	I
6th		H	I	F,G	
7th	B	I,J	F,H		
8th	C,D,E				F,G
9th	F,G,H,I,J				

Inf.	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
1st		F	I	G,H,J	
2nd		H	G	F	I
3rd		I	F		
4th		B,J		D,E	C,F
5th		C		A,B	D,E,G,H
6th		D	B,E,J	C	A
7th	G	A,E	C,D		B
8th	H,I,J		A		
9th	A,B,C,D,E				

both lexicon and taxonomic knowledge, the informants have followed a consistent age-associated pattern so far as the quantity of knowledge is concerned. With respect to the sharing of either kind of knowledge between informant pairs, however, no age-based grouping has been observed. What has recurred repeatedly, on the other hand, is a strong association between gender and plant knowledge, at least as reflected in the kinds of data considered so far.

This pattern was one of those regarded in advance of the field research as most likely to be discovered (cf. Hypothesis II above, pp. 138-141). In Ndumba, as described in Chapter II, there is in general a gender-based division of labor, residential segregation of the sexes, roughly parallel sets of age-grades for the two sexes, widespread division of activities into male and female spheres -- in all, a society-wide fundamental distinction between the sexes like those which have been found so often in the New Guinea Highlands (cf. Meggitt 1964).

With this kind of dichotomy at the core of Ndumba society and culture, it would be surprising if one did not find knowledge distributed among the population along sex lines, if not completely, then at least to a significant degree. For example, given a male child's experience of roaming the gardens, grasslands and forests principally with other males, one might expect him to learn primarily what those other males know. Such a tendency would acquire even more direction once the separation from his mother and other women takes place with his gummaana initiation. With the assumption of this status, and

a residential relocation to the men's house, the boy more fully enters the world of males and, especially important to the present argument, he takes on the responsibility for that knowledge -- including knowledge of plants -- which a male is both expected and relied upon by others to possess.

Similarly a female child, in her experience in the gardens, grasslands and forests (but only the lower reaches), has her opportunities to learn about plants restricted because of her gender, both with respect to the variety of plants she encounters and the range of people (viz., females) from whom she might learn about them. With the eventual departure of her brothers and residential segregation of the sexes, her associates will continue to be predominantly females for the rest of her life. Since her responsibilities will be the same as those of other women for the most part there is, as for the males, a vested social interest in her acquisition of appropriate knowledge, especially in such a critically important domain as plants.

For both sexes, then, the enculturation processes are well-designed to insure that these social expectations are likely to be met, and my data indicate that they probably are. Gender-associated differences in plant knowledge are not absolute, of course, but neither is the separation of the sexes. A male child has ample opportunities to learn from his mother, for instance, during his early residence with her, as well as in his continuing association with her at the evening mealtime (witness the similarities between Informant C and his mother,

J, above).

The same kinds of opportunities for cross-sex learning, so to speak, exist for husbands and wives, daughters and fathers, brothers and sisters and even more diverse groupings during community-wide activities, e.g., work groups, feasts and celebrations. Thus, I do not mean to imply that Ndumba is a rigidly-segregated society in which males and females interact only to reproduce. Nevertheless, the male-female dichotomy permeates so much of Ndumba social life that it is reasonable to expect some patterned effects in learning. With respect to the data considered so far at least, such a pattern is not only expected but demonstrated.

Thus, with the qualifications implied in the above discussion, it seems legitimate to speak at least tentatively of "male" vs. "female" plant knowledge among my informants and, to the extent that they are representative, among the Ndumba population. There appears to be not only a quantitative distinction which can be made, but a qualitative one as well. With regard to size of plant name lexicon, there is a slight difference in favor of the average male, with 1,128.6 or 1,124.6 names (respectively including and excluding idiosyncratics), compared to the average female's 1,122.4 or 1,119.4 names. As for size of plant folk taxonomy, measured simply as the number of taxa, the difference is larger and again in favor of the average male, who distinguishes 872.0 or 869.4 taxa, as opposed to the average female's 856.0 or 853.8 (cf. Table XXIII above, p. 234).

If we only considered these quantitative differences, it might be surprising that they are not greater, since men's activities encompass all of the eco-zones frequented by women and additionally include the higher portions of the forest, thus three additional vegetation communities (cf. Chapter II, pp. 63-67). However, it also seems reasonable to suppose that opportunities to observe plants do not necessarily result in acquisition of knowledge regarding them. Thus, e.g., a man who is repairing a garden fence has less reason to pay much attention to the plants growing along the drainage ditches than does his wife, who is primarily responsible for recognizing the "weeds" and removing them. Similarly, a woman collecting fence palings cut by her husband in the lower forest, alone or accompanied by another woman, might well give little notice to the trees around her as she stacks her load.

Thus, the different reasons for frequenting the various vegetation communities in Ndumba (those motivations based largely on the division of labor) could result in differential knowledge, in both degree and kind, of the plants that are found in them. So it is that qualitative differences in plant knowledge appear to characterize the two sexes among my informants. The gender-associated sharing patterns discovered above, in both plant name lexicon and taxonomic knowledge, support the conclusion that men do not simply know more about plants than do women, but that they know different things. That is, it is not the case that "men know what women know and then some," but that men tend to possess a certain body of plant knowledge and

the women another, the two information pools overlapping but distinct.⁸

Before any extrapolation might be made from these results to suggestions of "male culture" vs. "female culture," even with respect to only the domain of plants, three cautionary points must be mentioned. First, speaking of "average informants" -- male, female, or of unspecified gender -- must be qualified by the small sample size, but also by acknowledging the considerable range of variability within either sex. Such differences as those between Informants A and C, e.g., with respective individual plant name lexicons of 1,040 vs. 1,160 names and individual taxonomy sizes of 835 vs. 881 taxa (idiosyncratics excluded), can too easily be obscured by reifying an average of these two as a man with a lexicon size of 1,100 names and a taxonomy of 858 taxa. Indeed, one of the principal goals of this dissertation has been to point out the degree to which just such obfuscation can result from an ethnographer's search for supra-individual entities to describe, a point to which I will return in conclusion.

Second, all of the above interpretations have been stimulated and supported by sharing of knowledge between various pairs of informants. I have not explored possible sharing patterns among informant triads, tetrads, and so forth. It is possible that contradictory, or additionally-supporting, patterns would be discovered by so expanding the analyses. These explorations must be left for another time, however, and the present work judged within these limitations.

Third, the degree of sharing of plant knowledge among informants has not as yet been operationalized and measured as precisely or thoroughly as possible. After arguing that two informants could both know a given plant name yet not label the same conceptual class with that expression, I proceeded to examine agreements and disagreements among statements of taxonomic relationships, one indicator of conceptual categories as designata. It is still possible, however, for agreement as to semantic relationships of classes to mask differences in denotative meanings.

Thus, e.g., two Americans might know the expression "fir" and both agree that it is a kind of "tree" -- perhaps even to the point of agreeing that it is a kind of "conifer." However, for one of these two the expression(s) might label an "empty category"; i.e., he has only heard the name and knows what sort of thing it is supposed to label, but doesn't really know what a "fir" looks like, whereas the other individual is very familiar with "firs," preferring them above all other "conifers" as his Christmas tree. Or, on the other hand, both might feel that they know what a "fir" looks like but when touring a Christmas tree lot find that they disagree as to which are "firs" and which "spruces." Thus, while the two agree that the term "fir" designates a sub-class of "conifers" within another sub-class "trees," they find that their respective referential or denotative meanings of the term are different.

It is this kind of sharing or non-sharing of plant knowledge which would presumably be the most consequential for

Ndumba. While Americans seldom have the occasion to put their plant knowledge to such tests, the referential meanings of plant names in Ndumba are, in the end, the most important of all in terms of daily living. If a boy is sent out to gather kem'bora leaves for use in an earth oven feast, he is expected by others to bring back leaves which they would agree came from kem'bora. If his concept of kem'bora (i.e., the referential meaning of that term for him) sufficiently differs from theirs, his response to the request or demand will be inappropriate.

I now, therefore, turn to an examination of informants' sharing of denotative meanings of the plant names so far discussed, principally on the basis of performances of naming tasks (see Appendices 4 and 5). Whatever patterns might be found there should be the most illuminating with respect to the central question of the distribution of plant knowledge within the sample.

Denotational or Referential Meanings

In turning to a sample of the plants of Ndumba territory, my principal concern is not to describe "the Ndumba plant world" in Western botanical terms, having previously discussed its more "cognitive" aspects. Rather, I continue the main investigation of this chapter and the dissertation as a whole, viz., how much and in what ways do individual views of this world differ, and what patterns emerge from an examination of these differences? So far as linguistic labels for plants and conceptual categories into which they are grouped are concerned,

the extent and possible regularities within informant diversity have already been suggested above. That discussion can now be further clarified and its data base expanded by an examination of informants' applications of these names to actual plants, and thus the empirical content of the categories themselves can be partially inferred.

I have already described in Chapter III the techniques, both informal and formal, which I employed in determining how the plant names and folk taxa correspond to Ndumba vegetation as the Western botanist conceives it. While I collected information on this matter from many sources, for the sake of comparability among informants the discussion here will focus only on the data obtained in standardized and controlled plant identification sessions with my ten informants. These data are provided in full in Appendix 4, comprising 5,104 naming responses to 517 plant specimens.

The extent of diversity among these responses is initially indicated by the fact that to only 136 of the plants (or 26.3% of the total number) was a single name (or synonymous names) given by all ten informants. While no plant specimen received ten different names, and relatively few received seven or more, 354 (or 68.5%) evoked from two to six conceptually distinct naming responses, i.e., semantically distinct legitimate plant names as opposed to descriptive phrases (cf. recapitulation at end of Appendix 4, or Table VI above, p. 184).⁹

Before analyzing these diverse responses and searching for patterns within them, however, four possible sources of perform-

ance variability deserve brief comment: (1) variable context of the naming task; (2) variable adequacy of the stimuli; (3) "pseudo-compliance" and uncorrected errors in naming; and (4) responses of varying degrees of specificity. Theoretically at least, any of these could be responsible for differences among individual performances of a common task which do not necessarily reflect differences in competence or, in terms of the present discussion, differences in plant knowledge. Since these latter cognitive differences are of interest here, we must be as clear as possible as to what the data in fact imply.

(1) Variable context of the naming task. Situational or contextual influences on lexical choices have recently been widely discussed as they relate to semantic analyses, especially regarding such matters as the alternative uses of kinship terms (Burling 1970:82 ff.). Thus, an individual may label a particular person by a certain kin term in one context, by another in a different situation, depending on what kind of kin category-based behavior he wishes to evoke, or which of several possible relationships he wishes to emphasize on that occasion.

While this is true to an extent of Ndumba kin term usage (Patricia Hays, forthcoming), I have no evidence to suggest that plant names are context-sensitive, except as they may be disregarded in favor of function-based labels (e.g., fu'haa, 'medicine'). When informants offered such responses, to the extent that I recognized them as such (see Note 9 below), I repeated the request for the plant's name rather than such a descriptive expression.

More importantly, such contextual influence as might possibly occur was controlled for as far as possible by keeping the task performance context virtually the same throughout the research period. On a few exceptional occasions, it was necessary for my wife to administer the task at the menstrual house where an informant was confined, rather than summoning the woman to my house where the others examined and named the plants collected on a given day. In all cases the informants were isolated for the duration of the task in order that they not be influenced in any way by the presence of others. I had no reason then, nor upon reflection now, to suspect that variability among informants' naming responses could be a function of the context of the task, except as that particular context affected all performances in some unknown, but presumably common, manner (cf. Hypothesis I above, pp. 134-137).

(2) Variable adequacy of the stimuli. Related to the general question of contextual influences on naming responses is that of the adequacy of the stimulus material (i.e., the plant specimens) which could conceivably be relevant to assessments of variable responses in either of two ways. First, if one informant were asked to name a plant in its natural context and thus able to observe its full size and usual habitat, his response might be different from that of another informant presented only with a cutting from that plant, thus less total information. Second, a single informant might give two different responses if presented with the same plant under these two conditions. Thus, two questions arise with regard to the

naming task: (1) To what extent were the plant collections made sufficiently complete for the informants to make reasonably accurate identifications? (2) Whatever the adequacy of the stimuli in this sense, did all informants have access to virtually the same amount of information in making their judgments?

So far as the first point is concerned, I must first say that it was both physically and culturally impossible for me to take my informants (excepting Informant A, who was my field assistant¹⁰) on the plant collecting trips and still maintain the isolation in task performance required by my research design. Therefore, all but Informant A were confined to the plant specimens themselves in providing naming responses, although they understood that they were permitted to ask questions of me regarding places of collection and so on, and they occasionally did so.

While the plant specimens were limited to manageable size (up to thirty or more inches in length if pliable) due to the restrictions of field-pressing, in many cases this meant that the entire plant could be collected, especially regarding herbs and grasses. Larger plants, such as shrubs, trees, ferns and long vines obviously could not be collected whole, so representative cuttings were made. Given the requirements of Western botanists who would also eventually identify the plants flowering and/or fruiting material was always included so that each plant specimen constituted, at a minimum: leaves or fronds; stems, stalks or branches; and buds, flowers or fruits. When-

ever possible multiple examples of a given plant were collected and offered for the inspection of the informants.

In contrast to this procedure, ethnosystematists who have worked in folk zoology have suggested that the "ideal stimulus is the living organism in its natural habitat observed at close range and at length" (Hunn 1973:41). This is a reasonable recommendation considering the importance in many folk classificatory systems of such characteristics of animals as motor habits, voice or call, nest form and so forth. However, plants have few if any such "behavioral" features which might be crucial in identification and my informants, like their counterparts in Western botany, reported no cases in which they were unable to make determinations on the basis of the plant specimens as presented.

This is not to say that the plant features of diagnostic relevance for my informants were the same as those for Western botanists.¹¹ In fact, those of crucial importance to the latter (viz., flowering or fruiting characteristics) were almost totally ignored by my informants. Their stated priorities and actual attention when making identifications focused on leaf shape and texture, as has also been reported for other New Guinea and Melanesian folk botanical systems (Strathern 1969:192; Panoff 1972:389). Thus, so far as my informants were concerned, the adequacy of the plant specimens was primarily judged on the basis of leaf material included, and I always included as much of it as practicable.

Even if the stimulus material, i.e., plant cuttings

rather than living organisms in situ, were judged less than ideal, however, the second question raised earlier is more pertinent to the assessment of variable naming responses, viz., "Did all informants have access to virtually the same information in making their judgments?"

With the exception of Informant A, who had seen most of the plants collected in their natural habitats¹², all informants were presented with the same material and were free to ask for additional information. While they were not shown the specimens at exactly the same time, the administration of the task to all ten individuals seldom required more than three hours, and little change in the plants (e.g., dehydration) occurred over that time period.

I have no reason, then, to suppose that variable naming responses reflect variable adequacy of the stimulus material used. Surely a tree growing in its natural habitat and a withered, dried-out branch from that same tree several days later might be regarded as different stimuli, responses to which could not be fairly considered as comparable. My procedures never included stimuli of such variability, however, and the diversity of naming responses the task evoked can reasonably be assumed to be a function of variability in some other factor. Before that factor can be identified as differential plant knowledge, however, two other possibilities must be considered.

(3) "Pseudocompliance" and uncorrected errors in naming.
In the discussion so far I have proceeded as if one could

assume that informants always respond to any question or task to the best of their ability and without error. This is, of course, not true; informants differ in their enthusiasm for a task, their interest in it and their conscientiousness in performing it as accurately and truthfully as they can. It is accordingly possible that variation in naming responses by my informants could be at least partially due to these kinds of influences on performance.

With regard to any task performance

[when] a respondent does not understand an assignment or does not wish to comply, he frequently prefers pseudocompliance to outright refusal or admission of ignorance. [Campbell 1964:322]

I encountered instances of such pseudocompliance very early in my research when I attempted to obtain animal names by showing magazine illustrations to various individuals. Scattered among what later proved to be legitimate animal names were such expressions as 'a tree' and 'a tree branch' (both being responses to a picture of a small bird perched on a branch). While I did not recognize these responses for what they were at the time, it now seems clear that the informants did not fully understand the assignment, to say the least. It is possible that many of the descriptive phrases which occurred as naming responses to plant collections (the majority of them in the first few naming sessions) were the result of similar misunderstandings. I have had to deal with these phrases, as already mentioned earlier, by substituting for them those highest-level taxon labels which seem justifiable.

More difficult to identify and compensate for are those legitimate plant names which might have been offered in lieu of admitting unfamiliarity with the plant in question. Thus, e.g., when I presented Collection Number 400, nine informants responded with the name bim'bira, and one with the name fing-gungga. Did this mean that the exceptional informant really considered the plant to be fing-gungga or, not recognizing it at all, preferred to give it a name rather than admit his ignorance? Other researchers have reported possible instances of this, as in the "average" Kyaka Enga man who, while it could not be said

that he could identify with any certainty a hundred different species of birds, or even half that number, ...would seldom be at a loss to apply a name, or even a series of alternative names, to any bird he saw or that I could show him in my bird books and illustrated magazines. [Bulmer 1957: 225-226]

Another possibility is that the informant, again not recognizing the plant with certainty, would apply the name of a plant similar to it. Thus it was reportedly the case among the Tzeltal that

when presented with a particular plant specimen, informants rarely responded that the specimen had no name. Instead, they would systematically attempt to classify or relate the specimen under observation to one of the categories in their named taxonomy. [Berlin et al., n.d.]

The Tzeltal case illustrates Campbell's contention that pseudocompliant responses are "typically not random, but instead are characterized by irrelevant regularities" (1964:322). Berlin interpreted patterns in his Tzeltal responses as indi-

cating extended ranges of the plant categories, and I have argued from patterns in my data for their possible indication of covert categories (Hays 1973).

However motivated, such instances of false compliance with the naming task can, for present purposes, only be suggested as a possible source of some of the variability in naming responses. I would contend, however, that this possibility does not greatly affect the analysis and interpretations below for two reasons: (1) even if informants sometimes gave names of familiar plants to unfamiliar but similar specimens, this would still reflect individual differences in the comprehensiveness of plant knowledge; and (2) my general impression is that my informants, by and large, responded conscientiously, in many instances offering only the name of the highest-level taxon (mauna, sa'tari, etc.), volunteering comments that they didn't know the precise name of the plant but could only call it an 'herb' or a 'tree' or that the plant in fact had no more specific name than that of its life form (such responses, which I have called labels for "residual taxa" in the introductory remarks to Appendix 2, are identified there as mauna_r, sa'tari_r, etc.). Despite this confidence however, it would be naive to assume that my data contain no cases of deception, whether willful or not. Since such cases cannot be identified with certainty if they exist, the above remarks can only serve to add a further qualification to the interpretations to follow.

Also nearly impossible to identify but included in the

data because of their opacity, are informants' uncorrected errors. There is no doubt that my informants, like anyone's, made mistaken identifications of plants, for I witnessed numerous corrections to initial responses. Informants would sometimes, immediately upon being shown a plant specimen, utter a name only to follow by saying, "'No, it's not an x, it's a y.'" On occasion an individual would even leaf back through the sheets, long after naming a plant, look at it more closely, perhaps sniff its leaves, and change his earlier response.

I must admit the possibility, then, that in some cases informants made such errors but did not correct them, either because they did not realize that mistakes had been made or they did not consider the corrections worth the trouble. The latter was more likely to be the case in the earliest stages of the research when some of my informants frankly did not know how seriously they were supposed to regard the task.

Since any evaluation of final (i.e., unchanged) responses as "errors" could only be suspected rather than proven through rechecking now that the research is completed, I cannot justify deleting or changing any of my data. I can say that I was sensitive to this possible problem while in the field and tried to watch for obvious errors. That is to say, if several informants had responded to a plant specimen with one name, and I was suddenly offered a very different name, I would usually challenge the informant. However, since a direct challenge could be interpreted by him or her as an indication of

displeasure on my part, thus likely evoking a completely uninterpretable response, I confined my challenges to requests to repeat the name. In some cases, the informant paused and changed his response after looking at the plant again; in others, the first name was simply reiterated (usually loudly).

All that I can say with confidence regarding possible uncorrected errors, then, is that there may be some in the data under discussion. I can hope, and I do believe, that they are few, but I can do little in the way of compensation for these except to advise the reader accordingly.

(4) Responses of varying degrees of specificity. This fourth source of naming response variability which does not necessarily imply differences in knowledge or ability among informants was controllable to a large extent, but deserves brief comment before proceeding to the analyses below.

It is true by definition that a member of any taxon may also be called by the name of any higher-level taxon in which it is included. Thus, an American informant might legitimately respond to an indicated tree with the names "red maple," "maple" or "tree," depending on the degree of specificity chosen. When that choice is left to the informant, the resulting response can be ambiguous to the questioner. For example, if the informant responds with the name "tree," this could mean that he does not know a "red maple" or even a "maple" when he sees one, or simply that he chose to answer at a higher taxonomic level. Furthermore, when more than one informant is asked to name the plant, and various of the three

responses mentioned are given, one cannot be certain that this represents differential recognition by the informants or only choices made at different levels of inclusion. It is possible that all of the informants recognize the tree as a "red maple" but not all choose to be that specific in their responses.

A number of instances of this kind of ambiguity exist in my data, e.g., in the case of Collection Number 057, which was identified by nine informants as gia'tai'para, but by the tenth simply as mauna (see Appendix 4). All ten informants agree that gia'tai'para labels a taxon of generic rank within the life form taxon labeled mauna (Appendix 2). The question is posed, but now unanswerable, as to whether the exceptional informant did not regard the plant specimen as an example of gia'tai'para (thus differing from the others in his concept of gia'tai'para) or did, but chose to use the more inclusive name mauna -- a name which the others might also have used had they not chosen to be more precise.

Fortunately, such cases are relatively few in number and confined to the very earliest plant collections, made when I was not familiar with the plant names or able to recognize higher-level taxon labels when they were used. As the research progressed I was able to probe for greater specificity with the query: "Nraa _____ ve?" ('Which _____ is it?'), and my informants soon learned that I wanted them to respond, as a matter of routine, with the most specific name applicable to each plant. Thus the naming response data to be analyzed below

contain some of these problematic cases, impossible to clarify after the fact, but not enough of them to significantly affect the results.

In the preceding pages I have discussed four possible explanations for the informant variability in plant naming responses portrayed in Appendix 4. Because of the control measures included in the research design, none of these can satisfactorily account for the observed results except in a few possible cases. I have indicated as clearly as I can how these exceptions might have occurred and, given the restriction on opportunities for rechecking, why they cannot be identified with certainty and thus deleted from analyses.

Subject to these qualifications, then, my analyses proceed from the assumption that the plant naming responses shown in Appendix 4 are indicators of my informants' familiarity with the plants shown to them, rather than reflections of uncontrolled influences inherent in the task itself. To the extent that this is a justified assumption, differences and similarities among the responses may serve as evidence of informants' relative sharing of plant knowledge of this kind.

Performance of the plant naming task by my informants may be assumed to have involved at least two basic steps: (1) through observation of either perceptual cues or an overall pattern of features of the plant, recognize the plant as corresponding to a conceptual category, i.e., as a member of a

class of plants; and (2) assign a name to the plant on the basis of this perceived membership in a class which is habitually designated, as a folk taxon, by some linguistic expression.

If the informants performed the task conscientiously, their naming responses would then be functions of both the complexity of individual taxonomies (determining the number of classes into which the plant might be placed) and the extent of individual plant name lexicons (determining the names available for either designation or denotation). Thus the plant naming responses about to be considered provide a final, and perhaps the most relevant, indicator of differences in individual plant knowledge. Moreover, since they are influenced by these two variables, we might expect to find the same kinds of patterns in the naming responses as have already been observed in both lexicon and taxonomic knowledge.

My first approach to analysis of the responses can best begin by illustrating how these differences in either individual lexicons or taxonomies can affect the naming response in two hypothetical, but not unrealistic, cases.

(1) Informant A is presented with a plant specimen which the other nine informants have named fogini (i.e., assigned to the folk generic taxon labeled fogini within the more inclusive life form taxon labeled sa'tari; cf. Appendix 3). Informant A has no difficulty placing the specimen within the life form sa'tari, but reports that it is not a member of any of the named folk genera of sa'tari with which he is familiar. He knows that it cannot be denoted by the name for any of the

sa'tari folk genera which he does know since it does not satisfy the criteria for inclusion in those classes. Instead, he must decide that the specimen is a member of the heterogeneous class of all those sa'tari which are not distinguished among (by him), a class which I have chosen to call a "residual genus" and which he labels with the polysemous expression sa'tari (distinguished for purposes of description from the life form name by adding a subscript, as sa'tari_r).

Alternatively, he might try to name the plant more precisely by saying that it is 'like' or 'similar to' some other named class, but would finally have to assign it to the residual class; or, he might guess as to its membership by giving it a name which he knows, but whose designatum is unclear to him (cf. Hunn 1973:77 for "loose names"). For example, an American informant might know the name "gingko" but have no clear idea as to how a "gingko" differs from other trees; when presented with an unfamiliar tree he might then think, "Maybe this is what people mean by 'gingko'" and name the tree accordingly.¹³

In any of these instances, variability in naming responses can thus reflect differences in taxonomic complexity, as in the absence of a taxon labeled by those who know it with fogini or "gingko."

On the other hand, differences in naming may reflect only variable lexicon: Case (2) Again, Informant A is shown a plant specimen which the others have identified as fogini. In this case, however, Informant A recognizes it as a member of a distinct sub-class within the life form sa'tari, distinguishable

from all other folk genera. Thus he does not differ from the other informants in taxonomy, having a clear concept of this category. However, he does not know the name fogini, having never heard it before. Unable to assign it to any other named folk genus, he has no choice but to place it, nomenclaturally, within the residual genus and call it only sa'tari(r). Whereas in the earlier case, not distinguishing such a taxon, he might have qualified his response of sa'tari(r) with "'It has no name,'" in this case he admits that "'It has a name,'" (i.e., it is a member of a particular class) "'but I don't know it.'"

Thus plant naming responses differentially employing residual taxon names can indicate either individual differences in taxonomic knowledge or lexicon, or both, and bear directly on the question of variable plant knowledge. Whichever relative deficiency they reflect in a given case, we can make an initial inquiry into informant variability in knowledge by examining the frequencies of such residual responses by each informant (see Appendix 5).¹⁴

As I described in Chapter III, I made a total of 517 plant collections, but due to unexpected informant absences the number of naming responses was 5,104 (Informant C not present to identify Collections 449 through 470, and Informant I having missed Collections 143-166 and 299-318). In order to maintain strict comparability among the informants, only those plant specimens which all ten were able to identify, totalling 451, will be considered here, reducing the number of responses to 4,510.

By inspecting Appendix 5 I have tabulated for each informant the number of plant specimens which he or she assigned to a residual genus within one of the five agreed-upon life form taxa (foringa, mauna, muso, sana and sa'tari); these figures are provided in Table XXXV below.¹⁵ The individual totals are then combined in Table XXXVI with those for residual species assignments (e.g., hotera_r, kwazakwaza_r) to give an overall indication of each informant's use of this kind of category in identifying plants.

As can be seen from these two tables, the informants varied considerably in their use of residual naming responses. I must admit the likelihood that many of the plants I collected legitimately fall within these heterogeneous classes, especially since I tried to obtain a representative sample of the local flora rather than overemphasize those plants which were "important" or those which I had been casually told had distinctive names (i.e., were members of clearly-distinguished folk genera or folk species). Thus, if one attended only to Informant A's naming responses it would seem highly credible that slightly more than one-third of the plant specimens collected were from such unremarkable herbs, shrubs and trees (the majority of the residual responses being mauna_r and sa'tari_r).

However, on the basis of Informant C's responses, I collected relatively few plants that could not be assigned to a distinctively-named folk genus or folk species -- in fact, only slightly less than one-tenth of my collections were unclassifiable to this extent in his opinion.

TABLE XXXV
 FREQUENCY OF RESIDUAL GENERIC NAMING RESPONSES
 (4,510 Naming Responses)

Inf.	<u>foringa</u> _r	<u>mauna</u> _r	<u>muso</u> _r	<u>sana</u> _r	<u>sa'tari</u> _r	Total
A	4	81	9	6	29	129
B	3	53	2	4	26	88
C	1	27	0	1	6	35
D	5	53	6	5	21	90
E	4	49	0	3	10	66
F	2	55	6	8	30	101
G	1	68	2	6	36	113
H	1	45	2	4	12	64
I	1	32	2	3	12	50
J	2	21	1	5	12	41
$\bar{X}$	2.4	48.4	3.0	4.5	19.4	77.7
$\bar{X}$ Males	3.4	52.6	3.4	3.8	18.4	81.6
$\bar{X}$ Females	1.4	44.2	2.6	5.2	20.4	73.8

TABLE XXXVI
 FREQUENCY OF RESIDUAL NAMING RESPONSES
 (GENERIC AND SPECIFIC)
 (4,510 Naming Responses)

Inf.	Residual Genera	Residual Species	Total	% (N=451)
A	129	24	153	33.9
B	88	12	100	22.2
C	35	8	43	09.5
D	90	12	102	22.6
E	66	16	82	18.2
F	101	9	110	24.4
G	113	12	125	27.7
H	64	14	78	17.3
I	50	7	57	12.6
J	41	18	59	13.1
$\bar{X}$	77.7	13.2	90.9	20.2
$\bar{X}$	81.6	14.4	96.0	21.3
Males				
$\bar{X}$	73.8	12.0	85.8	19.0
Females				

It seems reasonable to interpret these data as indicating very little about the plants I collected, but rather more about my informants' relative familiarity with the local flora. It is possible that personality factors were influential in determining the differential use of residual names; e.g., Informant C may have been consistently reluctant to use them since I might interpret such responses as evidence that he did not know plants very well, and thus his prestige would suffer in my eyes. Indeed, on several occasions he remarked to me that one or another individual knew little about plants: "'You could show him plants which are very common and all he could say is 'mauna'."

Despite this kind of impressionistic evidence for biased responses (restricted to Informant C, and possibly E, in any case), the range of variation across informants permits a ranking which can then be compared to those previously obtained as indices of differential plant knowledge. Thus in Table XXXVII I have rank-ordered the ten informants according to the number of residual responses made, and compare this ranking to the separate rank-orders by lexicon and taxonomy size (idiosyncratic names and taxa included since they also occur in naming responses). If the use of residual taxon assignments is simply a function of lexical and/or taxonomic knowledge, we would expect an inverse relationship between the ranking under present consideration and the two earlier obtained, which were highly consistent with each other (cf. Table XXIV above, p. 236). That is, those informants who

TABLE XXXVII
COMPARISON OF RESIDUAL RESPONSE RANK-ORDER
AND PLANT NAME LEXICON AND TAXONOMY SIZE RANK-ORDERS

Inf.	Rank Lex. Size	Rank Res. Resp.	Inf.	Rank Tax. Size	Rank Res. Resp.
J	10	3 (59)	J	10	3 (59)
C	9	1 (43)	B	9	6 (100)
D	8	7 (102)	E	8	5 (82)
B	7	6 (100)	C	7	1 (43)
E	6	5 (82)	D	6	7 (102)
I	5	2 (57)	I	5	2 (57)
H	4	4 (78)	H	4	4 (78)
G	3	9 (125)	G	3	9 (125)
F	2	8 (110)	A	2	10 (153)
A	1	10 (153)	F	1	8 (110)

$$\underline{G} = -.489$$

$$(.01 < \underline{p} < .05)$$

$$\underline{G} = -.422$$

$$(\underline{p} > .05)$$

possess larger inventories of plant names and/or folk taxa -- if these have clear referential meanings for them -- should resort less often to residual responses since their "miscellaneous" categories would be less inclusive than those of informants with less elaborate systems.

As can be seen in Table XXXVII, the expected inverse relationship occurs with respect to lexicon size to a statistically significant degree ($\underline{G} = -.489$, $.01 < p < .05$); with regard to taxonomy size, however, the relationship is sufficiently weak to reject in statistical terms ($\underline{G} = -.422$, $p > .05$). It may be noted that the three informants with the smallest lexicons and taxonomies (A, F and G) rank highest in residual responses as was expected from the informants as a whole. For the rest of the sample, however, there is no such clear consistency, resulting in a relatively low coefficient of association.

Further inquiries may be made by examining naming responses separately as they involve either the generic or specific rank. In Table XXXVIII each individual's taxonomy size with respect to each of these ranks is compared to his or her frequency of residual responses at that rank. Again we would expect to find an inverse relationship between the two, with informants who make the most generic distinctions among plant classes resorting to residual generic naming responses least frequently, their "miscellaneous" categories being less inclusive than those of informants who make fewer generic subdivisions of the life forms (the same expected to hold regarding folk species as well). However, despite the fact that both of these sets of rankings are different from the combined ranking in Table XXXVII above, there is no clear or consistent correlation at either rank (cf. Table XXV, p. 237).

TABLE XXXVIII
COMPARISON OF TAXONOMY SIZE RANK-ORDER
AND RESIDUAL RESPONSE RANK-ORDER
(GENERIC AND SPECIFIC RANKS SEPARATED)

Inf.	Rank		Inf.	Rank	
	No. Genera	Res. Resp.		No. Species	Res. Resp.
B	10 (454)	6 (88)	J	10 (412)	9 (18)
E	9 (448)	5 (66)	D	9 (404)	6* (12)
C	8*(445)	1 (35)	C	8 (401)	2 (8)
J	8*(445)	2 (41)	E	7 (400)	8 (16)
D	6 (434)	7 (90)	B	6 (398)	6* (12)
A	5 (430)	10 (129)	G	5*(397)	6* (12)
I	4 (428)	3 (50)	I	5*(397)	1 (7)
H	3 (422)	4 (64)	H	3 (395)	7 (14)
G	2 (418)	9 (113)	F	2 (389)	3 (9)
F	1 (406)	8 (101)	A	1 (372)	10 (24)

$$\underline{G} = -.289$$

$$(p > .05)$$

$$\underline{G} = +.044$$

$$(p > .05)$$

Indeed, the inverse relationship between the number of generic taxa in an individual's taxonomy and his use of residual generic naming responses is too slight to be significant ($\underline{G} = -.289$, $p > .05$); so far as taxa of specific rank are concerned, the relationship is not inverse at all, but slightly positive, although probably attributable to chance ($\underline{G} = +.044$, $p > .05$).

It would seem from the above that the variable frequency of residual naming responses as used by informants cannot be explained by differences in either lexicon or taxonomy size. Moreover, if these responses are, instead, indications of variable knowledge of plants "on the ground" (which is surely the most consequential kind of plant knowledge for Ndumba), this carries at least two implications about the other kinds of knowledge I have discussed: (1) that many of the plant names known by informants are what Hunn has called "loose names," i.e., "recognized labels with neither clearly defined denotata nor defining attributes" (1973:77) -- thus the reluctance to use them to label plants, but instead the resort to residual "catch-all" names; and (2) that many of the taxonomic subdivisions drawn by individuals are in fact "empty categories" which can be readily discussed but have little salience when dealing with actual plants (a point which will be discussed below in connection with the relative cultural importance of plants).

Whatever the correspondence, or lack of it, among these three kinds of plant knowledge, if residual naming responses reveal variable referential knowledge, it is not distributed in any clearly systematic way among the informants. In Table XXXIX below, a suggestion of an age-association derived from the observation that three of the four youngest informants (A, F and G) rank the highest in residual naming responses, seems to be no more than a suggestion. For the informants as a whole, the inverse relationship is too small to be signifi-

TABLE XXXIX

COMPARISON OF AGE RANK-ORDER
AND RESIDUAL RESPONSE RANK-ORDER

Inf.	Age Rank	Rank
		Residual Response
E	10	5
J	9	3
D	8	7
I	7	2
C	6	1
H	5	4
B	4	6
G	3	9
A	2	10
F	1	8

$$\underline{G} = -.422$$

$$(\underline{p} > .05)$$

cant ($\underline{G} = -.422$, $\underline{p} > .05$).

Also there is little indication of a gender-based pattern, or at least none as striking as those found earlier with respect to plant name lexicons and taxonomies. There are differences between the "average male" and the "average female" informants in residual response frequencies (96.0 and 85.8 respectively), but the range of variation within each of the two sexes is considerable (43-153 and 57-125, respectively; cf. Table XXXVI, p. 279).

In general, then, it would seem that plant knowledge at the level of familiarity with actual plants is not necessarily

consistently associated with knowledge involving either plant names or semantic relationships among plant categories. Furthermore, the patterns discovered earlier in the distribution of the latter kinds of plant knowledge within the sample fail to appear so clearly in the naming response data so far considered, indicating that empirical knowledge may not be distributed in the same ways as more abstract kinds of thinking and talking about plants. However, I have dealt to this point only with statistical frequencies, and those of only one kind of naming response. It is still possible that regularities might be discovered when we examine the question of similarities among the informants in their responses to given plants regardless of the nature of the response. Such similarities could reasonably be interpreted as indicating shared knowledge, however rough or fine, and are thus of interest.

The relevant data are once again the 451 sets of naming responses included in Appendix 4, and presented in a different form in Appendix 5. These response sets may be characterized as follows: 115 cases of total agreement (i.e., the same name, or agreed-upon synonyms, given by all ten informants); 277 cases of disagreement at the generic rank in responses; and 59 cases of disagreement at the specific rank only (i.e., agreement as to the generic name applicable to a plant but differences of opinion regarding the folk species represented in a given case). Of these sets of responses I am especially concerned with the latter two types, which together include 336, or 75.0%, of the total of 451, about which there was some

disagreement among the informants.

The procedure followed is the same as that used previously in determining similarity of plant name lexicons and taxonomies between all possible pairs of informants. In this case I assume that if two individuals identified a plant specimen with the same name (or synonyms), this is an indication that there is at least overlap between their conceptual categories labeled by that expression. In this sense common naming responses are considered to be evidence of shared plant knowledge, viz., shared referential meanings for the plant names so offered.

I inspected Appendix 4, then, recording each instance wherein two informants identified a given plant specimen with the same name. For example, Collection Number 189 was called baugera_a¹⁶ by 36 pairs of informants (A and B, A and C, ..., B and C, etc.). I take this as evidence that a similar concept of baugera_a is widely-shared among the informants, but is not held by all. Informant F, the sole exception, called this specimen sana, denying that it had any other name. Since she did not give it the name of any of the various folk genera within the life form sana, I recorded her response as sana_r, assigning the plant to the residual generic taxon within sana. On the basis of this performance one might conclude that Informant F's concept of baugera_a (a taxon, so labeled, which is in her individual taxonomy) must be somewhat different from that shared by the others. Perhaps for her it is an "empty category," especially since she failed to use the name on an-

other occasion when eight of the informants identified Collection Number 142 as baugera_a (see Appendix 5). On the other hand, she may have a clear idea as to what baugera_a looks like, and neither of these plants fit the criteria. In either case this could be considered an instance of non-sharing of plant knowledge at the referential level between her and the other informants, just as agreement among the others is taken to imply shared referential knowledge.

The example just described is an instance of non-sharing or disagreement at the generic rank; Collection Number 400 exemplifies disagreement at the rank of folk species. There nine informants identified a plant as bim'bira, a folk species of the folk genus kwaza'kwaza (cf. Appendix 2). Informant E, however, called it fing'gungga, also a folk species of kwaza'kwaza. In this case all of the informants agreed that the plant was a kwaza'kwaza, thus sharing some concept or referential meaning at the generic rank. However, by assigning it to two different species, which are mutually-exclusive within the folk genus, they indicated a lack of agreement or shared concept at this finer level of distinction. All of the pairs which responded with bim'bira are thus recorded as instances of sharing at the specific rank, with sharing at the generic rank thereby implied. The case is not recorded as complete agreement, although there is such at one level, because there is the single dissenting response, and it is such evidence of differences in referential meanings at whatever level or rank they occur which is of immediate interest here.

I proceeded in this way, then, with all 336 plant specimens about which there was any naming disagreement, and the results are shown in terms of number and percent of cases of agreement by the various informant pairs in Table XI below. The informants are then rank-ordered with respect to each other in Table XII. One can readily see from the latter table that the patterns discovered earlier in lexicon- and taxonomy-sharing, especially those associated with gender (cf. Tables XVIII, p. 225 and XXII, p. 250) do not appear so clearly with respect to naming response agreement.

Three initial observations may be made concerning the rank-ordering taken as a whole. The first has to do with the overall low degree of agreement in naming responses. The highest percentage of agreement for any informant pair is only 56.55% (Informants A and D), with the next highest being 51.49% (A and B), then 50.30% (A and F), all of the remaining pairs agreeing in less than 50% of the cases. It must be reiterated that these figures apply only to those plants about which there was not complete agreement, but which include nearly 75% of the total of 451 plants considered here.

The second observation relates to the surprising appearance of Informant A in the rank-orderings for the various informants. While he always ranked at or near the bottom with respect to lexicon- and taxonomy-sharing (see Tables XVIII, p. 225 and XXII, p. 250), in naming response agreement he ranks at or near the top in relation to all of the other informants, and is also one of the parties in the three pairs

TABLE XL
NAMING RESPONSE AGREEMENT BY INFORMANT PAIRS
(336 Naming Responses)

Inf.	A	B	C	D	E	F	G	H	I	J
A	---	173 (51.49)	154 (45.83)	190 (56.55)	158 (47.02)	169 (50.30)	166 (49.40)	165 (49.11)	144 (42.86)	128 (38.10)
B	173 (51.49)	---	152 (45.24)	161 (47.92)	128 (38.10)	147 (43.75)	136 (40.48)	144 (42.86)	129 (38.39)	126 (37.50)
C	154 (45.83)	152 (45.24)	---	159 (47.32)	127 (37.80)	138 (41.07)	122 (36.31)	144 (42.86)	140 (41.67)	125 (37.20)
D	190 (56.55)	161 (47.92)	159 (47.32)	---	144 (42.86)	152 (45.24)	138 (41.07)	142 (42.26)	149 (44.35)	128 (38.10)
E	158 (47.02)	128 (38.10)	127 (37.80)	144 (42.86)	---	131 (38.99)	116 (34.52)	140 (41.67)	126 (37.50)	122 (36.31)
F	169 (50.30)	147 (43.75)	138 (41.07)	152 (45.24)	131 (38.99)	---	158 (47.02)	155 (46.13)	137 (40.77)	118 (35.12)
G	166 (49.40)	136 (40.48)	122 (36.31)	138 (41.07)	116 (34.52)	158 (47.02)	---	144 (42.86)	140 (41.67)	128 (38.10)
H	165 (49.11)	144 (42.86)	144 (42.86)	142 (42.26)	140 (41.67)	155 (46.13)	144 (42.86)	---	164 (48.81)	141 (41.96)
I	144 (42.86)	129 (38.39)	140 (41.67)	149 (44.35)	126 (37.50)	137 (40.77)	140 (41.67)	164 (48.81)	---	132 (39.29)
J	128 (38.10)	126 (37.50)	125 (37.20)	128 (38.10)	122 (36.31)	118 (35.12)	128 (38.10)	141 (41.96)	132 (39.29)	---

TABLE XLI
RANK-ORDERING OF NAMING RESPONSE AGREEMENT BY INFORMANT PAIRS
(336 Naming Responses)

Inf.	A	B	C	D	E	F	G	H	I	J
	D	A	D	A	A	A	A	A	H	H
	(56.6%)	(51.5%)	(47.3%)	(56.6%)	(47.0%)	(50.3%)	(49.4%)	(49.1%)	(48.8%)	(42.0%)
	B	D	A	B	D	G	F	I	D	I
	(51.5%)	(47.9%)	(45.8%)	(47.9%)	(42.9%)	(47.0%)	(47.0%)	(48.8%)	(44.4%)	(39.3%)
	F	C	B	C	H	H	H	F	A	A*
	(50.3%)	(45.2%)	(45.2%)	(47.3%)	(41.7%)	(46.1%)	(42.9%)	(46.1%)	(42.9%)	(38.1%)
	G	F	H	F	F	D	I	B*	C*	D*
	(49.4%)	(43.8%)	(42.9%)	(45.2%)	(39.0%)	(45.2%)	(41.7%)	(42.9%)	(41.7%)	(38.1%)
	H	H	I	I	B	B	D	C*	G*	G*
	(49.1%)	(42.9%)	(41.7%)	(44.4%)	(38.1%)	(43.8%)	(41.1%)	(42.9%)	(41.7%)	(38.1%)
	E	G	F	E	C	C	B	G*	F	B
	(47.0%)	(40.5%)	(41.1%)	(42.9%)	(37.8%)	(41.1%)	(40.5%)	(42.9%)	(40.8%)	(37.5%)
	O	I	E	H	I	I	J	D	J	O
	(45.8%)	(38.4%)	(37.8%)	(42.3%)	(37.5%)	(40.8%)	(38.1%)	(42.3%)	(39.3%)	(37.2%)
	I	E	J	G	J	E	C	J	B	E
	(42.9%)	(38.1%)	(37.2%)	(41.1%)	(36.3%)	(39.0%)	(36.3%)	(42.0%)	(38.4%)	(36.3%)
	J	J	G	J	G	J	E	E	E	F
	(38.1%)	(37.5%)	(36.3%)	(38.1%)	(34.5%)	(35.1%)	(34.5%)	(41.7%)	(37.5%)	(35.1%)

who show the highest percentage of agreement.

One avenue of speculation would in fact lead to just such a "lack of fit" among the three rankings. It might be said that Informant A is the informant whose plant name lexicon and individual taxonomy are the least developed in relation to the "core" lexicon and taxonomy which all ten informants possess (Appendix 2). Put another way, his plant knowledge of the lexical and conceptual kinds is the most similar to that core of knowledge possessed by all, having the fewest additions of plant names and the second-fewest number of additional taxa (cf. Table XXIV, p. 236). In terms of naming responses, then, he would have the smallest pool of names to draw upon of all informants.

If we assume that there is greater sharing among the informants as a whole of referential meanings of the plant names in the core lexicon, thus a "core" of referential knowledge, than there is regarding variably known names among those who know them, we would expect informant naming response agreement (but not necessarily the responses themselves) to be the highest with respect to the names in the core lexicon. Since Informant A goes relatively little beyond the core lexicon in his responses, informant agreement, while low when considered as a percentage of the total of tasks, would tend to be the highest with respect to his responses, as is the case.

The third general observation relates to the lowest rank orders of agreement. There one can see that, with regard to all five male informants, the informant who agrees the least

or second-least in naming responses is the oldest female informant (J), only exceeding another informant with respect to Informants C and E, and in both cases the other informant is another female (G). The same pattern is nearly repeated with the female informants, the informant who agrees the least or second-least being the oldest male (E), although the percentage of agreement exceeds that of another female with respect to the informant pair F and J (the youngest and oldest woman, respectively).

This last observation suggests some degree of an age-association in naming response agreement or, rather, in disagreement. If the lowest percentage of agreement is viewed as high disagreement then it may be said that the greatest amount of disagreement (or the least sharing of "empirical plant knowledge" if these responses may be seen as reflecting this) tends to occur between each informant and the oldest informant of the opposite sex. Coupled with the earlier discovery of a significant age-association with regard to both lexicon and taxonomy size (cf. Tables XI, p. 211 and XXVI, p. 239), this finding leads to a highly speculative suggestion that the oldest male and the oldest female in the sample represent something like polar opposites in their "empirical" plant knowledge. While they were not radically different in their individual lexicons or taxonomies (see Tables XVIII, p. 225 and XXXII, p. 250), so far as the mappings of these names and taxa on to the "real world" is concerned, they differ greatly. If their "maps" be viewed as those of the quintes-

sential Ndumba male and quintessential Ndumba female, we would expect to find a gender-association with regard to naming agreements with them, including their extreme positions vis a vis the opposite-sexed informants.

The foregoing is admittedly highly speculative and in fact there is no clear age-association within the ranking of each of the sexes, thus no evidence of "progression toward" the "quintessential" male or female by the other males and females such that, e.g., the rank-order of naming agreement with Informant E would be D (agreeing the most), then C, B and finally A. This speculation does, however, point our attention again to the possibility of a gender-association in the naming agreement for the informants as a whole.

A gender-association is not so immediately apparent in Table XLI above (p. 291) as was found with regard to the sharing of other kinds of plant knowledge. If we examine the three informants who agree the most in their naming responses with any particular informant, we find that, with respect to the males, all three are other males in the cases of Informants B, C and D, with only two of the three being males in cases A and E; thus one could propose some tendency for the males to agree with each other more than with females. With respect to the female informants, however, there are no cases where all three of the highest-ranking informants are females, four cases (F, G, H and J) in which two of the three are females, and one case (I) in which only one is female. Of course, the high relative ranking of Informant A across all informants substantially

affects the outcome for the female informants.

Another way of assessing the degree of gender-association is, as in earlier sections, to determine the percentage of naming response agreement between each informant and the "average" informant, of each sex and of both sexes combined, as in Table XLIII below. There one can see that each of the five male informants agrees in his naming responses with the "average male" more (by 4-6%) than with the "average female" informant. So far as the women are concerned, the differences are smaller (1-2%) but, with only one exception in Informant F, each of the women agrees more with the "average female" than with the "average male." For all informants except Informant F, concomitantly, the percentage of agreement is higher with the others of the same sex than with the other informants taken as a whole.

Finally, as before, a profile may be drawn of each informant's relative rankings in terms of agreement with other informants in naming responses, as in Table XLIII below (cf. Tables XXI, p. 229 and XXXIV, p. 253). Unlike the previous profiles, there is no clear gender-association here, with six of the ten informants being relatively more similar to at least one opposite-sexed informant than to at least one same-sexed informant.

In general, then, the evidence for age- or gender-associated patterns in naming response agreement is ambiguous. In the above analyses, some strong indications of such patterns has been presented, but some approaches, as in the last to be

TABLE XLII
AVERAGE PERCENTAGE OF NAMING RESPONSE AGREEMENT (BY SEX)
(336 Naming Responses)

Inf.	A	B	C	D	E
$\bar{X}$	47.85	42.86	42.26	45.07	39.42
excl. A & F	47.55	41.50	41.92	43.41	38.39
$\bar{X}$ Male	50.22	45.69	45.31	48.66	41.45
excl. A	---	43.75	45.14	46.03	39.59
$\bar{X}$ Female	45.95	40.60	39.82	42.20	37.80
excl. F	44.87	39.81	39.51	41.45	37.50

Inf.	F	G	H	I	J
$\bar{X}$	43.19	41.27	44.28	41.70	37.96
excl. A & F	42.26	39.29	43.33	41.67	38.35
$\bar{X}$ Male	43.87	40.36	43.75	40.95	37.44
excl. A	42.26	38.10	42.41	40.48	37.28
$\bar{X}$ Female	42.26	42.41	44.94	42.64	38.62
excl. F	---	40.88	44.54	43.26	39.78

TABLE XLIII
 PROFILE OF RELATIVE RANKINGS BY INFORMANT
 (Percentage of Naming Response Agreement)

Inf.	A	B	C	D	E
Degree of Closeness					
1st	B,D,E,F,G,H			A,C	
2nd	C	A,D		B,E,I	
3rd	I,J	C	B,D	J	
4th		H	H,I	F	
5th		E,F		G	
6th		G,J	E,F		A,D
7th			A,J	H	C
8th		I	G		B,F,J
9th					G,H,I
Inf.	F	G	H	I	J
1st			I,J		
2nd	G	F		H,J	
3rd	A,H	J	E,F,G		
4th	B,D,E	A,H,I	C	G	
5th			A,B	C,D	
6th	C,I	B			
7th			D	B,E,F	G,I
8th		D		A	C,E,H
9th	J	C,E			A,B,D,F

described above, have not yielded obvious regularities. It might be argued that a more meaningful approach would be to examine naming response agreement at a particular level of specificity, thus standardizing the responses at comparable levels. It has often been suggested, e.g., that the generic rank is the most salient in folk taxonomies, with generic names being the earliest-learned, most readily-elicited, most widely-known, and so forth (Stross 1969:9; Berlin et al. 1973:221).

Accordingly, I have re-examined the naming responses, noting each instance in which an informant pair agreed at the folk generic rank; e.g., two informants earlier classified as disagreeing because they considered a given plant specimen to exemplify two mutually-exclusive folk species within an agreed-upon folk genus are now classified as agreeing at the generic rank. These new figures and percentages of agreement for the various informant pairs are provided in Table XLIV below (cf. Table XL, p. 290) and a rank-ordering is shown in Table XLV (cf. Table XLI, p. 291). As can be seen, focusing on the generic rank increases the percentages of agreement between any given pair of informants, but does not substantially alter the rank-ordering, thus presumably the same general conclusions as the above would result from more intensive analyses of these new data which for present purposes will not be performed.

A final approach to the question of sharing of referential meanings is at the same time the most illuminating and yet one which does not lend itself to easy statistical summation. In-

TABLE XLIV
NAMING RESPONSE AGREEMENT AT GENERIC RANK BY INFORMANT PAIRS
(336 Naming Responses)

Inf.	A	B	C	D	E	F	G	H	I	J
A	---	205 (61.01)	182 (54.17)	217 (64.58)	191 (56.85)	192 (57.14)	196 (58.33)	191 (56.85)	173 (51.49)	164 (48.81)
B	205 (61.01)	---	178 (52.98)	192 (57.14)	163 (48.51)	177 (52.68)	164 (48.81)	178 (52.98)	157 (46.73)	156 (46.43)
C	182 (54.17)	178 (52.98)	---	192 (57.14)	162 (48.21)	162 (48.21)	148 (44.05)	175 (52.08)	170 (50.60)	160 (47.62)
D	217 (64.58)	192 (57.14)	192 (57.14)	---	178 (52.98)	178 (52.98)	172 (51.19)	178 (52.98)	177 (52.68)	159 (47.32)
E	191 (56.85)	163 (48.51)	162 (48.21)	178 (52.98)	---	161 (47.92)	150 (44.64)	178 (52.98)	164 (48.81)	158 (47.02)
F	192 (57.14)	177 (52.68)	162 (48.21)	178 (52.98)	161 (47.92)	---	179 (53.27)	181 (53.87)	163 (48.51)	150 (44.64)
G	196 (58.33)	164 (48.81)	148 (44.05)	172 (51.19)	150 (44.64)	179 (53.27)	---	177 (52.68)	168 (50.00)	160 (47.62)
H	191 (56.85)	178 (52.98)	175 (52.08)	178 (52.98)	178 (52.98)	181 (53.87)	177 (52.68)	---	189 (56.25)	173 (51.49)
I	173 (51.49)	157 (46.73)	170 (50.60)	177 (52.68)	164 (48.81)	163 (48.51)	168 (50.00)	189 (56.25)	---	165 (49.11)
J	164 (48.81)	156 (46.43)	160 (47.62)	159 (47.32)	158 (47.02)	150 (44.64)	160 (47.62)	173 (51.49)	165 (49.11)	---

TABLE XLV
 RANK-ORDERING OF NAMING RESPONSE AGREEMENT AT GENERIC RANK
 BY INFORMANT PAIRS
 (336 Naming Responses)

Inf.	A	B	C	D	E	F	G	H	I	J
	D	A	D	A	A	A	A	A	H	H
	(64.6%)	(61.0%)	(57.1%)	(64.6%)	(56.9%)	(57.1%)	(58.3%)	(56.9%)	(56.3%)	(51.5%)
	B	D	A	B*	D*	H	F	I	D	I
	(61.0%)	(57.1%)	(54.2%)	(57.1%)	(53.0%)	(53.9%)	(53.3%)	(56.3%)	(52.7%)	(49.1%)
	G	C*	B	O*	H*	G	H	F	A	A
	(58.3%)	(53.0%)	(53.0%)	(57.1%)	(53.0%)	(53.3%)	(52.7%)	(53.9%)	(51.5%)	(48.8%)
	F	H*	H	E**	I	D	D	B*	C	C*
	(57.1%)	(53.0%)	(52.1%)	(53.0%)	(48.8%)	(53.0%)	(51.2%)	(53.0%)	(50.6%)	(47.6%)
	E*	F	I	F**	B	B	I	D*	G	G*
	(56.9%)	(52.7%)	(50.6%)	(53.0%)	(48.5%)	(52.7%)	(50.0%)	(53.0%)	(50.0%)	(47.6%)
	H*	G	E*	H**	C	I	B	E*	J	D
	(56.9%)	(48.8%)	(48.2%)	(53.0%)	(48.2%)	(48.5%)	(48.8%)	(53.0%)	(49.1%)	(47.3%)
	C	E	F*	I	F	C	J	G	E	E
	(54.2%)	(48.5%)	(48.2%)	(52.7%)	(47.9%)	(48.2%)	(47.6%)	(52.7%)	(48.8%)	(47.0%)
	I	I	J	G	J	E	E	C	F	B
	(51.5%)	(46.7%)	(47.6%)	(51.2%)	(47.0%)	(47.9%)	(44.6%)	(52.1%)	(48.5%)	(46.4%)
	J	J	G	J	G	J	C	J	B	F
	(48.8%)	(46.4%)	(44.1%)	(47.3%)	(44.6%)	(44.6%)	(44.1%)	(51.5%)	(46.7%)	(44.6%)

spection of Appendix 5 reveals the referential meanings (in terms of botanical determinations) of 504 Ndumba plant names, at least to the extent that they may be determined within the limitations of the sample of 517 plants collected. For example, gaa'herara was used as a naming response to various species of Impatiens, a genus in the scientific botanical family Balsaminaceae. However, the question of how many species of Impatiens are included in "the" referential meaning of the Ndumba name gaa'herara immediately reveals the variation in referential meanings among my informants. For Informants G and I, I. balsamina is included, while for the other eight informants I. balsamina is at least part of the referential meanings of either daa'paaza, faasa'sombura, kovu_r, gora'kusanranra, saa'vevana'saara or sombura_r (see Appendix 4).

I cannot even say that, amidst this diversity, at least Informants G and I share a referential meaning for gaa'herara since Informant G also included I. hawkeri on three occasions, while Informant I did so only once, deciding on the other occasions that I. hawkeri was a referent of kovu_r. In fact, perusal of Appendix 5 reveals instance upon instance of just such informant variability in applying given names to various specimens, which themselves often differ at the generic or even family rank in terms of scientific botany.

Nor can any clear pattern, of any kind, be seen among those cases in which pairs or larger sets of informants agree in their restricted applications of particular plant names, indicating

shared referential meanings of the names. Even with respect to those names which label type-specific taxa which, as the 'genuine' or 'true' members of folk generic classes, might be expected to have the most widely-agreed-upon referential meanings, we find considerable variation among informants' uses of these names in plant identifications. Thus, out of a total of 34 type-specific plant names which occur among the responses in only seven cases is there total agreement among the informants as to their referents (at least among those plants collected). The other 27 names are used varyingly by individuals or by sets of individuals which show no consistent clusterings; e.g., Informants A,B,D,E,F,H,I and J agree on dog₂, implying that Informants C and G give somewhat different referential meanings to the term (cf. hohondi₂, which for Informants D and F refers to Phaseolus vulgaris, but has different referents for the other eight informants; see Appendices 4 and 5).

Against these cases of apparent sharing of referential meanings by all informants, or by subsets which are formed by nearly all possible combinations of individuals, stand the multiple examples of referential meanings which appear to be idiosyncratic. For example, the name gaa'mmunra was applied by only one informant (I) to only one plant specimen; surely her referential meaning of the term is not shared precisely with anyone else in the sample.

In sum, the implications of the data in Appendices 4 and 5 seem clear: the referential meanings of Ndumba plant names, and thus the empirical content of the plant categories repre-

sented in folk taxonomies, are highly variable among the sample of informants employed. Furthermore, if such data reflect plant knowledge at the basic level of familiarity or recognition of the local flora, such knowledge is also highly variable among the informants. It is not, moreover, simply variation or lack of consensus as to extended meanings, or with respect only to the widest range of reference allowable for particular terms, but disagreement regarding basic referential meanings as well. It is true that there are cases such as faasa'tiri (see Appendix 5), which all informants agree refers to Mitrastemon yamamotoi, but which Informants C, F and J also consider to include in its denotata Exocarpus erythrocaulis and/or Sciaphila sp. In such cases one could argue that there is a shared "basic" referential meaning, and a further "extended" meaning for some informants (cf. Sankoff 1972:563; Berlin et al., n.d.). Aside from the fact that these variable "extensions" of meanings are significant in themselves and require explanation, such cases, at least in my data, are far outweighed by much more diverse applications of plant names in which it would be impossible to state with any confidence exactly where the "basic" meaning ends and the "extensions" begin (e.g., see qaa'herara, Appendix 5).

Nor can such ambiguity as to referential meanings of plant names be traced to particular informants, or particular sets of informants grouped by age or sex, as seemed possible with regard to differential sharing of knowledge of the names themselves or the taxonomic relationships among the classes desig-

nated by these names. Instead, the distribution of plant knowledge of this fundamental kind among my informants is not obviously patterned. Elaborate statistical techniques might reveal clusterings or at least tendencies toward clusterings, but the age- and gender-associated patterns which seemed so obvious, and explainable, in the earlier analyses are subtle if present at all in the plant naming responses.

The data considered so far lead to a tentative conclusion that plant knowledge in Ndumba is of two different types: familiarity with plants as actual objects in the environment, or empirical knowledge; and a more abstract kind of knowledge which involves the plant world as a conceptual arrangement of mental categories. The latter categories can be discussed as to their interrelationships in cognitive structures and can be modeled by the ethnographer, but they have no clear correspondence with the other plant world, that of tangible realities which can be touched, smelled, tasted and otherwise manipulated. That is, the correspondence is not clear when these categories, and their apparent empirical content, are examined by going beyond "average" or "composite" models to the statements and actions of people who are immediately concerned with such things, viz.; my informants.

The more abstract kind of knowledge appears to be patterned in particular ways as discussed above. The other kind of plant knowledge, on the other hand, seems to follow such patterns much less strikingly and may be regarded as independent. Before this can be stated as more than a tentative

conclusion and its implications explored, however, a final possibility must be examined and that relates to the plants themselves. It is possible that what I have referred to as empirical plant knowledge is distributed in a patterned way among my informants, the pattern residing in the relative cultural importance of the various plants. While it seems reasonable to assume that a command of empirical knowledge is more consequential to Ndumba than a mastery of the more abstract kind, it is also true that familiarity or the ability to recognize certain plants is more important with some than with others. Thus we might find that the lack of agreement as to referential meanings of plant names is confined to those plants which have little significance for Ndumba. When we separate those plants which are important from those which are not, we might find considerably more sharing of knowledge, or at least patterns of sharing, with respect to the former than the latter. It is to this final exploration of individual variability in plant knowledge that I now turn.

Relative Cultural Importance of Plants

In any society motivations, values, beliefs and knowledge must be shared to some extent by its members in order that social life can proceed with some predictability. As I have strenuously maintained, complete homogeneity among the population is not necessary or even possible. However, what has been suggested for language could be extended to culture in the ideational sense of the term, namely that "in certain

adaptively crucial areas of behavior, it must be assumed that natural languages possess a hard core of intersubjectivity" (Harris 1964:158; cf. Goodenough 1970:99-100). Such intersubjectivity, at least to a degree, must be and is assumed by members of a society during their interaction. It is usually also assumed by ethnographers in their descriptions of this interaction.

The results of my research as reported so far, however, have suggested a paradox. On the one hand, an ethnographer wishing to describe Ndumba subsistence activities, house-building, ritual events and so on, would conventionally impute a common cultural model of the plant world to the actors: e.g., "Ndumba distinguish n varieties of sweet potatoes," or "the preferred timber for house wall construction is from the tree called honrimma (Castanopsis acuminatissima)." Such an imputation, however, finds little support in the data I have presented. These reveal considerable diversity among individuals' models and presumably these underlie behavior, ultimately an individual phenomenon.

On the other hand, Ndumba themselves impute common meanings and understandings to each other in some way that appears to be successful: sweet potatoes are planted, harvested and eaten; trees are felled and house walls are erected; and rituals are carried out in acceptable fashion. It is not that Ndumba are unaware of individual differences among themselves regarding plant knowledge or any other aspect of their culture. These differences, nevertheless, do not seem to preclude a

sufficient degree of communication and mutual predictability of actions. This in turn suggests that there are tolerable ranges of individual variability which can be accommodated and whose limits are usually not exceeded.

The most useful approach to the apparent paradox would be, then, neither to ignore the variability nor despair at its extent. Rather, the ethnographer must search for patterns within the variability which suggest the nature and consequences of the variation when it is viewed as a part of, and not necessarily inimical to, a sociocultural system which allows for, or in some cases may succumb to, the diversity it produces. Such an approach was indeed productive in the first two sections of this chapter where I found that informant variability in knowledge of plant names and folk taxonomic relationships was significantly patterned along the lines of sex and relative age. In a society where the division of labor -- and thus responsibilities and social expectations -- is based principally on these two variables, such patterns might well be expected. Age- or gender-associated differences in knowledge can arise due to differential enculturation experiences, and persist through reinforcement in similarly-patterned interaction spheres. Mutual predictability is not precluded since any Ndumba man or woman (in my sample at least), taking these differences into account, can more often than not project his or her own knowledge on to others accordingly.

This line of reasoning was put to a challenge, however, when I turned to the data concerning a more empirical kind of

plant knowledge, viz., the referential meanings of plant names and thus the content of the folk categories. Plant naming tasks performed by all ten informants showed complete agreement in only 115 cases, or 25.5%, of a total of 451, indicating substantial variability so far as recognition of the local flora is concerned. Moreover, when the responses were examined to determine whether subsets of individuals could be identified whose naming responses were most similar, no unambiguous clustering by sex or relative age was apparent. Thus with respect to this most consequential kind of knowledge the patterns discovered earlier failed to appear so strongly.

Even considering the limitations inherent in the plant naming task (e.g., the relatively small sample of plants when compared to the size of the entire plant name inventory and the flora itself) these results have implications for the interpretations of the other data. At first glance one might conclude that, despite the patterning and sharing of more abstract kinds of knowledge, empirical knowledge of plants is so variable and contradictory among the informants that they could not reliably assume that others meant the same things, referentially, as did they in using plant names. Such a situation, if true, would surely exceed the tolerable limits of diversity and seriously impede their cooperative activities as well as communication itself.

While the domain of plants is an "adaptively crucial" one for Ndumba, however, not all plants are equally important by their standards. Thus the allowable degree of referential

ambiguity of plant names might be expected to vary inversely with the relative importance of the plants designated by them. That is, we might expect to find patterns in the sharing of referential meanings of plant names when the names themselves are grouped according to relative cultural significance of their referents. Those names which designate more important classes of plants would be expected to show the most consistency among informants' applications of those names to plant specimens (cf. Hypothesis 3, pp. 141-146). Such sharing could be anticipated since those plant classes which are most important would presumably be learned about (along with their names) early in life, communicated about frequently, their referents encountered often; for these reasons ambiguity about them would be subject to many opportunities for clarification. On the other hand, those plant classes of least importance would be learned largely by chance, seldom discussed, and instances of them seldom noted; the result would be that those ambiguous categories and names would have little chance for clarification, with variable understandings of their empirical referents persisting largely because such variance would be inconsequential. Put in other terms, when the variable importance of plants is taken into consideration, we might find that Ndumba in fact do know what they need to know, the rest being superfluous and more randomly distributed.

Before undertaking such an inquiry, however, it is necessary to define and measure "relative cultural importance" with some precision. The question as to whether a food plant, for

instance, is "more important" than a medicinal plant, or whether either outweighs a plant used in making clothing, could be answered differently by different investigators. Inspection of the 269 plant uses listed in Appendix 6 will make immediately apparent the difficulty of making such a ranking. Furthermore, even the resolution of the problem of an ordinal ranking would lead to a further question as to a weighting of some uses as "twice as important," and so forth. It seems preferable to avoid subjective procedures as far as possible in favor of quantitative techniques, and in the following discussion I will use two different indices of relative importance: (1) the number of distinct ways in which a plant might be "used," in the broad sense previously given to this expression (pp. 196-201); and (2) the relative cultural importance of a given plant based on the number of other plants which are its functional equivalents. Each of these indices will be explained more fully in turn.

An alternative procedure developed by Berlin, Breedlove and Raven (1966, n.d.) requires comment, but is less satisfactory for present purposes. In their studies of Tzeltal ethnobotany, they categorized folk plant classes in descending order of cultural significance as: (1) "cultivated," considered as indicating the greatest importance; (2) "protected" but not cultivated; (3) "significant," including plants used in important ways but only growing wild; and (4) "unimportant," being those plants with few or no uses and never cultivated or protected (cf. above, pp. 195-196). In this discussion I

will be concerned with the implications of a plant's relative cultural importance for the distribution of knowledge regarding it. Thus I wish to employ measures which would reflect the variable reasons why an individual would be likely to be familiar with a given plant and why it would be in his interests to possess this knowledge. Both the number of uses to which a particular plant might be put and its strategic position within the entire plant inventory would seem relevant, whereas neither of these variables is necessarily correlated with the degree of human involvement in propagation, as will be shown below. Therefore, while Berlin's scheme might be useful for other purposes I have not adopted it as a central measure of importance here.

I begin, then, with an examination of Ndumba plant classes and the ways in which they are put to human use. The term "use" has previously been given an unusually wide scope in which nearly any differential response to a plant is included. Thus, e.g., if an informant were asked to comment on the plant named nraamma'saasira, he would mention that it is a very dangerous tree since if it were felled or cut in any way, the breasts of the wife or close kinswoman of the man responsible would swell and dry up, perhaps even resulting in death. On the other hand, the leaf of nraamma'saasira makes a fine decoration for one's hair and would be collected once it has dried and fallen to the ground.¹⁷ Other uses commonly associated with trees are precluded in this case since the tree must not be felled. Thus, there are two ways in which familiarity with this tree

would be useful to a man, in one instance by allowing him to avoid making a disastrous mistake, and in the other by providing him with a trophy which will be admired by others. I have therefore coded nraamma'saasira as having two "uses," or contexts in which the tree should be distinguished from others.

A more useful plant in this quantitative sense is a tree named faahifaan'daura, which grows wild in the grasslands and forest. There are ten ways in which faahifaan'daura might be used: (1) as bridge construction material; (2) fence posts; (3) house posts; (4) trap frames for catching marsupials; (5) prop sticks for climbing vines such as yams and beans or to support sugar cane; (6) the juice of its fruits can be rubbed on the face for decoration; (7) firewood; and as a cue to hunters that game might be nearby since (8) marsupials sleep in its branches or hollow trunks; (9) birds build nests in its branches; and (10) its fruit is eaten by wild animals. None of these uses is restricted to this tree, but not all trees have all of these uses. Thus there are ten reasons for Ndumba men, at least, to be able to recognize faahifaan'daura.

I compiled a total of 269 such plant uses, or practical reasons for distinguishing among plants, for the entire inventory of plant classes known to any of my ten informants or observed by me, and they are listed in Appendix 6. It is doubtless true that there are additional uses which I did not discover, with regard to particular plants and for the flora as a whole; especially is this likely so far as ritual and

ceremonial uses are concerned. However, the information I was able to obtain and the procedure of tabulation of such uses, while neither is entirely satisfactory, allow an initial and quantifiable approach to analyzing the plant naming responses in a search for a relationship between referential ambiguity and relative cultural importance.

Not all of the total number of plant classes were represented in my plant collections according to my informants' naming responses. A total of 504 conceptually distinct responses occurred in the 517 sets (Appendix 5), of which 22 were life form taxon names or polysemous expressions which were recorded prior to my attaining sufficient familiarity with plant names to recognize them as such. Consequently I have judged these too heterogeneous or ambiguous (on my part) to assign "use scores." For an additional 24 naming responses I obtained no information regarding uses, leaving a total of 458 conceptually distinct naming responses which can be scored. Use scores range from zero¹⁸ to seventeen, and the frequency of plant names which occurred are provided according to use score category in Table XLVI below, with further indications as to whether the plants grow wild, are cultivated, or both.

As can be seen in the table, no direct relationship exists between the degree of human involvement in propagation and the relative importance of a plant as measured by the number of distinct ways in which it merits attention by Ndumba. Indeed, except for the one plant which has the highest number of uses (rira, a tree planted in gardens and used in 17 dif-

TABLE XLVI
 FREQUENCY OF NAMING RESPONSES BY USE SCORE CATEGORY

<u>Use Score</u>	<u>Wild Only</u>	<u>Cultivated Only</u>	<u>Wild and Cultivated</u>	<u>Total</u>
0	50	0	0	50
1	96	31	4	131
2	54	14	2	70
3	21	12	5	38
4	18	2	4	24
5	16	1	3	20
6	10	3	1	14
7	7	1	0	8
8	6	2	0	8
9	5	1	1	7
10	15	0	0	15
11	17	0	2	19
12	34	0	2	36
13	8	0	1	9
14	5	0	0	5
15	2	0	0	2
16	1	0	0	1
17	0	1	0	1
Total	365	68	25	458

ferent ways), those plants with the highest use scores (10 or more) are nearly all wild plants, the exceptions being plants which are both wild and cultivated. Most of these high use scores, it must be noted, are a function of the multiple uses generally associated with trees, as in the example of faahi-faan'daura described above. One could condense several of these uses, e.g., by grouping house posts, fence posts, bridge planks and the like as "construction materials," or in another way by combining such uses as bird nesting site, marsupial sleeping-place, and so on, as "hunting aids." However, these various uses do not always combine in the same way for different trees. Furthermore, each of them constitutes a distinct context in which a tree might be either sought or discussed. Therefore I have separated these uses since each of these various contexts calls for plant knowledge of some precision.

The relatively large number of cultivated plants with low numbers of uses are mostly food crops. Many, such as tuber crops, are coded as having only one use, viz., the tubers being eaten. Others of which both the leaves and fruit are eaten are considered to have two separable uses, especially as such crops are often harvested on different occasions depending on the part desired. While this may intuitively seem to be an under-rating of the importance of food plants, in terms of the number of reasons why one might need to recognize a plant, food crops are thus limited.

The relationship between the relative importance of plants measured in this way and the cultivated/wild distinction

is thus partly a function of my coding system. However, even such lumping or uses as suggested above would not significantly affect the overall ordering. By any such modified coding system wild plants would still dominate at both ends of the continuum, accounting for all of those plants with no uses and most of those with more than three.

Using this means of measurement, then, I have tried to determine how relative cultural importance is related to referential agreement among my informants. I expected the relationship to be direct since those plants which are distinguished from others in a greater number of contexts would presumably have a proportional likelihood of coming to the attention of anyone learning to recognize plants. The plants themselves would be pointed out, or collected by others and thus observed, and their names mentioned with frequencies in proportion to this diversity of potential contexts of use. Thus plant names and their empirical referents would have a greater chance of becoming widely-known within the population in proportion to their importance in this sense. According to this reasoning, wider knowledge would be reflected in plant naming tasks by more consistent applications by the informants of those plant names which label the more important plant classes, indicating sharing of referential meanings of the names. The referents of those names which label less important plant classes, conversely, would be less clearly understood by Ndumba, and inconsistencies among informants' applications of those names to the plant specimens I collected would reflect

this referential ambiguity.

I arrive at no entirely satisfactory means of measuring referential ambiguity in the plant naming task performances in terms of a continuous scale. Instead, by examining the ranges of occurrences of each plant name in Appendix 5, I have grouped the names into three sets on the basis of informant agreement in applications: (1) those names which were used consistently by all ten informants (or nine if one were absent from a particular naming session) in naming the plant specimens collected (e.g., the name qaahisa, which was applied by all ten informants to Collection Number 113, and not given by any informant to any other plant specimen); (2) those names which were applied by all informants in the same way on at least one occasion, but also given by at least one informant to at least one additional plant specimen (e.g., the name gaari'mera, which was used by all informants to label Collection Number 248, but also given by seven informants to Collection 271 and by one informant to Collection 274); and (3) those names which were variably applied by informants to plant specimens with no cases of complete agreement.

I consider the first set to be those plant names whose referential meanings are the same for all informants, at least within the limitations of the data here considered. It is possible that with additional plant identifications some of these names would be more variably applied. The second set includes, but is not restricted to, examples of names which might be said to have a core or basic referential meaning for

all informants, with the additional variable applications of the names representing cases of individual extensions which are not shared. Thus it is legitimate to group these first two sets together, as I do in the discussion below, since they both represent a higher degree of referential agreement than does the third set of names which clearly should be treated separately. This third set, varying widely in the matching of names to specimens with inconsistencies so far as a single informant is concerned in many cases and even more for the informants as a group, is what I consider to include those plant names which are referentially ambiguous.

In Table XLVII below I show the distribution of the plant names which occurred as naming responses across these three types and as these types are differentially represented in each use score category. Thus, e.g., of those 50 plant names whose use score is zero, there were no cases of complete agreement as to their referents, 4 cases of consistency in labeling on at least one occasion, and 46 names which varied as to denotata, indicating referential ambiguity. My expectation was that naming would be more consistent with the more important plants; i.e., the higher the use score, the greater proportion of complete or at least occasionally complete agreement; the lower the use score, the more referentially ambiguous cases there should be.

A first point to be made regarding the data in the table is that the number of names for which there was complete referential agreement among the informants is only 55, repre-

TABLE XLVII
COMPARISON OF NAMING AGREEMENT AND USE SCORE

Use Score	Number of Names	(1)*	%	(2)*	%	(1+2)*	%	(3)*	%
0	50	0	0.0	4	8.0	4	8.0	46	92.0
1	131	9	6.9	12	9.2	21	16.1	110	83.9
2	70	7	10.0	14	20.0	21	30.0	49	70.0
3	38	4	10.5	3	7.1	7	17.6	31	82.4
4	24	1	4.2	5	20.8	6	25.0	18	75.0
5	20	5	25.0	2	10.0	7	35.0	13	65.0
6	14	4	28.6	2	14.3	6	42.9	8	57.1
7	8	3	37.5	2	25.0	5	62.5	3	37.5
8	8	1	12.5	2	25.0	3	37.5	5	62.5
9	7	3	42.9	2	28.6	5	71.5	2	28.5
10	15	3	20.0	1	6.7	4	26.7	11	73.3
11	19	5	26.3	0	0.0	5	26.3	14	73.7
12	36	6	16.7	3	8.3	9	25.0	27	75.0
13	9	2	22.2	1	11.1	3	33.3	6	66.7
14	5	0	0.0	1	20.0	1	20.0	4	80.0
15	2	0	0.0	0	0.0	0	0.0	2	100.0
16	1	1	100.0	0	0.0	1	100.0	0	0.0
17	1	1	100.0	0	0.0	1	100.0	0	0.0
Total	458	55	12.0	54	11.8	109	23.8	349	76.2

(1)* Complete agreement among all informants.

(2)* Complete agreement on at least one occasion.

(3)* No cases of complete agreement; thus, "referential ambiguity."

senting only 12.0% of the total names which were used to identify the plant specimens. With respect to another 54 names (11.8% of the total) there was complete agreement in at least one case. If these two groups are combined there is substantial agreement (interpretable as similar if not identical referential meanings) among the informants for only 109, or 23.8%, of the plant names. If these naming responses may reasonably be interpreted as evidence regarding the sharing of plant knowledge of an empirical kind, there is considerably less than might be expected in such a critically important domain of culture, at least so far as the informants as a whole are concerned. If the set of plant names which occurred as naming responses is representative of the lexicon as a whole, one could conclude that slightly more than three-fourths of Ndumba plant names are referentially ambiguous, albeit in varying degrees not indicated in these figures.

However, I must admit that this set of names is not strictly representative since the majority of names of cultivated plants, especially food crops, are not included.¹⁹ I did not collect the numerous varieties of sugar cane, yams, bananas, taro and many other garden crops and it is possible that there would be more agreement in naming these plants than is true of the specimens collected, which are heavily biased toward wild plants. However, informal experiments I conducted with taro leaves and the sweet potato leaf collections represented in the sample considered here in fact revealed considerable disagreement among informants as to which variety was

represented in a given case. The same degree of naming "confusion" was reported by K. Heider among Dani women regarding the identification of sweet potatoes, even when shown tubers rather than leaf cuttings (Heider 1969).

In any case, even with this qualification the degree of sharing of referential meanings among the informants is relatively low considering the fact that many names are included which are said to label plant classes of high importance. Nor is there any consistent pattern discernible in the relationship between referential ambiguity and relative use scores. While 92.0% of the names which label insignificant plants (i.e., those with no reported or observed uses) may be judged semantically ambiguous from their variable use in naming tasks as might be expected, the degree of ambiguity does not decrease consistently with an increase in plant use scores. Thus with respect to those names which label plant classes with 10 or more uses, we would expect to find substantially less referential ambiguity than with the plants of lesser importance. However, according to the data provided, 64 out of a total 88 (or 72.7%) of these plant names are referentially ambiguous, with complete agreement as to referents in only 18 cases (20.5%) and partial agreement in 6 (6.8%). When the use score continuum is viewed as a whole, moreover, there is no overall tendency toward the inverse relationship expected.

Such results imply that my informants do not, for the most part, carry the same mental images of most plants in

their heads, and one could imagine two men looking for marsupials in two very different trees, each thinking it was faahifaan'daura. Aside from its seeming indictment of Ndumba enculturation processes, such a state of affairs could be of serious consequence in resource exploitation. If there is any relationship at all between a plant's physical properties and its culturally-defined uses, such a high degree of ambiguity in matching plant names to actual objects is potentially disastrous and at best inefficient.

However, the above discussion has not taken into consideration the division of labor in Ndumba and its implications for the consequences of variable plant knowledge among the population. I have already described in general terms the allocation of different tasks and responsibilities to adults on the basis of sex, but I have so far not addressed this dichotomy as it relates to the cultural importance of plants.

It seems obvious that when one considers the different activities of men and women in Ndumba, the discussion above does not adequately reflect the different demands made on the plant knowledge of members of the two sexes. When this is considered the relative cultural importance of plants cannot be measured for the population as a whole in the way I have done because plant classes only have uses or significance for those who have the opportunities and need to use them. To the extent that members of the two sexes have greater or less opportunity to observe certain plants, we would expect to find variable familiarity with these plants. Moreover, such vari-

able knowledge would be more or less consequential depending on the likelihood that an individual would ever have to draw upon that knowledge, i.e., it would depend on whether he or she ever engages in an activity that calls for a particular plant.

Thus, e.g., many of the distinctions which men make among the trees which grow only in the higher portions of the forest would never likely be learned by women who are forbidden to go to those areas and thus never have the opportunity to observe the trees or any other plants which grow only there. Nor would this be a liability so far as women are concerned since their duties and responsibilities do not include the activities for which most of these distinctions are relevant. In the case of faahifan'daura discussed earlier, I assigned the plant a use score of 10 based on the number of different reasons why one might seek out the tree and need to recognize it. However, while it grows wild in the grassland and thus might be observed and/or exploited by women, it is a useful plant for them in only two ways -- as a source of facial decoration by rubbing its fruit juices on their cheeks and foreheads, and as firewood which women collect almost daily for their household needs. The other eight uses of the tree are relevant only to men, with three having to do with construction, one with the cutting of prop sticks for garden crops, and four relating to hunting and trapping concerns. All three classes or kinds of activities are restricted to men; thus knowledge of those plants which are used in them and how they

are to be distinguished from other plants is of little if any direct relevance to women.

The assignment of use scores to plants must, then, reflect these differences in social expectations regarding role performance and the variable knowledge accordingly required of men and women. While ambiguity concerning the referent(s) of the plant name faahifaan'daura could be consequential for men, Ndumba women would seldom if ever need to be able to distinguish the tree. So, too, could the situation be reversed, wherein a distinction which women would need to be able to make in the performance of their activities is an irrelevant one so far as men are concerned (e.g., in the cases of plants which are used in women's childbirth rituals in which men are never involved).

I have, then, repeated the operations described earlier but assigned two different use scores to each of the plant classes whose names occurred in plant identifications, one reflecting the importance of the plant to men and the other for women. These new figures may be seen as they relate to referential ambiguity and the distribution of the naming responses in Table XLVIII below, which may be compared to Table XLVI (p. 314).

Again there is no striking correlation between the use score for either sex and the degree of human involvement in propagation. A major difference between the two distributions, however, is in the lowering of use scores so far as women are concerned, with no plants having scores of 10 or higher, while

TABLE XLVIII
 FREQUENCY OF NAMING RESPONSES BY USE SCORE CATEGORY
 (SEPARATED BY SEX)

Use Score	<u>Wild Only</u>		<u>Cultivated Only</u>		<u>Wild and Cultivated</u>		<u>Total</u>	
	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>	<u>M</u>	<u>W</u>
0	51	76	0	1	1	0	52	77
1	96	153	32	35	3	5	131	193
2	53	89	14	12	2	9	69	110
3	21	29	12	9	5	8	38	46
4	18	15	2	4	4	3	24	22
5	16	1	0	3	3	0	19	4
6	12	0	3	3	1	0	16	3
7	5	2	1	0	0	0	6	2
8	6	0	2	0	0	0	8	0
9	5	0	1	1	1	0	7	1
10	15	0	0	0	1	0	16	0
11	17	0	0	0	2	0	19	0
12	34	0	0	0	1	0	35	0
13	8	0	1	0	1	0	10	0
14	5	0	0	0	0	0	5	0
15	2	0	0	0	0	0	2	0
16	1	0	0	0	0	0	1	0
17	0	0	0	0	0	0	0	0
Total	365	365	68	68	25	25	458	458

men's scores extend to 16 (a tree named haan'davi, especially important in hunting and for construction material). This difference is due largely to the greater importance to men of the forest trees which, as I previously mentioned, account for nearly all of the higher use scores.²⁰

By examining naming consistency as before, but considering the two sexes separately, new indications of referential ambiguity as well as agreement across the variable use score categories are obtained. Again the relationship is expected to be direct for either of the sexes among my informants for the reasons discussed earlier. However, the overall distribution patterns are both different from the one previously derived since some plant names were used consistently by the male informants but not by the women, or vice versa. These new patterns are shown below in Tables XLIX and L, indicating the degree of consistency when only the informants of either sex are considered (cf. Table XLVII above, p. 319).

For either sex, the number of names upon which there is complete agreement or consistency is higher than previously, with 80 cases (17.5%) for the males and 77 (16.8%) for the females, as opposed to 55 (12.0%) for the two groups combined. Also, the number of cases in which there was complete agreement on at least one occasion is slightly higher for both sexes when considered separately, with 56 (12.2%) for the men and 61 (13.3%) among the women, as against 54 (11.8%) for the informants as a whole. The number of cases and percentage of referentially ambiguous names for each sex is accordingly reduced from the earlier total, with 322 (70.3%) for the men and 320 (69.9%) for the women (cf. 349, or 76.2%, for the combined samples).

Despite these accommodations to the differential importance of given plants to the two sexes, then, the amount of

TABLE XLIX
COMPARISON OF NAMING AGREEMENT AND USE SCORE
(MALE INFORMANTS ONLY)

Use Score	Number of Names	(1)*	%	(2)*	%	(1+2)*	%	(3)*	%
0	52	0	0.0	6	11.5	6	11.5	46	88.5
1	131	14	10.7	13	9.9	27	20.6	104	79.4
2	69	13	18.8	10	14.5	23	33.3	46	66.7
3	38	6	15.8	3	7.9	9	23.7	29	76.3
4	24	1	4.2	9	37.5	10	41.7	14	58.3
5	19	4	21.1	3	15.8	7	36.9	12	63.1
6	16	6	37.5	2	12.5	8	50.0	8	50.0
7	6	1	16.7	2	33.3	3	50.0	3	50.0
8	8	2	25.0	2	25.0	4	50.0	4	50.0
9	7	3	42.9	2	28.6	5	71.5	2	28.5
10	16	6	37.5	0	0.0	6	37.5	10	62.5
11	19	7	36.9	1	5.3	8	42.2	11	57.8
12	35	12	34.3	1	2.3	13	36.6	22	63.4
13	10	4	40.0	1	10.0	5	50.0	5	50.0
14	5	0	0.0	1	20.0	1	20.0	4	80.0
15	2	0	0.0	0	0.0	0	0.0	2	100.0
16	1	1	100.0	0	0.0	1	100.0	0	0.0
17	0	0	0.0	0	0.0	0	0.0	0	0.0
Total	458	80	17.5	56	12.2	136	29.7	322	70.3

(1)* Complete agreement among the male informants.

(2)* Complete agreement on at least one occasion among the male informants.

(3)* No case of complete agreement among the male informants; thus, "referential ambiguity" for the males.

TABLE I
COMPARISON OF NAMING AGREEMENT AND USE SCORE
(FEMALE INFORMANTS ONLY)

Use Score	Number of Names	(1)*	%	(2)*	%	(1+2)*	%	(3)*	%
0	77	4	5.2	8	10.4	12	15.6	65	84.4
1	193	25	13.0	29	15.0	54	28.0	139	72.0
2	110	24	21.8	14	12.7	38	34.5	72	65.5
3	46	12	26.1	7	15.2	19	41.3	27	58.7
4	22	6	27.3	2	9.1	8	36.4	14	63.6
5	4	2	50.0	1	25.0	3	75.0	1	25.0
6	3	1	33.3	0	0.0	1	33.3	2	66.7
7	2	2	100.0	0	0.0	2	100.0	0	0.0
8	0	0	0.0	0	0.0	0	0.0	0	0.0
9	1	1	100.0	0	0.0	1	100.0	0	0.0
10	0	0	0.0	0	0.0	0	0.0	0	0.0
11	0	0	0.0	0	0.0	0	0.0	0	0.0
12	0	0	0.0	0	0.0	0	0.0	0	0.0
13	0	0	0.0	0	0.0	0	0.0	0	0.0
14	0	0	0.0	0	0.0	0	0.0	0	0.0
15	0	0	0.0	0	0.0	0	0.0	0	0.0
16	0	0	0.0	0	0.0	0	0.0	0	0.0
17	0	0	0.0	0	0.0	0	0.0	0	0.0
Total	458	77	16.8	61	13.3	138	30.1	320	69.9

(1)* Complete agreement among the female informants.

(2)* Complete agreement on at least one occasion among the female informants.

(3)* No case of complete agreement among the female informants; thus, "referential ambiguity" for the females.

referential ambiguity among the plant names is still high for both groups. Also there is still no consistent pattern in the distribution of ambiguity across the various use scores. There is a tendency for ambiguity to decrease with increasing use scores for the women informants, but not so far as the men are concerned. Thus we are still left with less apparent sharing of referential meanings among informants than expected, and no clear confirmation of the suspected association between shared plant knowledge and the relative cultural importance of plants. There is still a strong implication that Ndumba are not as intimately familiar with their flora as their needs would lead one to suppose. Nor, given the relatively low degree of referential agreement among informants even when divided and considered separately by sex, does it appear that empirical knowledge is distributed along the lines laid down by the division of labor. The data still indicate that a given informant cannot reliably project his or her understandings of the referential meanings of most plant names onto others even of the same sex.

Nevertheless, since Ndumba men and women so obviously manage to use plants effectively, this implies that their ability to recognize the plants they are seeking must be sufficient to meet their needs. Put in other terms, the tolerable range of ambiguity as to the referential meanings of plant names and the tolerable range of diversity among individuals' understandings of these referential meanings must be surprisingly wide. The question arises as to how such imprecision and

variability in plant knowledge can persist given the overall importance of plants to Ndumba adults of both sexes.

One possible explanation which can be explored here, at least in part, involves my second measure of relative cultural importance, that having to do with the functional equivalence of plants. While it is true that a hunter, for instance, would find it advantageous to know how to recognize faahifaan'daura when looking for sleeping marsupials, it is not necessary for him to recognize it by name as faahifaan'daura. (In fact, faahifaan'daura is one of the referentially ambiguous names so far as the male informants are concerned, whereas the female informants agreed completely as to its referent on at least one occasion!). That is, what is important to him is being able to make a correct classificatory response in terms of a function-based system of tree classes. There are at least 146 named tree classes whose members are said to be likely places to find sleeping marsupials. For the hunter, any of these trees is a functional equivalent of the others with respect to this particular use of trees he has in mind. (If he were seeking a vine to lash a fence with, he would similarly have a choice of equivalent vines from which to choose, and so on). Thus it is not consequential that he classify a particular tree as an instance of the named class faahifaan'daura so long as whatever tree he thinks is properly named in this way is one from this set of tree classes which will serve his purposes, and the odds are in his favor that he will be correct. Another hunter might give this same tree a different name, argu-

ing that faahifaan'daura is some other tree; indeed, disagreements among informants in the plant naming tasks represent just such kinds of statements. What is of consequence for the two men is not that either is entirely certain of the referent of the name faahifaan'daura (if indeed it makes any sense to speak of "the" referent of the name) or that they agree as to the term's referential meaning. Rather, their agreement that the tree is either faahifaan'daura or one of the other 145 named kinds of trees which will serve their purposes is more to the point.²¹

Thus many plant classes are functionally equivalent, with respect to single uses or contexts in which distinctions are consequential, or equivalent across whole ranges of uses. The naming responses I have been examining reflect only consistency or ambiguity in identifications of plants by name, disregarding the fact that some plant names in some contexts are in fact functional synonyms, whether informants would agree that they label "the same plant" or not. It seems necessary, therefore, to compensate for this substitutability of different plant classes when interpreting the social consequences of referential ambiguity of plant names. In some cases such ambiguity would make a real difference while in others it would have no consequences in the use of plants.

It is impossible to identify here all of the possible sets of plant names which could in various contexts of plant use be regarded as synonymous in the sense just described. Such sets of names would be different for each of the 269

plant uses listed in Appendix 6 with considerable overlap but probably not many instances of complete isomorphism. Such a reordering of the plant naming responses from Appendices 4 and 5 in accordance with these equivalence classes would doubtless lead to a considerably different pattern of agreement and disagreement among informants. I can, however, explore the possible utility of such an approach by examining those plant names which fall at the opposite pole from names such as faahifaan'daura on a continuum of functional equivalence. Thus my final analysis in this present work concerns those plants which are important to Ndumba in having no functional equivalents or substitutes.

In the total inventory of 269 plant uses, there are 115 which are associated with single named plant classes. For example, according to my informants, if one wishes to gather leaves which may be burned and the ashes made into salt, only one plant is suitable -- the plant named min'do. Since there are no alternatives available, min'do, unlike faahifaan'daura, is thus a more important plant to know by name. Again assuming that there is some relationship between the physical properties of some plant or plants in the Ndumba flora and the requirements of salt-making, it is crucial that anyone wishing to make salt collect the right plant. Concomitantly, given the importance of making such a distinction, it would be reasonable to expect that informants would vary less in their individual referential meanings of such expressions which label such crucial plant classes.

Some plants are important in being functionally unique in several use contexts. Thus rira, for example, is used in 12 different ways in which it is the only plant considered suitable. Because of such multiply-crucial plants, the 115 uses which are restricted to single plants involve only 89 named plant classes. Furthermore, not all of these 89 names occurred as responses in the plant identification sessions and may thus not be examined here. A total of 54 of the names did occur, and I have scored each of these names according to the degree of consistency among my informants in their applications of these names to the plant specimens collected. I expected much less inconsistency on the whole than observed for the larger inventory of plant names since less ambiguity could be afforded with respect to these names than with the others, many of which have functional equivalents or alternatives.

However, again one must keep in mind the differences in plant knowledge required of Ndumba men and women. Both sexes might collect leaves to make ash salt, so the name min'do would be expected to show consistent referents across all informants. On the other hand, as only men make arrow bindings, only they need be concerned with being able to recognize the vine called hi'nraana, the only plant deemed suitable for a particular kind of binding. I would expect, then, that the male informants would agree as to the name's referent(s), while there might be inconsistency or ambiguity among the women for whom it would be of no real consequence.

In Table LI, I have divided these 54 names first of all on the basis of whether their importance is relevant to both sexes, males only or females only. Within each of these three sets, cases of multiple special uses are indicated separately from those of single uses.²² Then I record the number of names within each set for which there is complete referential agreement (among all informants for the first set, among all male informants for the second, and all females for the third), complete agreement on at least one occasion, or no agreement at all.

As can be seen in the last column, there are some cases of ambiguous names in each of the sets, but the proportion of such disagreement is much lower than in any of the tabulations based on the earlier measure of relative cultural importance (cf. Tables XLVII, XLIX and I above, pp. 319, 327 and 328). Nevertheless, because of the previous reasons to expect agreement, some attempt to explain the exceptions is in order.

With regard to the plants which should be known to adults of both sexes, 6 of the total of 21 are ambiguous to at least some informants. Of these, one is baugera_a, which is the only plant considered suitable for wrapping tobacco for smoking in bamboo pipes. All informants agreed as to its referent at least once except for Informant F, who never gave the name to any plant specimen. However, she does not smoke a pipe and never has, nor does any member of her family and thus she is not likely to have ever had the need to collect the plant.

Four of the remaining cases involve ambiguity only on the

TABLE LI
NAMING AGREEMENT ON PLANTS WITH SPECIAL USES

Importance	Number of Names	(1)*	%	(2)*	%	(1+2)*	%	(3)*	%
Both sexes:									
12 uses	1	1	100.0	0	0.0	1	100.0	0	0.0
5 uses	1	1	100.0	0	0.0	1	100.0	0	0.0
3 uses	1	0	0.0	1	100.0	1	100.0	0	0.0
2 uses	1	0	0.0	0	0.0	0	0.0	1	100.0
1 use	17	5	31.3	7	41.2	12	72.5	5	27.5
Total	21	7	33.3	8	38.1	15	71.4	6	28.6
Males Only: AGREEMENT AMONG MALE INFORMANTS ONLY									
2 uses	1	1	100.0	0	0.0	1	100.0	0	0.0
1 use	21	7	33.3	4	19.0	11	52.3	10	47.7
Total	22	8	36.4	4	18.2	12	54.6	10	45.4
Females Only: AGREEMENT AMONG FEMALE INFORMANTS ONLY									
1 use	3	1	33.3	1	33.3	2	66.7	1	33.3
Total	3	1	33.3	1	33.3	2	66.7	1	33.3
Sub-Total	46								
Excluded**	8								
Total	54								

** Excluded cases involve plants which are important to one sex, but whose names only occurred as naming responses by informants of the opposite sex.

(1)* Complete agreement.

(2)* Complete agreement on at least one occasion.

(3)* No case of complete agreement; thus "referential ambiguity."

part of one or two informants, and deserve brief comment. The name kombaari'hora was coded as ambiguous because it occurred only once and then only given by a single informant, J. Its use which justifies its inclusion here, however, is a medicinal one which may only be relevant to curers since it is used in a special curing ritual in cases of epidemics; thus the informant's use of the name may well be a case of either guessing when presented with a plant she did not recognize or special knowledge on her part not shared by the others.

A second response which indicated ambiguity was the name kwaam'bimba, given by two informants to a single specimen. The name is said to designate a plant which is used only in performing sorcery; while no informant ever admitted to me that he or she had ever in fact used the plant in this way, perhaps these two informants had had the occasion to distinguish this from the other varieties of kaapi and thus knew it well.

A third ambiguous name is mmeguaara, recorded as such because it was an idiosyncratic response by Informant C on one occasion. The plant has two special uses, one medicinal and the other in relation to love magic which has failed; these are indeed special uses and, knowing the informant concerned, the response is most likely a guess on his part for an otherwise unremarkable folk species of saara, an ornamental shrub. The fourth case in this group is to'hongginranra, the name of another folk species of the folk genus saara and applied only by one informant (B) on one occasion. Again, its

only special use is medicinal and, like the previous case, is likely to have been a guess.

The final case of ambiguity in this set of names which might be relevant to both sexes is the name nraro'nraa'rora which is the name for a plant whose special use is in making children's whistles. On one occasion the name was given by eight informants, and on others was variable offered by single informants or pairs. While this case is more complicated than the others, it could hardly be said to involve an "adaptively crucial" plant use so far as adults are concerned.

Thus in all of these instances of coded ambiguity, the consequences are not likely to be so serious as might be imagined from the fact that they involve plants with special uses. When I turn to the plants which only men would need to know, the picture is less clear. Ten names are used inconsistently by the five male informants; eight concern plant names which were applied idiosyncratically and the other two were cases where only two of the men differed from the other three. Thus the ambiguity rating obscures the fact that there was at least substantial agreement, although not complete.

Finally, with regard to the plants whose special uses are important only to women, there was only one case of ambiguity, although the total number of such plants is so small as to make this a high proportion (one-third). The name in question is qi'rera'nitara, whose designatum has an important use in women's rituals. In this light it is significant to note that on three occasions the four oldest women informants agreed

on their uses of the term, although on others they differed. Informant F, the youngest woman in the sample, never offered the name and might well not know the plant; given her youth, however, it is unlikely that she would play a role in such rituals as would demand its knowledge on her part.

The ambiguous cases thus do not cast as much doubt on the suspected link between variability in knowledge and a "need to know" as first appeared. However, one should not conclude that knowledge of these special-purpose plants is sex-specific even when the uses are. While it is generally true that there is substantial referential agreement among the male informants regarding plant names whose designata have special uses for males (12 out of 22 cases, or 54.6%), it is also true that these names were also used consistently by the female informants. Thus the male informants agreed completely in their applications of 8 of the 22 names in the second set in Table LI; of those same 22 names, the women also agreed completely on 8 of them. They were not the same names in both cases -- the name fenra₂ shows complete agreement for the women but ambiguity for at least one of the men, while the name hi'nraana, used consistently by the men, is ambiguous so far as the women are concerned. When we turn to the women's special plants, the one case of complete agreement among the women is also the same for the men; on the other hand, the women agreed on at least one occasion with regard to naam'bufua'raara, whereas the name was never used consistently by all of the men.

Thus, those cases of referential agreement by men for

"their" plants and similarly for the women are largely incidental to more widespread agreement regarding the plant names involved. In all cases, despite there being good reasons for the members of one sex particularly to have clear understandings of given plant names' referents, there is also sufficient reason for the opposite sex to know them too. For example, faanrau₂ has a special use in trapping (as bait in bird traps) and the men benefit by their knowledge of the plant. It is also a human food, however, and is cultivated by women in their gardens. The plant named ti'saaru is of special importance to men for the trapping of eels, but is also planted in house gardens for the glue manufactured from its sap, and thus well-noted by all. The tree called saa'vara is important to women in making the bark-cloth beater they use, but is also one of the best sources of bridge planks and lashing material which is made from its bark, and thus is sought by men. Examples could be multiplied further, but would only reiterate the same point, viz., that plant uses, no matter how distinctive, do not systematically pattern the distribution of knowledge of their referents so far as gender is concerned.

The above analysis of plants with special importance to Ndumba is as revealing in what it does not show as it is for what has been found. While the number of cases examined is small relative to the total inventory of plant names and classes, their special nature makes it all the more likely that a more exhaustive investigation would make clearer the

relationship between the cultural importance of plants and the distribution of knowledge regarding them. However, I suggest that this relationship is not an obvious one; indeed, it has required many different approaches, often by circuitous routes, to derive a general impression from the immensely complex data. That impression, clearer with this last close look at plants where we began with them -- on the ground (or in the trees) -- is certainly one of relationships: between age and lexicon size, sex and lexicon size; between age and taxonomy size, sex and taxonomy size; between age and familiarity with plants, sex and familiarity with plants; between the importance of plants and referential knowledge, ...

All of these have been found to be interrelated, but throughout the various analyses the statistics have always been just strong enough to support a reasonable argument, but never strong enough to convince by themselves. Individuals' plant name lexicons were found to vary considerably, but much of the variation involved differential knowledge of synonyms, despite a tendency toward age- and gender-associated patterns. Taxonomic models, when constructed for individuals rather than idealized groups, vary in their elaboration but mostly as a result of relative differences in horizontal expansion. This means that some individuals make finer distinctions than do others within and among plant classes, just as they are found to do when asked to name plants. But when these differences are seen in their relationship to behavioral responses to plants as in the final analyses, most of these differences are

found to be inconsequential. Indeed, this is the general impression left after these investigations, limited as they are by smaller samples than desirable, of informants and of plants: differences among individual Ndumba adults with respect to plant knowledge are surprisingly extensive despite the cultural importance of plants, but the differences themselves are seldom of importance.

Karl Heider, in trying to cope with variable plant knowledge among his Dani informants, has referred to "the problem of all those names for sweet potatoes in the New Guinea Highlands" (1969). My problem has dealt with a much broader range of names and plants but the query may be similarly posed: Why all of those names for plants in Ndumba? Or, more to the point of this study, if less grammatical: How all of those names, when they are so variably known and, in a literal sense, so often mean different things?

The "Why?" question is probably unanswerable, at least to the extent that it involves a temporal dimension. The Ndumba lexicon, seen as an extra-individual "pool" of names, is continually expanding as new names enter the Basin along with new plants; so too is it contracting as old plants are superseded and their names lost. The lag between the two processes produces "the" lexicon of a frozen point in time. So too do the same processes occur with individuals, with increasing participation in community life bringing new encounters with unfamiliar plants in unfamiliar contexts. To the extent that these are structured by considerations of age and gender, so

do lexicons and knowledge of connections phraseable in taxonomic terms become distributed along these lines -- not perfectly, however, because life in Ndumba as elsewhere resists easy compartmentalization.

So diversity arises and so it takes shapes and forms patterns. But around the patterns, and within them, remains diversity. On the one hand, by emphasizing the patterns, one can speak of the "average Ndumba man" or the "average Ndumba woman" or even the "average Ndumba." But with the final test of matching the words and the abstract models to the leaves and fruits and branches of real concern, the "averages" dissolve back into the diverse individuals, almost lost in the process of abstraction like the forgotten crop varieties of the ancestors.

Thus the "How?" question returns. Amidst the importance of plants to Ndumba from birth to death and at all points between, how is ambiguity not the same as confusion? The answer seems to be that the ambiguity and the diversity are not dysfunctional as would first appear to be the case. Among so many plants of equivalent use, relatively few of the distinctions are consequential. Thus it is also seldom consequential that Ndumba make the distinctions in the same ways. Distinguishing twenty-five varieties of sweet potatoes is no less efficient than knowing thirty when all varieties are used alike -- all are planted, all are tended, all are eaten, no matter how named. So too, but to a lesser extent, is there little profit in knowing for certain whether a given tree is

faa'hifaan'daura or ka'haara when the result is the same: an eye peeled for marsupials, a dead branch snapped off for the evening fire, or a stout limb chopped for a yam stick.

It is not that there is advantage in ambiguity, or in ignorance. But neither is there obvious disadvantage. In fact the more accurate observer of plant knowledge, at least among my sample of ten adults, would not stress how much any one of them does not know and question how he or she manages to get along; rather he would say that they tend to know much more than seems to be necessary. Especially with regard to what I have called the "abstract" kinds of plant knowledge -- of numerous names and synonyms, and elaborate taxonomic interconnections -- but also true for the "empirical" knowledge that enables one to distinguish the trees from the forest, Ndumba continually show that they know more than they have any practical reason to know. Knowing what is required becomes then a fortuitous by-product, just as variable knowledge is a luxury the system can afford to produce and maintain.

To conclude this present work I wish to return to the question with which I initiated this inquiry: How can the variable statements and actions of one's informants be translated into a description of "a culture"? Restricted to the immediate concerns of this study, how might my ten informants be converted into some supra-individual entity whose plant knowledge can be described and compared with that of the Hanunoo, Tzeltal and other societies? Whether they represent

the population of Ndumba or a collectivity no larger than themselves, how might useful and valid descriptive statements be made about their view of the plant world when they are considered as a whole?

While I have been examining only one cultural domain in this dissertation, my problem is the same as that of any ethnographer trying to provide a more comprehensive account of a culture as a phenomenon whose locus is outside of the individual. In the first chapter I suggested that most ethnographers have conventionally adopted one of two main approaches: to describe and discuss a culture as a system of ideas, beliefs and values which are shared by the members of a society; or alternatively, as a pool of such information which is in some sense available to the society's members, but not completely held by any one individual or evenly distributed among the population.

Choosing the first of these options, an ethnographer would abstract from his informants' statements and actions a portrait of a "lowest common denominator" or minimal culture-bearer; such an approach, if the criterion of sharing is employed in its literal sense, allows valid statements about aggregates, but necessarily excludes the unevenly distributed knowledge and behavior which flesh out this "bare skeleton" so far as any individual is concerned (Keesing and Keesing 1971:23).²³ Wishing to avoid the exclusion of specialists or other loci of diversity within the population, he might alternatively construct a "composite" model of the culture, imputed to an

ideal, omniscient individual who takes form through an additive combination of actual informants, pooling their various versions of "the culture."²⁴

I can briefly indicate the relative adequacy of these two approaches to the present problem by examining two kinds of statements which would result in the context of the variability in the data I have presented and analyzed in some detail above. Especially as I will discuss only two specific matters, viz., plant name lexicon and folk taxonomy size, I do not intend to offer here alternative comprehensive descriptions of the plant domain within Ndumba culture. Rather I wish only to suggest some of the problems which attend even the beginning step toward such an ultimate goal.

One of the first tasks facing the ethnobiologist is to compile a lexicon of names which label plant (or animal) classes, since it is through queries using these names that he will be able to derive the semantic relationships among the classes, or at least among those which are named. In Ndumba, both the size and composition of the lexicon are functions of the number of informants interviewed for, as I have discussed in detail in the first part of this chapter, Ndumba adults vary considerably in their knowledge of plant names. The range of variation so far as my sample of ten is concerned is from 1,041 to 1,182 plant names (excluding descriptive phrases which might be applied to plants); if idiosyncratic names are excluded, the range decreases to 1,040 - 1,172 (see Table IX, p. 207). Presumably if I had increased my sample, I would have

discovered even more plant names and the range would be influenced accordingly. In interview sessions, no informant listed all of the plant names he or she knew, and it was only through the provision of names by dozens of individuals in the population that many came to my attention. Certainly if I had used fewer informants, either within my formal sample or more generally, the number of names of which I became aware would have been smaller.

It is not that I chose exactly the right number of informants, nor do I believe that there is an appropriate number per se. Rather, I believe with E. Heider that "an adequate sample of people is one which includes enough informants to recognise idiosyncratic usages as such, to discover low-frequency usages, and, most importantly, to document real variations of usage in the population" (1972:448). Such were my goals and, given my results, my sample would seem adequate in providing such documentation and discovery. The sample is probably inadequate, however, to confidently construct either a "shared" or "composite" model of this aspect of the domain of plants. Nevertheless, my data are sufficient to indicate some of the difficulties with either approach.

Viewing a culture as "shared knowledge" too often begs the question as to the meaning of "shared." If sharing requires that a plant name be known by all ten informants, then the lexicon contains only 971 names. If the names must not only be known by all ten, but they must also agree as to the kind of plant class labeled by them, the number decreases to

938 (see Appendix 2). If a further requirement is that the informants agree as to the referents of the names, the total drops by hundreds, unless naming responses to the plants I collected do not reflect a general pattern. In all of these cases, the number of names which would constitute the shared lexicon is smaller than the number in any individual informant's lexicon.

To dismiss out of hand all of these additional plant names because they are not shared by all informants is to create an unconscionably large number of what Heider calls "false negatives," i.e., "failures to identify terms which are actually used consistently by some [members of the society]" (1972:456). If one's description of a culture is ever to be foundational in creating explanatory models of behavior in Ndumba, surely the lexicons which these individuals have available to them are more relevant than such a restricted view would provide, and there is no case of an individual who has only the shared lexicon upon which to draw.

But if more is to be included than simply those names which are shared by all, how many people must share a name for it to be a part of their language, and knowledge of its conceptual and empirical referents a part of their culture? If one supposes that there are likely to be significant differences between "men's culture" and "women's culture" (which finds some support in my data, as has been previously discussed, then this would provide one approach to the problem by describing two lexicons: one which consists of those names shared by

all male informants, and those shared by all females in the sample. This would yield 1,025 names for the men and 1,038 for the women, both figures higher than the total shared by all, but again lower than the number of names in the smallest individual lexicon (1,041; see Table IX, p. 207). Again there is a significant loss of information which would have to be considered in making sense of individuals' behavior since no behavior is limited to what others of his or her own sex also know. Also obscured in such an abstracting process would be the range of variation found among the members of either sex, which is nearly as great as that for the informants as a whole (1,041-1,164 for the men, 1,074-1,182 for the women).

As a final recourse, one might still retain the criterion of sharing, but require only that a given name be shared by a certain percentage of one's informants. My analyses in an earlier section explored the sharing of lexicon items between pairs of informants and yielded interesting and possibly significant patterns when viewed in the larger context of how plant knowledge is acquired and reinforced in Ndumba. If one required only that a plant name be shared by two persons to be a part of the culture, the lexicon would vary accordingly from 994 names (shared by Informants A and F) to 1,129 (shared by Informants C and D, and by C and J). Just which names would be included, however, would vary with the composition of the informant pair. Since the same would presumably also be true if one chose to consider only triad-sharing, or tetrad-sharing, and so on, the confusion still remains as to what constitutes

the culture of the group when there are so many alternative cultures which might be described, at least with respect to this aspect of one domain.

Nor does the problem become much easier of solution if we adopt a "composite" model as our goal. Here individual plant name lexicons would be pooled, forming a maximal lexicon, attributed to no single individual but regarded as the set of names which an ideal Ndumba would know if he could look into all of his neighbors' heads. This lexicon would include a total of 1,249 plant names (or 1,214 if idiosyncratic names were excluded). The number is much larger than most individual totals and, to this degree, is misleading so far as relating behavior to culture is concerned.

Where the "shared" model consistently understated the number of plant names immediately available to any individual who might require such information without consulting others, this approach yields an overstatement. No individual employs such a lexicon in his behavior for a good portion of it is distributed widely and unevenly among the population. While it might be useful for some purposes to think of this composite lexicon as a pool from which he might draw, or which represents potential knowledge on his part since it is available to be learned, this perhaps reifies its locus too much. So far as having any practical effect on behavior is concerned, it would be necessary for the right individual to be in one's company at the right time. Given the distribution of these variably known names within the population, there is insufficient evidence of

consistent patterning to demand so much of coincidence.

One could define different composite lexicons, however, given the variable frequency of interaction among selected subsets of individuals, thus describing more accurately the pools of information which are in a real sense available to given individuals. If gender were again chosen as a significant criterion, one could describe a "men's lexicon," consisting of 1,210 names (or 1,190 excluding idiosyncratic names) and a "women's lexicon," also with 1,210 (or 1,195) names -- coincidentally the same number, but differing somewhat in content (see Appendix 3). Or, again, one could choose pairs, triads, or tetrads, each of which would have its own composite lexicon.

Yet another way of describing this aspect of "the culture" of my informants would be to construct "average" lexicons, often chosen as a technique by ethnographers but not always supported by data regarding the individuals who are being averaged. Thus, so far as my informants are concerned, the "average Ndumba" knows 1,125.5 plant names (or 1,122.0 if idiosyncratic names are not included); the "average man" knows 1,128.6 (or 1,124.6); and the "average woman" controls 1,122.4 (or 1,119.4). (cf. Table IX, p. 207). Further subdivisions within the population could be made by relative age, hamlet membership, marital status -- indeed any variable that might be suspected as relevant to the distribution of such knowledge. Such an averaging process, however, depends upon the same logic as the abstracting of "composite" culture-bearers and is subject to

the same dangers of reification, although such constructs may be useful for cross-"cultural" comparisons.²⁵

The same exercises as the above could be conducted regarding plant folk taxonomy size, attended by the same problems with only the figures changing. Those figures, along with those from the discussion above, are presented in Figure VII below so that the variable descriptions possible of "Ndumba culture," or at least "the culture" of my informants, may be seen in these two aspects. Rather than repeat much of the above discussion, I leave the reader to inspect the figures regarding taxonomy size. One comment is necessary, however, concerning a possible source of confusion in the figure.

One of the most basic parts of a description of plant knowledge involves the construction of folk taxonomic models, which indicates the complexity with which the local flora is subdivided into contrasting sets. With respect to my ten informants, as indicated in the figure, a "shared" taxonomy would include 766, or 786 or 794 taxa, or various other total numbers, depending on the degree of sharing required for consideration -- complete among all informants, complete among all males or females or some other group, between pairs of informants, and so on. As was also true of "shared" plant name lexicons discussed above, none of these is as large, nor is it the same in content, as that held by any actual informant. The same kinds of problems result as earlier described when trying to relate behavior to such models which cannot be a part of any individual's decisions when they exist

FIGURE VII
COMPARISON OF ALTERNATIVE POSSIBLE SIZES
OF PLANT NAME LEXICON AND FOLK TAXONOMY

Basis of Description	Lexicon Size (Number of Names)	Taxonomy Size (Number of Taxa)
Range of Informants:	1,041 - 1,182 (1,040 - 1,172)*	826 - 897 (825 - 890)*
Males:	1,041 - 1,164 (1,040 - 1,160)	835 - 885 (835 - 883)
Females:	1,074 - 1,182 (1,073 - 1,172)	826 - 897 (825 - 890)
"Shared" Knowledge:	971	766
All Males:	1,025	794
All Females:	1,038	786
"Composite" Knowledge:	1,249 (1,214)	889+? [972] (865+? [948])
All Males:	1,210 (1,190)	872+? [949] (859+? [936])
All Females:	1,210 (1,195)	866+? [946] (855+? [935])
"Average" Knowledge:	1,125.5 (1,122.0)	864.0 (861.6)
"Average" Male:	1,128.6 (1,124.6)	872.0 (869.4)
"Average" Female:	1,122.4 (1,119.4)	856.0 (853.8)

* Idiosyncratic names and taxa excluded.

only in the ethnographer's account.

With "composite" folk taxonomic models, the difficulties are increased since in many cases variable informants' statements cannot be combined in an additive way. One problem concerns the resulting inclusion of what Heider calls "false positives" or idiosyncratic taxa (1972:456); I have already discussed these as possibly of dubious validity, but a composite model would not distinguish these from taxa which are more widely-known and thus have a more legitimate ontological status.

A more serious problem is indicated by the question marks qualifying the size of various composite models suggested in the figure. Here the dilemma offered by Two Crows at the beginning of this dissertation is brought home to the ethnosystematist. Two or more "equally authoritative" informants in Ndumba disagree about 83 plant names as to whether they label distinct folk taxa or are only synonyms for other names (Appendix 3, Part 2). For one informant, maandundin'dira labels a folk taxon of generic rank within the life form sa'tari; for another it is simply an alternative name for the folk generic taxon called faari'vura. These two statements cannot be combined to decide whether the composite taxonomy should be increased in size and content by one folk genus or not. Thus the ethnosystematist cannot define with any certainty the size of his model except as a minimum figure and what the maximum possible would be, as is indicated in the figure with brackets. Uncertainty as to size is accompanied by uncertainty as to content and thus the foundation of his subsequent exploration of the domain

is weakened at its most basic point.

Thus either of the two conventional approaches to describing "cultures" involves problems when operationalized to address the data I have collected in Ndumba. While each has its own limitations, and creates reifications in its own way, a distortion common to both has been suggested by research into the variability of knowledge in the domain of color in a similar society:

There is an important respect in which the criterion that a category exists only if all speakers agree to it and the criterion that a category exists if only one speaker (the ethnographer's informant -- with no information about the usage of any other member of that culture) uses it are identical: both exclude the discovery and examination of real intra-cultural variation. [E.R. Heider 1972:464]

If my data from a study of ten Ndumba adults' plant knowledge are at all indicative of the variability which might be found in other domains of their culture, each ethnographer must ask whether this is true of all human societies, and consider its implications for his descriptive efforts. It is unlikely that any ethnographers currently employ the "replication of uniformity" view, to use Wallace's (1970:22) term, in which a society is assumed to be culturally homogeneous. Rather, we are increasingly coming to realize that

[all] societies are, in a radical sense, plural societies. The problem for ethnographic analysis, then, beyond the initial level of describing 'the' culture as a pattern, is to discover how diverse elements are organized into patterns. [Wallace 1970:109-110]

Thus an "organization of diversity" approach is surely

required in which a culture is

not so much a superorganic entity, but policy, tacitly and gradually concocted by groups of people for the furtherance of their interests, and contract, established by practice, between and among individuals to organize their strivings into mutually facilitating equivalence structures. [Wallace 1970:24]

In this dissertation I have examined one domain of a culture as an organization of diverse elements, or "variant strategies" (Sankoff 1972:564) as these are represented by ten informants' individual views of this domain. Wallace's suggested approach has been productive in that it involves more comprehensive treatment and acknowledgement of the data than those which stress the shared or composite features of a cultural system, and thus approximates more closely the models which underlie behavior. However, in my search for the patterns in which these diverse elements are organized, my data indicate that this diversity may not be so organized as assumptions of complementarity and "equivalence structures" would imply. The earlier discussion of plant knowledge disclosed large numbers of plant names and folk taxa which were variably known by my informants, and not necessarily according to any ascertainable subdivisions of the population by complementary roles, although strong evidence of patterning was found along relative age and gender lines. Even that knowledge which was patterned, however, often did not reflect shared knowledge at another level, that of referential meanings of the names and the empirical content of the categories.

The fact that social life in Ndumba proceeds despite these

disagreements, inconsistencies and contradictions suggests that cultures accomodate much more diversity, both organized and unorganized, than is usually indicated in ethnographic descriptions, concerned as they are with the characteristics of groups. My present argument, as shaped by this examination of plant knowledge in Ndumba, suggests that such definitions as Goodenough's of a society's culture as "whatever it is one has to know or believe in order to operate in a manner acceptable to its members, and do so in any role that they accept for any one of themselves" (1957:167) would be more usefully amended to include those things that one can get by without knowing or believing and still operate in an acceptable manner. Only by adopting a view of a socio-cultural system as one which allows for diversity and non-sharing of knowledge can we understand how a fieldworker can report -- as insight rather than in resignation -- that "the villagers appeared to be endowed with a far greater tolerance for ambiguity -- both theirs and mine -- than for answering questions" (Watson 1972:173).

I have not been concerned in this dissertation with the issue of defining "culture" as a crucial ethnographic problem per se. Much (perhaps too much) attention has already been given to this hoary question resulting, as such debates are wont to do in Anthropology, in typologies of increasing complexity; one can now describe as many kinds of cultures as one wishes: "operating cultures," "public cultures," "subcultures" and "culture pools" (Goodenough 1971:37-41); "small group cul-

tures" (Roberts 1951); and even "the culture of an individual" (D'Andrade 1970:21).

It would seem to me that a higher priority should go to clarification as to the goals of ethnographic description, whether of single domains or larger systems. If we decide that we are interested in description for its own sake, then perhaps we can afford to lose individuals in larger abstractions by describing central tendencies, composites, averages and the like, so long as these are clearly identified as such. However, if description is instead the means of "developing empirical support of theoretical analysis" (Wallace 1970:123) of relations among ecosystems, social groupings, and human behavior (all the more so to the extent that we proclaim our theories to involve cognition), then the kinds of variation I have documented and analyzed here take on additional importance and only at considerable cost are obfuscated by our abstractions.

My informants name and classify plants every day of their lives as an initial step toward putting them to their use. In doing so, they draw upon knowledge which they, not others or theoretically conceivable others, possess. To understand how and why they make the choices they do is a difficult task, since it requires a prior understanding of how they view their flora and the choices it offers them, and these views are even more variable than their behavior. However, unless the goals of ethnography are to be adjusted according to the relative ease of attainment, the challenge remains as it was laid down by Two Crows nearly a century ago.

FOOTNOTES

CHAPTER I

1. I refer here to the problems of delimiting boundaries, whether viewed as a heuristic device or as an analytical construct. These problems have received some critical attention recently (e.g., Helm 1968; Barth 1969; Naroll 1970), but by no means proportionally to their importance.
2. The approaches described here are acknowledged to be simplifications of the intricate and complex process which field research always is. However, with that qualification I would argue that the following pages present a valid characterization, and not merely a caricature, of accepted and common procedures in ethnography.
3. Murdock (1972) has recently labeled concepts such as "society" and "culture" reifications, and deserves credit for his boldness, especially given his own use of these concepts throughout his career. He exempts the "ethnographic record" from his charges, however, declaring it to be "the crowning glory of our discipline" (1972:17). I consider this exemption unwarranted and curiously inconsistent with his argument; if "society" and "culture" are "illusory conceptual abstractions" (1972:19) as he maintains, how can descriptions of them be more than illusions?
4. However, even some of the New Ethnographers (e.g., Conklin, Frake and Metzger) have been less than explicit about the numbers of informants they have employed. Several others, however, can be cited:

Basso's description of "the Western Apache classificatory verb system" based on data "collected from three male informants, all over forty, who are residents of Cibecue" (1968:254).

Berlin's description of "Tzeltal plant classification," employing a total of sixty-four informants, of whom four -- all males, and all between the ages of thirty and forty -- were the "principal informants" (Berlin et al. 1973, n.d.).

Black's description of "Ojibwa world view," based on the statements of five persons, "three men and two women, between the ages

of 62 and 85," all of whom were from a single community (Black 1969:168).

Goodenough's use of a single informant to produce "Trukese duty scales" (1965: 11).

Examples could no doubt also be cited from such pioneer ethnographers as Malinowski, Firth and Radcliffe-Brown, had they been as explicit as the above.

5. From this point on in the dissertation, the terms "ethnography" and its derivatives refer to works which include at least a partial concern with the description of systems of meaning, whether explicitly in the "ethnosemantics" tradition or not.
6. I thus exclude from explicit consideration those definitions of culture which stress behavior (e.g., Harris 1964). This is not to say, however, that those who de-emphasize ideational phenomena have not lodged some valid criticisms of ethnosemantics; to the contrary, these will be directly considered where appropriate.
7. For much the same reasons as I have discussed here, Murdock finds one of the "scattered kernels of valid or promising theory" (1972:22) in the decision-model approach, wherein
the emphasis is always squarely on the individual, on the psychological mechanism of reinforcement, and on the relevance of the specific conditions under which behaviour occurs. [1972:23]
8. The exceptions in the ethnosemantic literature which have attended, in varying degrees, to the question of individual variation are: Tyler 1966; Sanday 1968; K. Heider 1969; D'Andrade 1970; Sherzer 1970; Sankoff 1971, 1972; Rosaldo 1972; White and Thomas 1972; Wexler and Romney 1972; and Gal 1973.

CHAPTER II

1. Maps I and II were prepared by Dr. Kerry J. Pataki (University of Papua New Guinea) for the New Guinea Microevolution Project, whose principal investigator was Dr. James B. Watson (University of Washington). The maps as used here are adapted from their

published forms in Littlewood (1972) and McKaughan (1973), and appear with the permission of Drs. Pataki and Watson. Their assistance is gratefully acknowledged.

2. A detailed general history of European contact in the Highlands has yet to be written. In the meantime, the best general account is found in Souter (1963). For the history of Highlands anthropology, the reader is referred to Watson (1964b).
3. An outline of the Project is available in Watson (1963b). Two parts of a projected series of volumes are now published (Littlewood 1972; McKaughan 1973) as are many less comprehensive reports, including: Leininger 1964, 1966; Littlewood 1966; McKaughan 1964; Pataki 1968; S. Robbins 1970; Watson 1964a, 1964c, 1965b, 1967a, 1967c, 1968, 1970, 1972; Watson et al. 1961. V. Watson is presently preparing the third volume in the series, and Pataki the fourth.
4. The total figure cited is derived from government census reports on file in the Kainantu Sub-District Office. Such censuses are wrong with respect to the "Habi'ina Census Unit" (herein referred to as Ndumba; see below) by an overcount of approximately ten percent. If such errors are consistent across other "census units" (as I suspect they are), the total figures for Tairora Census Division, Dogara Census Division (in which "Habi'ina" is included) and the Iturua and Piora Census Divisions may be wrong, but the pattern of distribution would be generally accurate.
5. Especially valuable in this regard will be the publication of Watson's monograph on Northern Tairora ethnography and Patricia Hurley Hays's doctoral dissertation (at the University of Colorado) on Ndumba social and cultural change, both of which are now in preparation.
6. The name "Piora Basin" is of my own coinage, derived from the name given by some forgotten mapmaker to the mountain whose runoff the basin drains. Its validity is thus no more nor less than that of other names which appear on maps, but nevertheless is a useful label for those who read maps, and increasingly for those who must interact with those who do.

7. The people to be described in this dissertation, and their land, are called by the Administration "Habi'ina" and that name appears on most maps of the area. The name is derived from the local name Haavira, which properly applies only to a small piece of land on the banks of the "Malaria River" (herein called qOranaam'bu). For this reason, and because the name Ndumba has more currency in the area, among the inhabitants of the area in question and among their neighbors, I have chosen the latter to be used here. In fact, there is no all-inclusive name for the territory to be discussed or its inhabitants, so far as the "Ndumba" themselves are concerned but, as with "Mount Piora," they are gradually beginning to use such terms.
8. I am indebted to Dr. Kerry J. Pataki for the computation of Ndumba land area. In doing so, he employed what few maps and aerial photographs were available, and walked over much of the territory with me in 1972. His final figures were:
- | | |
|----------------------|---------------------------|
| 19.4 mi ² | forest |
| 4.0 mi ² | grassland |
| <hr/> | |
| 23.4 mi ² | total area (orthographic) |
- These figures can only be approximations, and any inferences or other extended use of them are the responsibility solely of myself, and such errors as might be so made cannot be attributed to Pataki.
9. This account draws upon several published descriptions, as modified for Ndumba on the basis of plant collections and botanical surveys. In the latter I was greatly assisted by my wife, Patricia, my field assistant and informant Kwaa'keso, and on two separate occasions by others whose extensive knowledge of New Guinea vegetation benefitted me greatly. I wish to acknowledge with thanks this assistance by Drs. George Argent (New Guinea Biological Foundation), William C. Clarke (Department of Geography, University of Papua New Guinea), and M.J.E. Coode (formerly of the Papua New Guinea Department of Forests, Division of Botany, and now of the Kew Gardens, United Kingdom). The major published sources consulted include: Brass 1964; Robbins 1961, 1962, 1963, 1970; Saunders 1970; van Royen 1963; and Womersley 1958. For details necessarily omitted here due to space considerations, the reader is

referred to these accounts.

10. More complete scientific names with authorities are provided in Appendix 1.

11. The climate of Ndumba is as complex as it is in the rest of the Highlands (cf. McAlpine 1970). While Ndumba themselves distinguish between a 'rainy season' (puwaa'nragi) and a 'dry season' (hwai'rigi), this distinction is based more on the location of the rising sun than differential rainfall. Impressionistically, there is a period of the year in Ndumba, from December to May, when it seems to rain all of the time (although it does not) and nights are very warm; on the other hand, from June to November it seems to seldom rain (although it does) and days are very warm while the nights are cold. The general validity of this impression may be seen in the following figures which show high and low temperatures and number of days on which measurable rain fell during a twelve-month period in Ndumba.

Month	Low Temp. (F°)	High Temp. (F°)	Days of Rain
Oct. 1971	51	80	9
Nov.	50	82	13
Dec.	48	81	19
Jan. 1972	54	80	10
Feb.	52	80	17
Mar.	53	79	28
Apr.	54	77	22
May	46	78	23
June	45	81	9
July	46	80	8
Aug.	46	81	6
Sept.	44	80	8

Overall Low 44 Overall High 82 Total 172

12. Scientific names for the crops mentioned were obtained primarily from the ethnographic, ecological and botanical literature, and are offered with that limitation (as opposed to professional determinations from specimens). Those for which determinations were made from actual collections are marked with an asterisk.

Ndumba Name	Scientific Name
<u>gaanigaani</u>	<u>Allium</u> sp.
<u>gaa'nrosa</u>	* <u>Dicliptera</u> <u>papuana</u>
<u>bum'ouri</u>	<u>Manihot</u> <u>esculenta</u>

<u>doga</u>	<u>*Cyanotis</u> sp.
<u>geta</u>	<u>Musa</u> spp.
<u>faa'nrau</u>	<u>*Trichosanthes</u> <u>tricuspidata</u>
<u>fa'ruti</u>	<u>Passiflora</u> <u>quadrangularis</u>
<u>fu'kaa</u>	<u>*Nicotiana</u> <u>tabacum</u>
<u>furi</u>	<u>Cucurbita</u> <u>pepo</u>
<u>haana</u>	<u>Zingiber</u> sp.
<u>haang'guma</u>	<u>Zea</u> <u>mays</u>
<u>ho'haa</u>	<u>*Cucumis</u> <u>sativus</u>
<u>ho'hondi</u>	<u>*Phaseolus</u> spp.
<u>honri</u>	<u>*Rungia</u> <u>klossii</u>
<u>kaa'mma</u>	<u>*Ipomoea</u> <u>batatas</u>
<u>kaa'pisi</u>	<u>*Brassica</u> spp.
<u>kopi</u>	<u>Coffea</u> <u>arabica</u>
<u>kosa</u>	<u>Setaria</u> <u>palmifolia</u>
<u>kwaanru</u>	<u>Saccharum</u> <u>edule</u>
<u>ma'tate</u>	<u>Solanum</u> <u>tuberosum</u>
<u>meru</u>	<u>*Oenanth</u> <u>javanica</u>
<u>nraa'mmaahina</u>	<u>*Pueraria</u> <u>triloba</u>
<u>nraa'mmunra</u>	<u>Amaranthus</u> spp.
<u>nraa'vida</u>	<u>Arachis</u> <u>hypogaea</u>
<u>nra'nraasa</u>	<u>Ananas</u> <u>comosus</u>
<u>paangki</u>	<u>*Cucurbita</u> <u>moschata</u>
<u>saagaa</u>	<u>Saccharum</u> <u>officinarum</u>
<u>saara</u>	<u>*Cordyline</u> <u>fruticosa</u>
<u>sara</u>	<u>Colocasia</u> <u>esculenta</u> ; <u>Xanthosoma</u> <u>sagittifolium</u>
<u>taana</u>	<u>*Dioscorea</u> spp.
<u>taagu</u>	<u>Bambusa</u> spp.
<u>tepi</u>	<u>Psophocarpus</u> <u>tetragonolobus</u>
<u>to'maato</u>	<u>Lycopersicon</u> <u>esculentum</u>
<u>wahe</u>	<u>Hibiscus</u> <u>manihot</u>

13. Various elevations for Mount Piora, ranging from 10,000 to over 12,000 feet, have been shown on maps of the area, most of which measurements are approximations based on aerial surveys. During a twenty-four hour period in September, 1972, Dr. Kerry J. Pataki and I recorded readings from two independent altimeters on the summit of the mountain. The highest reading, consistent on both, was 11,350 feet, which is given here as the summit elevation.
14. Depictions of the pre-contact Ndumba social universe are based on conversations with numerous men, with most of the details provided by two elderly "big men," Fai'ote and Vetaza. The collective idiom employed here and below is qualified accordingly.
15. A young woman married in to Ndumba from one of

the Waffa hamlets told my wife of her surprise at seeing so many old people in her new home. She claimed that in Naina (her natal hamlet), before a person ever grew old, if enemies did not kill you, the snakes would.

16. This description, like that of marriage links below, is based on intensive interviewing of an old "big man" and renowned fighter of Ndumba, Fai'ote, with corroboration from numerous other men of varying ages.
17. Ndumba is regarded generally in the Basin as having the best land, partly because of its favorable location on the trade route to be described shortly, partly because of its plentiful forest for hunting, and partly because of its reputedly rich soil. It was not uncommon during the research period for other groups, especially To'okena, to experience food shortages and come to Ndumba to buy sweet potatoes, where such shortages were unknown.
18. Most of the detailed information on trading was obtained from two informants: qUnggai, a 30-year-old man from Ndumba who actively participates, and Yamyena, an qImaani man in his late 30's who resided in Ndumba for much of the research period and arranged or otherwise participated in many exchanges during his lifetime.
19. Salt (gorago) is packaged by qImaani in hard rectangular bricks, usually about a foot long, 4-6 inches wide and 2-3 inches thick. The brick is then securely wrapped with cane or vines and traded as such. Exchange rates current in 1972 in Ndumba are exemplified thus:
 - 5 bricks = 1 steel axe
 - 2 bricks = 1 steel machete
 - 1 brick = 1 bandolier cowrie shells (woven band approximately 6 feet long by 4 inches wide)
 - 1 brick = 1 bandolier large shells
20. First contact may have been earlier. According to Giles et al. (1970:66), the "initial official European contact with the Waffa-speaking people appears to have been in 1936 according to evidence still available in Siaga village." Old men in Ndumba claim to remember a "Government" officer arriving from the direction of Siaga in the 1920's, on the basis of other dateable events. This 'kiap,' they say, asked them not to reveal

his whereabouts to the 'Japanese' who might come looking for him. To encourage their assistance, he gave them presents of western clothing and steel axes, went away, and was never seen again. Such are the data for Highlands ethnohistory.

21. At the time of the research, some 30-35 individuals were living away from Ndumba, most of them being young men employed in plantation labor on the coast. All figures are thus qualified by the exclusion of these people. Absentees are also excluded from official Administration census figures for the sake of comparability.
22. This rate is computed on the basis of births (16) and deaths (5) which occurred in Ndumba during the research period.
23. Details of a case of sib fission some fifty years ago, resulting at least in part from marriage complications, are provided in P. Hays (forthcoming). For present purposes, a detailed account of this and other aspects of Ndumba social organization is unnecessary, and the reader is referred for a more complete description to the forthcoming work by P. Hays.
24. Four women, all married in from other places, are members of sibs not otherwise represented in Ndumba, and are lumped together for present purposes.
25. Information about childbirth was obtained by my wife, Patricia, who attended a childbirth in October, 1971. Additional information about age-grades was obtained through personal observations and conversations with numerous men, women and children.
26. Food taboos of all kinds were described in detail by several male informants, especially Kwaa'keso, Saasapi, Fetaqu and qUnggai, and one woman, qIraiqo, whose childbirth my wife witnessed.
27. The description of the gummaana ceremony is based on my observations and discussions with many men on two occasions when the ceremony was held. Only one opportunity existed to observe the kwaasi ceremony to be described below, and the details are unclear.

CHAPTER III

1. I will not attempt to give here what would necessarily be an incomplete list of the many reports of the genre just characterized. The interested reader is referred to Conklin's excellent bibliography (1972) for a nearly-exhaustive annotated list, including works in ethnozoology, to which the foregoing remarks apply as well.
2. There was, on the other hand, during this same period in American anthropology, a wave of monographs and articles dealing with world view or cosmology, which gave a good deal of attention to classification systems, especially as they related to totemism. The subsequent use of these materials by Levi-Strauss and others doing so-called "symbolic anthropology" has been a source of considerable confusion in which distinct types of classification systems have been confounded (see below).
3. For a more detailed characterization of "Ethnoscience," see Sturtevant 1964; for "Ethnographic Semantics," Colby 1966; and for "Cognitive Anthropology" and "the New Ethnography" see Tyler 1969. For convenience, these phrases will be used interchangeably in this dissertation as they all refer to virtually the same areas of interest in the anthropological literature.
4. Only the most directly relevant criticisms will be dealt with here. More general objections can be found in Harris (1968:568-604), while responses to his charges are best articulated by Hymes (1970), Kay (1970) and Goodenough (1971):
5. Some investigators have reported their consternation at trying to deal with "a variegated system (or intersecting set of partial systems)" (Thomas 1964:14), or the "overlapping" of "food and plant taxonomies" (Perchonock and Werner 1969:232-233), or "cross cutting classifications" (Werner and Begishe 1970:251). In these cases it seems quite clear that the confusion has resulted from confounding categories and names, i.e., taxa and labels.

Thus, in Ndumba, plant taxonomies "overlap" or "intersect" with food or medicine taxonomies, but only in the sense that the same linguistic labels occur with taxa in both. An example may be cited in the polysemous expression hanra. In plant

taxonomies, the expression hanra occurs as a label for the taxon whose empirical content consists of the set of all trees which are named Pandanus conoideus by Western botanists. In food taxonomies, on the other hand, hanra is a label for the taxon whose empirical content consists of the set of all edible "fruits" of the trees which are also called by the same name. While the linguistic label is identical in both instances, the conceptual categories (taxa) being labeled are quite distinct, and belong to different taxonomic structures. Informants are not confused by the polysemy, and the investigator can usually clarify the problem by more intensive questioning which, in the case just cited, revealed that one could always say hanra'taamma (literally, 'hanra fruit') when speaking of the food product to eliminate any possible ambiguity.

6. Originally I began with twelve informants, including an adolescent boy and an additional woman. They are excluded from consideration here because of three reasons: (1) data for both are incomplete; (2) the boy was originally chosen to provide some perspective on developmental aspects of plant knowledge, thus is not considered in comparisons of adults' knowledge; and (3) the woman proved to be much less cooperative than most, was absent during many of the plant naming sessions, and my judgment is that data provided by her are not as valid, for her, as are other informants' reports for themselves.
7. I am indebted to Brent Berlin for the suggestion of both the Collection and Identification Files. While I was in the field, Berlin described these techniques as they were employed in his fieldwork through his generous provision of a manuscript, subsequently published as part of Berlin et al., n.d.
8. The experiment of asking informants to name plants from reference work plates was not attempted more generally because most informants had some difficulty in "reading" photographs and drawings, especially when not in color. The informant I did employ for this task had worked with me a good deal on various drawings and photographs and stated that he was able to identify many of the grasses in this way, although he too admitted some difficulty due to the reduction in size and dimensionality. The results should be interpreted with these qualifications in mind.

9. The example shown is one of the simpler matrices. Such contrast sets as sa'tari ('trees and shrubs') includes as many as 60 columns and 200 rows. For economy of space, faa'nresa was chosen only to illustrate the way in which these data have been ordered for the analyses in Chapter IV.

CHAPTER IV

1. Explicit consideration is given here only to folk taxa which are habitually labeled linguistically. Convincing evidence exists for unlabeled or "covert" taxa in Ndumba plant ethnosystematics (Hays 1973) but due to lack of comparable data from all ten informants these are excluded from this discussion.
2. As stated earlier, I am not here concerned with connotational meanings of plant names.
3. Given my continuous efforts at cross-checking of informants' statements, the idiosyncratic names are the only data considered here in which I have less than full confidence. Many of these were obtained as naming responses to plant collections and I have little doubt that, at least in some cases, they were invented by informants in lieu of admitting that he or she did not recognize a particular plant. This kind of response, probably motivated by personality factors, has been reported by other ethnosystematists as well.

As much as possible, through subsequent questioning of informants who had supplied suspicious names, I have eliminated those which I am convinced were not legitimate plant names. It is possible, however, that some remain among the idiosyncratic names, especially those given by Informant B who has the highest number (14) of all informants in his individual lexicon. Informant B, especially during the early period of the field research, seemed anxious to please me and thus, mistakenly, may have thought that I preferred any name to no name at all.

The case of Informant J, with the second-highest number of idiosyncratic names (10), is perhaps more easily understood. The only member of the sample not born in Ndumba, her childhood and adolescence were spent in Ahea (see Map III, p. 37), where a separate dialect of Tairora is spoken, and this may account for several of her

idiosyncratic names, which refer to food plant varieties cultivated there but not in Ndumba. Also included in her total are three names which are Ahea-dialect synonyms for plant names known by others in Ndumba. However, many other names for plants not occurring in Ndumba are widely-known to other informants; for example, all ten informants know the names of 34 Waffa plants (Appendix 2), and synonyms from other dialects are also widely-known.

In order to maintain consistency with regard to inclusion of plant names from other dialects and hamlet clusters, then, the above-mentioned idiosyncratic names are retained in the Appendices. The foregoing comments are intended only to justify the separate tabulations, affected as they are by the two informants' totals just discussed.

4. The statistic used here is "a coefficient of association between two sets of ordered observations based on their mutual predictability in terms of the relative number of agreements and inversions in the order of the rankings" (Freeman 1965:82).

The formula for computing $\underline{G}$ is

$$\underline{G} = \frac{f_a - f_i}{f_a + f_i}$$

where f_a equals the frequency of agreements in the order of the rankings, and f_i equals the number of inversions. The result is a ratio of this difference to maximum possible agreement (identical rank-orders) or maximum possible inversion (complete reversal of rank orders), which will always vary between -1.00 and +1.00.

Agreements and inversions are counted by comparing each number in the right-hand column of two rank-orderings with each of those above it. For each rank level, every larger number which occurs above a smaller one counts as an agreement; each smaller number which lies above a larger one counts as an inversion. Thus, in computing $\underline{G}$ for the two rank-orders in Table X:

<u>Inf.</u>	<u>Incl. Idio.</u>	<u>Excl. Idio.</u>	<u>Inversions</u>	<u>Agr's</u>
J	10	10	0	0
C	9	9	0	1
D	8	8	0	2
B	7	6	0	3
E	6	7	1	3
I	5	5	0	5
H	4	3	0	6
G	3	4	1	6
F	2	2	0	8
A	1	1	0	9
Total			2	43

$$\begin{aligned}
 G &= \frac{f_a - f_i}{f_a + f_i} \\
 &= \frac{43 - 2}{43 + 2} \\
 &= \frac{41}{45} = (+) .911
 \end{aligned}$$

In this and subsequent uses of the G statistic, the reader is cautioned that it can only be suggestive given the relatively small number of individuals whose ranks are being compared.

5. The number of synonyms among the total corpus of plant names is fairly large (e.g., 172, or 18%, of the 938 names in the lexicon of the fully-shared taxonomy) and deserves a brief comment. Synonyms for plant and animal names are often coined by individuals or otherwise enter the vocabulary as a result of either dialect differences, individual whim or the system of name taboos.

Thus, some alleged synonyms, variably known by the informants, are the preferred names of "the same plant" in hamlets where other dialects of Tairora are spoken (e.g., gesang'gora, the name used in To'okena for the plant called hu'revu in Ndumba). Many of these dialectal differences are known, and recognized as such, across several hamlet clusters, transmitted with intermarriage or other kinds of interaction.

Other synonyms are coined by individuals merely as personal preferences. Thus, several informants had bestowed names of their own creation on

the shrub commonly known as to'teza, reportedly because they 'liked its flowers' and wanted it to have a special name. Such personal names were often shared with others and the whole matter was regarded light-heartedly.

Finally, many synonyms are useful to know (whether created for that purpose or not) because of the name taboo system. This is described by P. Hays (forthcoming) and will not be outlined here, except to say that it principally involves matrilineal relatives and affines, often resulting in a large number of people whose names a given individual may never speak aloud under any circumstances. When a person whose name is taboo is also named after a plant, the plant's name also must never be uttered. For example, Informant A may not say the name gorafu'hara (a kind of sa'tari) since that is also the name of a sib-mate of his father's mother; thus, he must know and resort to an alternative name for the same plant if he has occasion to speak of it. Since tabooed names vary among individuals, the need to know particular synonyms also varies, and could partially account for the variable knowledge of such names.

6. Since 2 informants are tied in the ranking of taxonomy size with idiosyncraties excluded, the usual procedure for calculating G must be modified. Given the very small number of such ties, in this and additional tables below, I have simply scored each tie as one-half of an inversion and one-half of an agreement (cf. Freeman 1965:84-87, 170-175, 249, for a different method involving larger numbers of cases).
7. On the basis of those folk plant and animal taxonomies so far described, Berlin and his associates have postulated a set of five "universal ethnobiological categories" (Berlin et al. 1973; the term "category" has subsequently been replaced with "rank," Berlin, personal communication):
 - (1) the rank of unique beginner -- the highest-level (level zero), all-inclusive taxon (e.g., 'plant'); not habitually labeled linguistically (1973:215).
 - (2) life form -- occurring at level one, invariably few in number, including the majority of all named taxa of lesser rank; tends to be labeled by primary lexemes (cf. my foringa, mauna, muso, sana and sa'tari for Ndumba). (1973:215).
 - (3) genus -- most are immediately included

in one of the few life form taxa (cf. 'kinds of' mauna, e.g., faa'nresa) and thus occur at level two; others, which may be called "un-affiliated generics" (typically the economically important plants, e.g., kaa'mma, 'sweet potato' in Ndumba, or morphologically unusual plants such as 'bamboo,' taagu), are not included in these higher taxa and thus occur at level one. Taxa of generic rank of both kinds tend to be labeled by primary lexemes (1973:215-216).

(4) species -- those taxa immediately included in taxa of generic rank, most commonly labeled by secondary lexemes (e.g., qora'faanresa) (1973:216).

(5) variety -- those taxa immediately included in taxa of specific rank, also most commonly labeled by secondary or even tertiary lexemes (e.g., guna'tepi, which is a kind of tepi, which is itself a "species" of the "unaffiliated generic" ho'hondi, 'bean') (1973:216).

For Ndumba it is necessary to add a sixth rank, that of sub-variety, since for all informants guna has two subsidiary classes, nerira (a wild poisonous form) and guna tuanra'nraana (the cultivated, 'genuine' form).

With this addition I will use Berlin's typology in the discussions here, although it has recently been criticized and amendments suggested by Hunn (1973:106-109). For present purposes, the differences between the two schemata are not crucial, and detailed comment on their relative applicability to the Ndumba material will be deferred.

8. Especially recently, there has been considerable discussion, at least informally, of the question of male and female "cultures" or "sub-cultures," often in the context of allegations of biases in traditional ethnography resulting from exclusion of one or the other of the sexes from descriptions (e.g., see Singer 1973). So far as I am aware, although my data so far indicate some validity for such a contention, the present work is the first substantive documentation regarding such differences, however extensive they may or may not be. Implications of what I have found in my own data, so far as ethnographic description is concerned, will be discussed further below.
9. In those cases where an informant's response was later judged to be a descriptive phrase rather than a legitimate plant name, the phrases have been replaced in Appendices 4 and 5 with the

highest-level taxon labels which were implied in the actual responses. Thus, e.g., the expression mauna fu'haa ('a mauna used for medicine') was converted to simply mauna. While in many instances the informant might have been able to supply a more specific name if the phrase had been recognized as such at the time, this procedure is the only one which I feel is justified for such ex post facto alterations of the data.

10. Ideally, my collecting assistant would have been someone other than a member of my sample to assure strict comparability among the sample members. However, there were few reliable men of his age group available for inclusion in the sample and Kwaa'keso proved to be extraordinarily conscientious, hard-working and insightful in all respects. No one in Ndumba understood my project as well as he and I have no reason to believe that his dual role introduced any significant bias in either my results or interpretations.
11. Indeed the whole question of the relative importance of "distinctive feature" (or "cue") vs. "gestalt" or pattern-recognition in ethno-systematics is still under debate (cf. Frake 1962b:83-84; Keesing 1972:18; Hunn 1973:92-109). Even my best (i.e., most articulate) informants had difficulty, for example, in describing plants to me in terms of particular features, even when discussing a specimen in hand. While I elicited more than twenty general labels for parts of plants, I was unable to get any informant to easily characterize a given plant's leaf shape or stem thickness, and so forth. Rather, they tended to simply say, "It looks like a _____, and if you've never seen it before you wouldn't know how to recognize it" (cf. Fowler and Leland 1967:399-400).
12. Sometimes on plant collecting trips, my assistant did not see every plant I collected, thus the special importance of his identifying all specimens again after returning to my house. On occasion, for example, while he was climbing a tree to collect an epiphytic orchid or fern, I would be seeking ground herbs or grasses below. Thus he would not see the plants obtained in this way until later as specimens.

13. It is impossible, removed from the naming task situation, to separate these kinds of "guesses" from confident responses. I was forced to rely on clues from my informants (e.g., a questioning tone of voice) during the task performance to identify such guesses and thus cannot be certain that none were recorded as final responses. However, given the general willingness of informants to confine their responses to residual generic names when they were not certain of a classification, I feel that the number of such questionable responses in the data is small.

14. This discussion does not imply that residual generic or residual specific taxa (i.e., heterogeneous groupings of non-subdivided members of a folk genus) are not legitimate taxa. One would be surprised if every plant in the rich Ndumba flora were classified into a sharply-bounded folk taxon with its own name.

For example, the Ndumba folk genera ho'tera and kwaza'kwaza together approximately coincide with the botanical family Orchidaceae, of which there are nearly 3,000 species in New Guinea, at least hundreds of which are found in Ndumba forests (cf. Robbins 1971:24). It might be expected that a considerable portion of this diversity would be lumped together into a kind of "miscellaneous orchid" category such as the residual specific taxa hotera_r and kwazakwaza_r. To demand exhaustive partitioning into fine-grained mutually-exclusive subsets of such complex and large taxa as these folk genera would be pushing the "passion for classifying" which Levi-Strauss attributes to the "savage mind" (1966) to absurd limits (cf. Appendix 1, where Western botanists also identified many of my plant collections only at the generic rank).

The point at issue here is not, then, whether only some informants find residual taxa useful or necessary, but which informants include more in them than do others, whose taxonomies are more elaborately sub-divided.

15. As can be seen in Appendix 5, residual generic names are combined with life form names. The latter occurred with the earliest plant collections, before I was aware of their polysemous character. Unable to determine now whether informants could have provided more specific identifications on those occasions had they been asked,

I must treat the responses as residual generic names for present purposes.

16. Subscripts a and b distinguish between polysemous plant names. In this case all informants distinguish a folk genus within the life form sana ('vine') and label it baugera(a). Eight informants also use the expression baugera(b) as a synonym for faugora, a folk genus within the life form mauna (see Appendix 3). Such instances of what are doubtless homonyms are relatively few in the total Ndumba plant name lexicon. Their subscripts readily distinguish them from the other two kinds of polysemy already discussed, those of residual taxa (subscripted r) and type-specific taxa (subscripted 2).
17. I have described in Chapter III the techniques employed in obtaining information regarding plant uses. In this discussion I have pooled all such information from all sources, i.e., both interviews and observations. For reasons of economy of space the "Use File" is not reproduced here.
18. Technically no plant class has a use score of zero given the broad definition of "use" adopted here. There are many small herbs, grasses and mosses, for example, which have no direct or indirect use. However, one of these growing wild in a garden might be viewed as a 'weed' (weang-gusa) and thus require attention, viz., removal. However, this is true of the vast majority of plants and has less to do with a need to recognize a given plant per se than a contextual consideration, and thus is not included here as a plant use.
19. An approximate indication of the representativeness of the sample of plant names which occurred as naming responses might be obtained from the following fact: Out of the 799 plant names (excluding synonyms) known to all ten informants, 388, or 48.6%, actually were used in identifying the plant specimens collected. This constitutes a necessary qualification to any extrapolations from the present data.
20. This difference is probably also due to my less complete information regarding women's uses of plants. Nearly all of my regular informants for this kind of information were men (because of lack of fluency in Tairora on my part), and as

a result there are doubtless a number of plant uses of importance to women, and perhaps known only to them, which are not counted here. I doubt, however, that such uses would be numerous enough to significantly affect the distribution here to the extent of the differential sex-related importance of trees.

21. An interesting anecdote from the Paliyan of India perhaps illustrates the point well:
 Three Paliyans sat around a healthy bush with plentiful leaves and fruit, the wood of which is one of five used for digging sticks. They gave me three different names for the bush and argued among themselves over the name for several minutes because the alternatives were not synonymous. Finally, one of them laughed, turned to me, and said, 'Well, we all know how to use it!' [Gardner 1966:397]
22. This does not mean that the plant in question has only one use but that only one of its uses is restricted to that plant.
23. There are probably no cases of ethnographers who have so restricted their descriptions. Indeed, there are relatively few who indicate that they have systematically explored the degree to which the culture they describe is shared. To this extent, by suggesting that this is an option actually chosen by some, I could be accused of setting up a straw man. However, straw men can have legitimate purposes, and the intent here is to draw attention to the unresolved, and largely unaddressed, question of what is meant when culture is said to be "shared."
24. It is not, however, always obvious to the reader of an ethnography when a description has been arrived at in this way. Especially is this so when the ethnographer implicitly or explicitly transforms such an "ideal" informant into a "typical" or "average" one.
25. The above alternatives can be seen in microcosm through determining Ndumba's place in the "New Guinea Highlands sweet potato naming sweepstakes," where they doubtless lose to the Dani, with their "70 names for sweet potato varieties" (K. Heider 1969:78).

If my ten informants constitute an adequate sample, "Ndumba" have anywhere from 27 to 31 names for sweet potato varieties (actually folk species in the typology used here), depending on the informant asked. All ten informants share 27 names, as do all five of the men and all five women, although the three sets of 27 names are not identical. There is a total "pool" of 31 names, but only 28 so far as the men are concerned, with the women's pool equalling the total. The "average Ndumba" knows 28.3 names, the "average man" 27.2 and the "average woman" 29.4.

So far as the number of distinct kinds of sweet potatoes is concerned, there are 23, 24, 25 or 26, depending on the informant. In the folk taxonomy shared by all informants, there are 23 subclasses within kaa'mma; in that shared by all male informants, again 23, and the same for the shared women's taxonomy -- however, these three sets differ in content. The "composite" folk taxonomy includes at least 25 kinds; that of all men only 24, and the women's total pool also includes 25 kinds -- again these all differ in content. Finally, the "average Ndumba" distinguishes 23.7 kinds, the "average man" only 23.2, and the "average woman" 24.2.

Thus, while it is clear that Ndumba loses the contest, it is less clear as to how close they come to winning.

APPENDIX 1 ALPHABETICAL INVENTORY (BY GENUS) OF PLANT
COLLECTIONS IN NDUMBA TERRITORY

The following list includes identifications of all 517 plant collections made in Ndumba. The determinations (updated to July, 1973) were all provided by Mr. J.S. Womersley and his staff at the Department of Forests, Division of Botany, Lae, Papua New Guinea, where the collections are presently housed in the Herbarium.

The collections are listed alphabetically by genus, along with their identification numbers. An indication "sp." should be read as "undetermined species" which, in some cases of multiple instances, may eventuate as more than one actual species.

<u>Acalypha</u> sp.	403, 452
<u>Adiantum</u> sp.	375
<u>Aeschynanthus</u> sp.	006, 007, 010, 034
<u>Ageratum</u> <u>conyzoides</u> L.	028
<u>Alphitonia</u> <u>incana</u> (Roxb.) Teys. & Binn. ex Kurz	229
<u>Alpinia</u> <u>floccosa</u> Val.	174
<u>Alpinia</u> sp.	134, 287, 315, 341, 415
? <u>Alpinia</u> sp.	327
<u>Alyxia</u> <u>lamii</u> Mgf.	222
<u>Amaracarpus</u> <u>clemensae</u> M. & P.	168
<u>Amyema</u> sp.	281, 485
<u>Anaphalis</u> <u>mariae</u> F. Muell. f. <u>mariae</u>	479
<u>Anisomeles</u> <u>indica</u> (L.) O.K.	260
<u>Anthoxanthum</u> <u>angustum</u> (Hitchc.) Ohwi	487
<u>Araucaria</u> <u>cunninghamii</u> D. Don.	408
<u>Ardisia</u> sp.	434

<u>Arthraxon ciliaris</u> P. Beauv.	312
<u>Asplenium nidus</u> L.	381
<u>Asplenium</u> sp.	384, 387
<u>Astelia papuana</u> Skottsb.	484
<u>Astronia c.f. papuana</u> Cogn.	438
<u>Begonia</u> sp.	015, 040, 084, 293, 334, 429, 440
<u>Belvisia</u> sp.	421
<u>Bidens pilosa</u> L.	027, 511
<u>Blumea lacera</u> (Burm. f.) DC. var. <u>lacera</u>	071
<u>Boerlagiodendron micranthum</u>	038, 292
<u>Brassica ?juncea</u> (L.) Czern. & Coss.	031
<u>Broussonetia papyrifera</u> (L.) Vent.	498
<u>Bubbia</u> sp.	465
<u>Buchnera tomentosa</u> L.	057
<u>Buddleia asiatica</u> Lour.	404
<u>Bulbophyllum</u> sp.	131, 138, 202
<u>Calanthe micrantha</u> Schltr.	173, 218
<u>Caldcluvia brassii</u> (Perry) Hoogl. in ed.	352
<u>Callicarpa caudata</u> Maxim.	079
<u>Calycacanthus magnusianus</u> K. Sch.	460
<u>Canna indica</u> L.	214
<u>Cardamine africana</u> L.	036
<u>Carex brownii</u> Tuckerm.	115
<u>Carex neoguineensis</u> C.B. Cl.	121
<u>Carex xestogyne</u> Nelm.	047
<u>Carex</u> sp.	366
<u>Carpodetus arboreus</u> (Lant. & K. Sch.) Schltr.	270
<u>Cassia floribunda</u> Cav.	101
<u>Castanopsis acuminatissima</u> (Bl.) Hickel & Camus	304, 455
<u>Casuarina oligodon</u> Johnson	215
<u>Casuarina papuana</u> S. Moore	259
<u>Ceratostylis scirpoides</u> Schltr.	204
<u>Ceratostylis</u> sp.	203, 335

<u>Chloranthus officinalis</u> Bl.	463
<u>Claoxylon capillipes</u> Airy Shaw	194
<u>Clematis phanerophlebia</u> Merr. & Perry	437
<u>Coelogyne</u> sp.	409
<u>Coix lachryma-jobi</u> L.	219
<u>Coleus scutellarioides</u> (L.) Benth.	026, 152, 244, 272, 276, 296,
<u>Commelina diffusa</u> Burm. f.	102, 249
<u>Conandrium polyanthum</u> (K. Sch. & Laut.) Mez.	169
<u>Cordyline fruticosa</u> (L.) A. Chev.	177, 186, 247, 258, 264
<u>Coriaria papuana</u> Warb.	504
<u>Corsia</u> sp.	035
<u>Cosmos ?bipinnatus</u> Cav.	098, 162, 163
<u>Crassocephalum crepidioides</u> (Benth.) S. Moore	302
<u>Crotalaria ferruginea</u> Benth.	240
<u>Crotalaria linifolia</u> L. f.	235
<u>Crotalaria mucronata</u> Desv.	407
<u>Crotalaria semperflorens</u> Vent.	166
<u>Cucumis sativus</u> L.	262
<u>Cucurbita moschata</u> (Duch. ex Lam) Duch. ex Poir.	164
<u>Cucurbita pepo</u> L.	278
<u>Curculigo orchiioides</u> Gaertn.	061
<u>Curcuma longa</u> L.	393
<u>Cyanotis</u> sp.	499
<u>Cyathea</u> sp.	354, 355, 371
<u>Cyclosorus</u> sp.	324, 376, 377, 382
<u>Cyperus cyperoides</u> (L.) O.K.	119
<u>Cyperus pedunculatus</u> F. v. M.	086
<u>Cyperus pilosus</u> Vahl	321
<u>Cyperus sesquiflorus</u> (Torr.) Mattf. & Kuk.	394
<u>Cyrtandra</u> sp.	136, 464
<u>Danthonia archboldii</u> Hitchc.	482
<u>Dawsonia</u> sp.	190

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<u>Derris</u> sp.	505
<u>Desmodium gyroides</u> DC.	030, 053
<u>Desmodium repandum</u> (Vahl) DC.	008, 025
<u>Desmodium sequax</u> Wall.	077, 226
<u>Dianella ensifolia</u> L.	092, 149, 338
<u>Dichrotrichum</u> sp.	001
<u>Dicliptera papuana</u> Warb.	416, 500
<u>Dicranoloma</u> sp.	195
<u>Dicrocephala bicolor</u> (Roth.) Schlechtend.	515
<u>Dimorphanthera robbinsii</u> Sleum.	221
<u>Dimorphanthera elegantissima</u> K. Sch.	428
<u>Dioscorea</u> sp.	417, 456
<u>Diplazium</u> sp.	323, 373
<u>Diplycosia morobensis</u> Sleum.	357
<u>Dodonaea viscosa</u> (L.) Jacq.	225
<u>Drimys piperita</u> Hook. f. entity <u>coriacea</u>	495
<u>Drimys piperita</u> Hook. f. entity <u>heteromera</u>	336, 337
<u>Elaeocarpus crenulatus</u> Knuth	358
<u>Elaeocarpus nubigenus</u> Schltr.	216
<u>Elaeocharis dulcis</u> (Burm.) Trin.	185
<u>Elatostema integrifolium</u> (D. Don.) Wedd.	223
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<u>Embelia</u> sp.	220
<u>Emilia prenanthoidea</u> DC.	019, 050, 255
<u>Epiblastus</u> sp.	037, 380
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<u>Eragrostis tenuifolia</u> Hochst. ex Steud.	116
<u>Erigeron canadensis</u> L.	182
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<u>Eulalia leptostachys</u> (Pilg.) Henrard	397
<u>Euphorbia buxoides</u> A.R. Sm.	518
<u>Euphorbia pulcherrima</u> Willd.	212
<u>Euphorbia serrulata</u> Reinw.	105
<u>Evodia</u> sp.	373
<u>Evodiella</u> sp.	510
<u>Exocarpus erythrocaulis</u> (F. Muell.) Stauff.	209
<u>Ficus adenosperma</u> Miq.	419
<u>Ficus angusta</u> Corner	117
<u>Ficus calopilina</u> Diels	107, 242
<u>Ficus camptandra</u> Diels	200
<u>Ficus copiosa</u> Steud.	450
<u>Ficus dammaropsis</u> Diels	372, 469
<u>Ficus wassa</u> Reinw.	303
<u>Ficus xylosycia</u> Diels	392
<u>Ficus</u> sp.	137
<u>Fimbristylis dichotoma</u> (L.) Vahl	183
<u>Galbulimima belgraveana</u> (F. Muell.) Sprague	462
<u>Garcinia</u> sp.	453
<u>Gardenia lamingtonii</u> F.M. Bail.	139
<u>Garnotia mezii</u> Janowsky	326
<u>Gaultheria mundula</u> F. Muell. var. <u>mundula</u>	478
<u>Geniostoma arfakense</u> Kan. & Hat.	160
<u>Gentiana</u> c.f. <u>lorentzii</u> Koord.	488
<u>Geranium potentilloides</u> L'Herit. ex DC.	490
<u>Gleichenia</u> c.f. <u>erecta</u> C. Chr.	120
<u>Glochidion</u> sp.	133
<u>Glossorhyncha</u> sp.	206, 300, 491
<u>Graptophyllum</u> sp.	048, 316, 426, 448
<u>Gunnera macrophylla</u> Bl.	095
<u>Haloragis chinensis</u> (Lour.) Merr.	306
<u>Harmsiopanax ingens</u> ssp. <u>ingens</u>	424
<u>Harpullia</u> c.f. <u>leptococca</u> Radlk.	167
<u>Hedyotis hispida</u> Retz.	227
<u>Helichrysum bracteatum</u> (Vent.) Andr.	020

<u>Helicia saruwagedica</u> Sleum.	512
<u>Helicia</u> ?sp. nov.	359
<u>Hemigraphis</u> sp.	447
<u>Homalomena</u> sp.	470
<u>Hornstedtia</u> sp.	106, 457
<u>Hypericum gramineum</u> Forst. f.	052, 143
<u>Hypericum</u> ? <u>macgregorii</u> F. Muell.	489
<u>Hypolepis</u> sp.	325, 374
<u>Impatiens balsamina</u> L.	263
<u>Impatiens hawkeri</u> Bull	002, 003, 011, 032, 089
<u>Impatiens</u> sp.	188, 250, 277, 297, 301, 318
<u>Imperata conferta</u> (Presl) Ohwi	517
<u>Ipomoea batatas</u> (L.) Lamk.	248, 271, 273, 274, 275, 295
<u>Ipomoea</u> sp.	014
<u>Iresine herbstii</u> Hook. f.	213
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<u>Ischaemum polystachyum</u> Presl	332
<u>Juncus effusus</u> L.	114, 369
<u>Kibara</u> sp.	155, 158
<u>Lablab purpureus</u> (L.) Sweet	237
<u>Lactuca indica</u> L.	236
<u>Laportea decumana</u> (Roxb.) Wedd.	459
<u>Leersia hexandra</u> Sw.	396
<u>Lepidagathis</u> sp.	410
<u>Leucobryum</u> sp.	175
<u>Lindernia anagallis</u> (Burm. f.) Pennell	370
<u>Lindernia pusilla</u> (Thumb.) Merr.	104
<u>Liparis</u> sp.	005, 154, 207, 228
<u>Lithocarpus</u> c.f. <u>rufo-villosus</u> (Markgr.) Rehd.	468
<u>Ludwigia octovalvis</u> (Jacq.) Raven	055, 322, 365
<u>Lupinus</u> sp.	063

<u>Lycianthes</u> sp.	128
<u>Lysimachia japonica</u> Thunb.	111
<u>Macaranga pleioneura</u> Airy Shaw	399
<u>Macaranga</u> sp.	454, 513
<u>Maclura cochinchinensis</u> (Lour.) Corn.	217
<u>Maesa</u> sp.	320
<u>Malaxis</u> sp.	041
<u>Malvaviscus arboreus</u> Cav.	238, 239
<u>Maoutia</u> sp.	108
<u>Marattia</u> sp.	385
<u>Mazus pumilus</u> (Burm. f.) Steen	110
<u>Medinilla</u> sp.	432
<u>Mediocalcar</u> sp.	170
<u>Melastoma polyantha</u> Bl.	093
<u>Melicope</u> sp.	159
<u>Melinus minutiflora</u> P. Beauv.	311
<u>Microglossa pyrifolia</u> (Lamk) O.K.	124
<u>Mikania cordata</u> (Burm. f.) B.L. Rob. f. <u>undulata</u> Koster	288
<u>Miscanthus floridulus</u> (Labill.) Warb.	112, 181, 245, 427
<u>Mitrasacme pygmaea</u> R. Br.	068
<u>Mitrastemon yamamotoi</u> Mak.	298
<u>Mucuna ?stanleyi</u> C.T. White	411
<u>Mussaenda ferruginea</u> K. Sch.	328
<u>Myristica womersleyi</u> Sincl.	388
<u>Nasturtium</u> sp.	383
<u>Nastus productus</u> (Pilg.) Holtt.	435
<u>Nicotiana tabacum</u> L.	268
<u>Ocimum basilicum</u> L.	267
<u>Oenanthe javanica</u> DC.	013, 261, 265
<u>Olearia monticola</u> F.M. Bail. c.f. var. <u>monticola</u>	483
<u>Olearia ?platyphylla</u> Mattf.	342
<u>Olearia spectabilis</u> Koster	474
<u>Omalthus novoguineensis</u> (Warb.) Laut. & K. Sch.	401
<u>Ophiorrhiza ?nervosa</u> Val.	081, 085

<u>Ophiorrhiza</u> sp.	153
<u>Oplismenus undulatifolius</u> (Ard.) Beauv.	286
<u>Osbeckia chinensis</u> L.	018, 062
<u>Oxalis corniculata</u> L.	045, 051, 099, 243
<u>Palmeria c.f. fengeriana</u> Perkins	142
<u>Palmeria fengeriana</u> Perkins	189
<u>Pandanus julianettii</u> Martelli	441
<u>Parahebe albiflora</u> (Penn.) P. Royen & Ehrend.	480
<u>Parsonsia curvisepala</u> K. Sch.	197
<u>Parsonsia c.f. wollastonii</u> (Wernh.) Mgf.	205
<u>Parsonsia</u> sp.	466
<u>Paspalum longifolium</u> Roxb.	395
<u>Pedilochilus</u> sp.	198
<u>Pennisetum macrostachyum</u> (Brongn.) Trin.	113
<u>Peperomia</u> sp.	056, 501
<u>Phaleria</u> sp. nov.	082, 282
<u>Phaseolus lunatus</u> L.	406
<u>Phaseolus vulgaris</u> L.	289
<u>Phreatia</u> sp.	140, 171, 210
<u>Phyllanthus flaviflorus</u> (Laut. & K. Sch.) Airy Shaw	130
<u>Phyllocladus hypophyllus</u> Hook. f.	344
<u>Physalis peruviana</u> L.	179
<u>Pilea</u> sp.	430, 458
<u>Piper macropiper</u> Pennant	241
<u>Piper</u> sp.	390, 431, 446
<u>Pipturus argenteus</u> (Foerst. f.) Wedd.	109
<u>Pittosporum pullifolium</u> Burk.	211
<u>Pittosporum ramiflorum</u> (Z. & M.) Zoll. ex Miq.	422
<u>Poa saruwagedica</u> Pilger	234
<u>Poikilogyne</u> sp.	507
<u>Polia macrophylla</u> Bth.	290
<u>Polygala japonica</u> Houtt.	059
<u>Polygala paniculata</u> L.	029, 065, 118

<u>Polygonum barbatum</u> L.	233
<u>Polygonum minus</u> Huds.	094
<u>Polygonum nepalense</u> Meisn.	078
<u>Polystichum</u> sp.	386
<u>Prunus ?pullei</u> (Koehe) Kalkm.	351
<u>Psychotria leucococca</u> Laut. & K. Sch.	193, 280
<u>Psychotria</u> sp.	132, 157, 433
<u>Pteris</u> sp.	412
<u>Pueraria triloba</u> (Lour.) Makino	402, 497
<u>Pullea glabra</u> Schltr.	127
<u>Randia</u> sp.	461
<u>Ranunculus basilobatus</u> Eichl.	231
<u>Rapanea</u> sp.	473
<u>Rhododendron beyerinckianum</u> Koord.	493
<u>Rhododendron macgregoriae</u> F.v.M. var. <u>macgregoriae</u>	067
<u>Rhododendron multinervium</u> Sleum.	024
<u>Rhododendron nummatum</u> J.J. Sm.	492
<u>Rhododendron womersleyi</u> Sleum.	481
<u>Rhododendron</u> sp.	208, 350
<u>Rhus taitensis</u> Guill.	506
<u>Rhyticarium novoguineense</u> (Warb.) Sl.	141
<u>Ricinus communis</u> L.	266
<u>Riedelia c.f. geluensis</u> Val.	285
<u>Riedelia hollandiae</u> Val.	291
<u>Riedelia monticola</u> Val.	091
<u>Riedelia</u> sp.	023, 087, 088, 283, 284, 339, 346, 356
<u>Rorippa</u> sp.	449
<u>Rubus ledermanni</u> Focke (ATYPICAL)	191
<u>Rubus moluccanus</u> L. var. <u>dendrocharis</u> (Focke) R. Royen	191
<u>Rubus rosaefolius</u> Sm.	012, 046, 073
<u>Rubus</u> sp.	049, 064
<u>Rungia klossii</u> S. Moore	080

<u>Rungia</u> sp.	420
<u>Sacciolepis indica</u> (L.) Chase	075
<u>Sagina papuana</u> Warb.	043
<u>Salvia splendens</u> Sellow ex Nees	021
<u>Saurauia</u> c.f. <u>conferta</u> Warb.	294
<u>Saurauia</u> sp.	125, 313, 439, 502
<u>Scaevola oppositifolia</u> R. Br.	072
<u>Schefflera</u> sp.	156, 423, 496
<u>Schuurmansia henningsii</u> K. Sch.	161, 187, 299
<u>Sciaphila</u> sp.	172
<u>Scirpus mucronatus</u> L.	329
<u>Scirpus ternatanus</u> Reinw. ex Miq.	516
<u>Scleria</u> sp.	418
<u>Scleropyrum aurantiacum</u> (Laut. & K. Sch.) Pilg.	389
<u>Selliguea</u> sp.	378
<u>Setaria montana</u> Reeder	180, 252
<u>Setaria palmifolia</u> (Keon.) Stapf	331
<u>Sida rhombifolia</u> L.	060, 251
<u>Sigesbeckia orientalis</u> L.	364
<u>Smithia sensitiva</u> Ait.	368
<u>Solanum aviculare</u> Forst.	246
<u>Solanum</u> sp. aff. <u>S. belense</u> M. & P.	083
<u>Solanum nigrum</u> L.	090
<u>Solanum tuberosum</u> L.	165
<u>Solanum verbascifolium</u> L.	414
<u>Sopubia trifida</u> Buch. Ham.	076
<u>Spathoglottis grandiflora</u> Schltr.	256
<u>Spathoglottis</u> sp.	058, 103
<u>Sphenomeris chinensis</u> (L.) Maxon var. <u>divaricata</u> (Chr.) Kramer	367
<u>Spiridens</u> sp.	199
<u>Sporobolus diander</u> (Retz.) Beauv.	398
<u>Stephania grandiflora</u> Forman	442
<u>Styphelia suaveolens</u> (Hook. f.) Warb.	472
<u>Symbegonia</u> sp.	004

<u>Symplocos</u> c.f. <u>luteifolia</u> Kan. & Hat.	279
<u>Symplocos</u> sp.	135, 436, 445, 477
<u>Syzygium</u> sp.	514
<u>Tagetes</u> ? <u>patula</u> L.	100
<u>Tagetes</u> sp.	148
<u>Tephrosia</u> <u>vogelii</u> Hook. f.	066
<u>Tetramolopium</u> ?sp. nov.	471
<u>Thelymitra</u> <u>papuana</u> J.J. Sm.	305
<u>Themeda</u> <u>australis</u> (R. Br.) Stapf	184
<u>Themeda</u> <u>intermedia</u> (Hack.) Jansen	317
<u>Timonius</u> <u>trichanthus</u> M. & P.	269
<u>Timonius</u> <u>trichocladus</u> M. & P.	363
<u>Trachymene</u> <u>adenodes</u> Buw.	042, 123, 486
<u>Trichosanthes</u> <u>tricuspidata</u> Lour.	451
<u>Trifonia</u> sp.	016
<u>Trigonotis</u> <u>inoblita</u> F. Muell.	129
<u>Trigonotis</u> <u>procumbens</u> (Warb.) Johnston	044
<u>Tritonia</u> x <u>crocasmiflora</u> (Lemoine) Nich.	097
<u>Triumfetta</u> c.f. <u>nigricans</u> F.M. Bail.	405
<u>Triumfetta</u> <u>nigricans</u> F.M. Bail.	151
<u>Triumfetta</u> <u>pilosa</u> Roth.	254
<u>Trochocarpa</u> <u>papuana</u> (Wright) Sleum.	476
<u>Urena</u> <u>lobata</u> L.	253
<u>Usnea</u> sp.	096
<u>Vaccinium</u> <u>albicans</u> Sleum.	508
<u>Vaccinium</u> <u>amplifolium</u> F. Muell.	475
<u>Vaccinium</u> <u>keysseri</u> Schltr. ex Diels var. <u>keysseri</u>	345
<u>Vaccinium</u> <u>striicaule</u> Sleum.	069, 494
<u>Vaccinium</u> sp.	391
<u>Vernonia</u> <u>cinerea</u> (L.) Less.	257
<u>Vernonia</u> <u>cinerea</u> (L.) Less. var. <u>cinerea</u>	074
<u>Viola</u> <u>arcuata</u> Bl.	054, 178
<u>Viola</u> <u>betonicifolia</u> J.E. Sm.	033
<u>Wahlenbergia</u> <u>marginata</u> (Thunb.) DC.	017, 144, 145, 146, 147

<u>Wendlendia paniculata</u> Bl.	150
<u>Youngia japonica</u> (L.) DC.	070, 232
<u>Zeuxine</u> sp.	192
Unidentified Fungus	176, 196
Unidentified Orchidaceae	349, 353, 360, 361
Unidentified Rubiaceae	333, 444
Unidentified	307, 310, 314, 319
CANCELLED	009

TOTAL NUMBER OF GENERA COLLECTED	261+
TOTAL NUMBER OF SPECIES COLLECTED	346+

Additional plants which definitely occur in Ndumba territory or are known to Ndumba through visits to neighbors are mentioned in the text, and may be listed here. While not collected or properly identified, it was possible to make fairly accurate determinations in the field through the use of various reference works and descriptive accounts, especially Massal and Barrau (1956), Rappaport (1968), Purseglove (1968) and Clarke (1971).

Albizia falcataria (L.) Fosberg

Allium sp.

("shallot")

Amaranthus sp.

("native spinach")

Ananas sp.

("pineapple")

Arachis hypogaea L.

("peanut")

Areca catechu L.

("betel nut")

Bambusa spp.

("bamboo")

Beta vulgaris L.

("beet")

<u>Brassica chinensis</u> L.	("Chinese cabbage")
<u>Brassica oleracea</u> L. var. <u>capitata</u> L.	("common cabbage")
<u>Brassica rapa</u> L.	("turnip")
<u>Calamus</u> sp.	("rattan cane")
<u>Carica papaya</u> L.	("papaya")
<u>Citrus limon</u> (L.) Burm. f.	("lemon")
<u>Cocos</u> sp.	("coconut")
<u>Coffea arabica</u> L.	("coffee")
<u>Colocasia esculenta</u> (L.) Schott	("taro")
<u>Daucus carota</u> L.	("carrot")
<u>Dioscorea</u> spp.	("yam")
<u>Freycinetia</u> sp.	("climbing Pandanus")
<u>Hibiscus manihot</u> L.	
<u>Imperata cylindrica</u> (L.) P. Beauv.	("kunai")
<u>Lactuca sativa</u> L. var. <u>capitata</u> L.	("lettuce")
<u>Lycopersicon esculentum</u> Mill.	("tomato")
<u>Mangifera indica</u> L.	("mango")
<u>Manihot esculenta</u> Crantz	("cassava")
<u>Musa ingens</u> Simmonds	("wild banana")
<u>Musa</u> spp.	("banana")
<u>Pandanus conoideus</u> (Lam.) M. & P.	("marita")
<u>Passiflora</u> sp.	("passionfruit")
<u>Pisum sativum</u> L.	("common pea")
<u>Psophocarpus tetragonolobus</u> (L.) DC.	("winged bean")
<u>Saccharum edule</u> Hassk.	("edible pitpit")
<u>Saccharum officinarum</u> L.	("sugar cane")
<u>Setaria palmifolia</u> Stapf	("native asparagus")
<u>Xanthosoma</u> sp.	("Hong Kong taro")
<u>Zea mays</u> L.	("corn")
<u>Zingiber</u> sp.	("ginger")

APPENDIX 2 CORE PLANT NAME LEXICON AND PLANT FOLK TAXONOMY OF TEN NDUMBA ADULTS

In the following, all 766 named plant folk taxa are ordered by the contrast sets of which they are members. Only those names and relations of inclusion upon which there was unanimous agreement among all ten informants are included, variable names and taxa being treated in Appendix 3. Within each contrast set, named taxa are alphabetized according to spelling based on the orthography used throughout this dissertation.

At the extreme left of the page may be found the highest-level named taxon of which all taxa to its right are members. Polytypic taxa are shown as standing at the head of branching which lead to the right to all of the members of that set, again in alphabetical order. Thus the reader should follow from left to right in a progressive subordination of taxa.

Subscripts are employed in a number of cases: the subscript a and b, as in baugera_a and baugera_b, indicates that the name is polysemous in a homonymous sense; the subscript r indicates a "residual" named category as defined in the text above; and the subscript 2 indicates a "type-specific" named taxon, included in a folk generic taxon labeled by the same name and, by implication but not so designated here, properly subscripted 1.

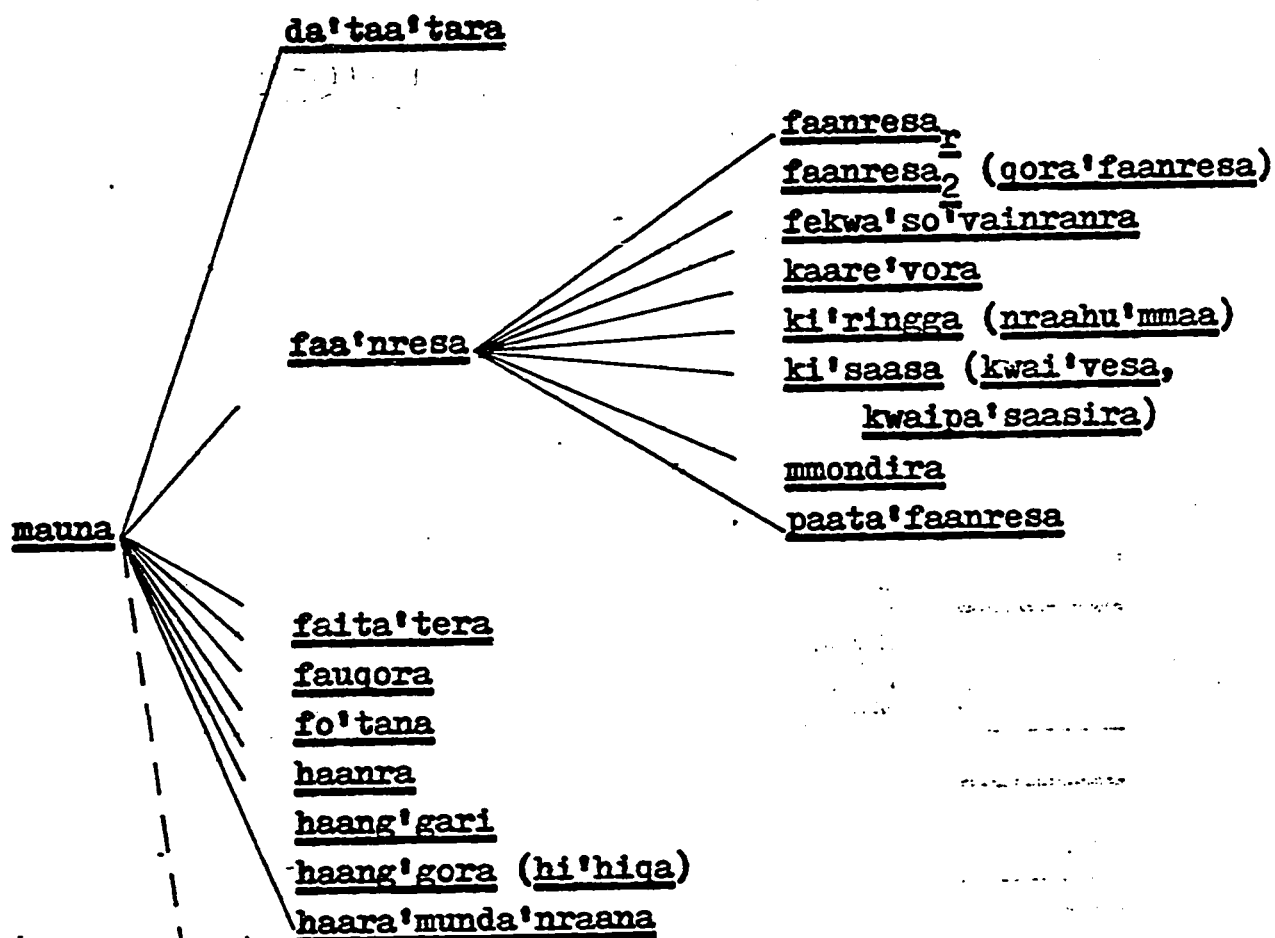
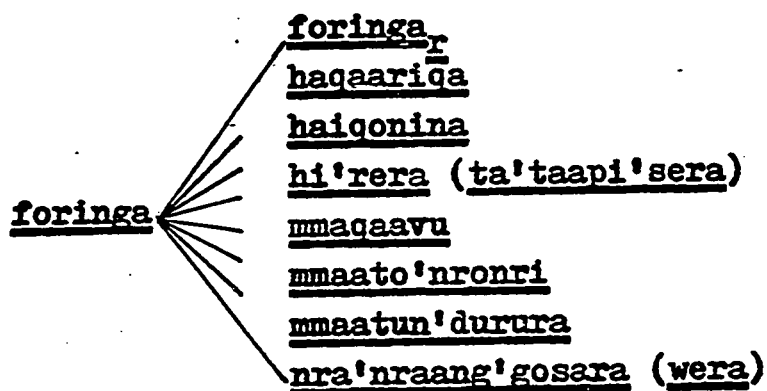
Synonyms are provided in parentheses following the more commonly used names. Plant classes which are said by all informants not to occur in Ndumba territory, but in Waffa-speaking hamlets, Imaani territory, coastal regions, or in neighboring hamlet clusters (e.g., Ahea, Oraura, etc.) are marked with an asterisk.

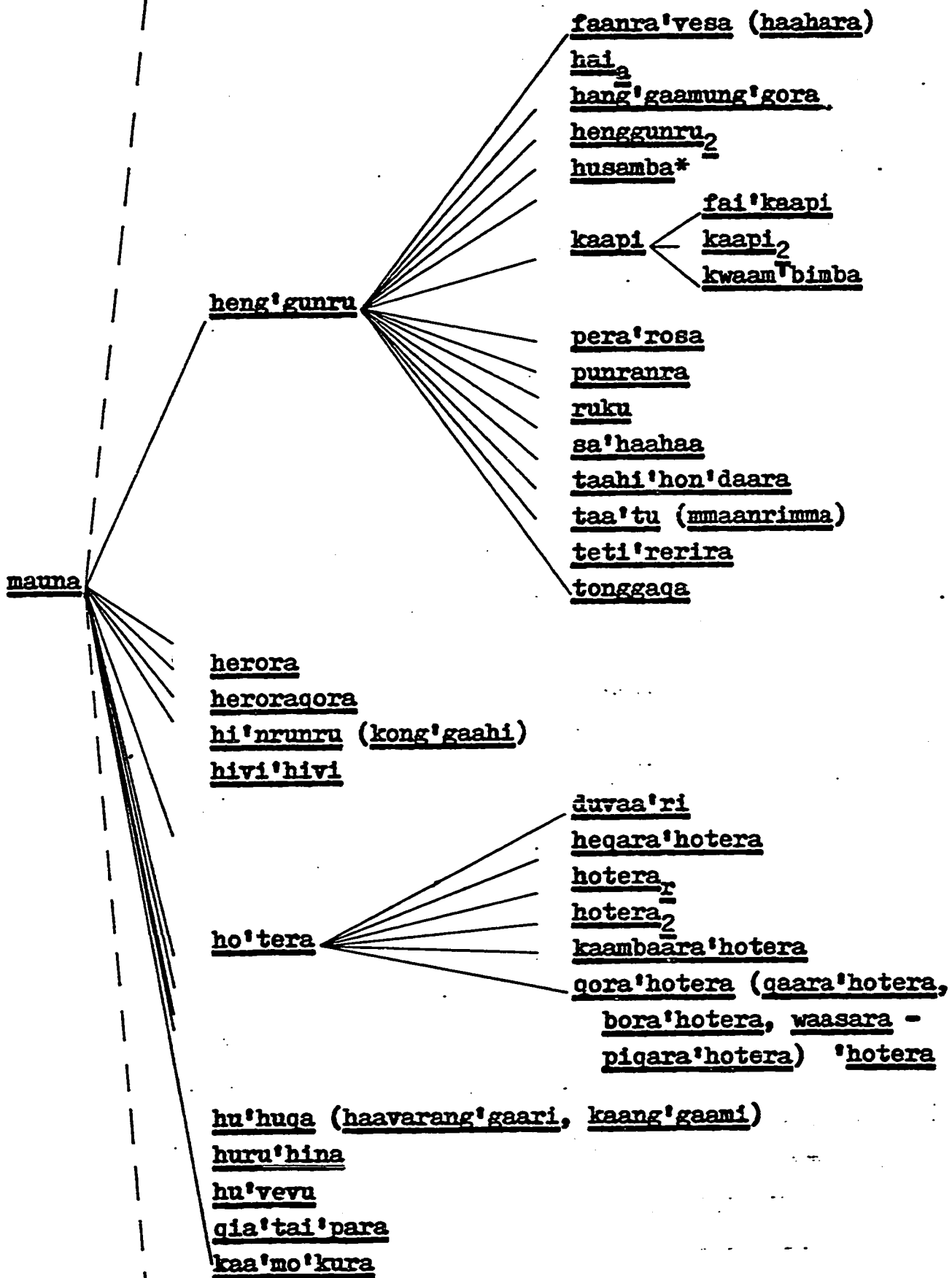
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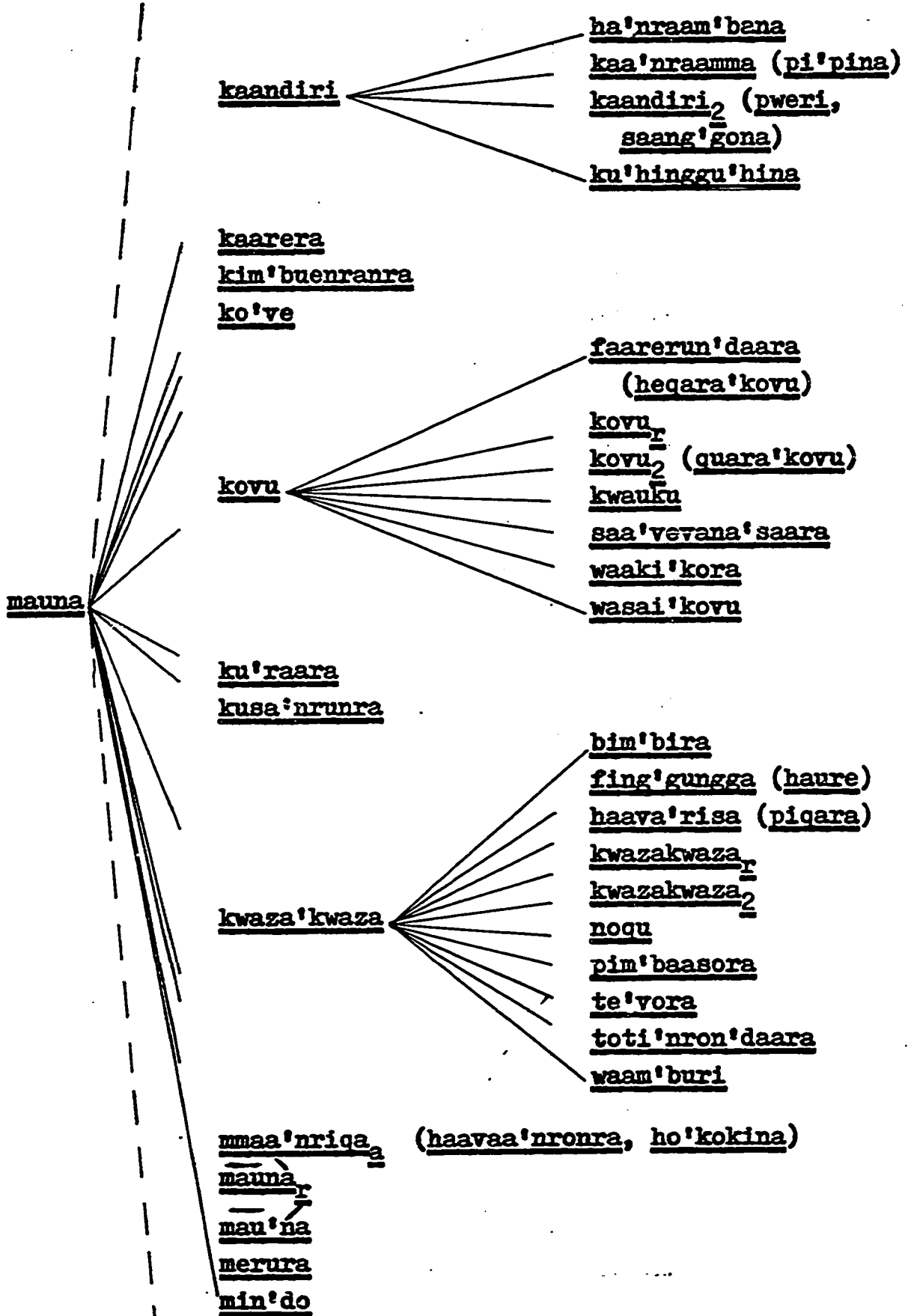
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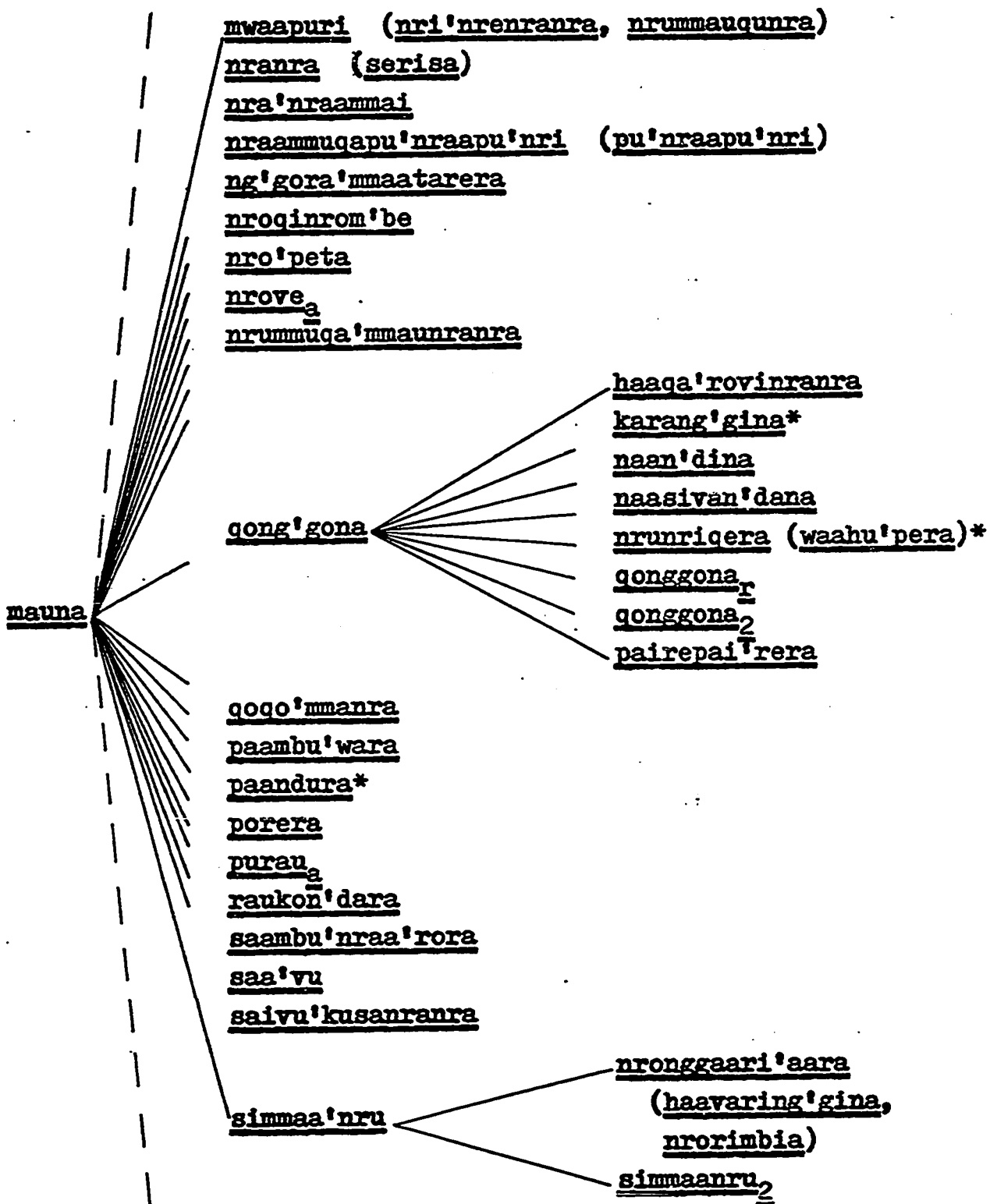
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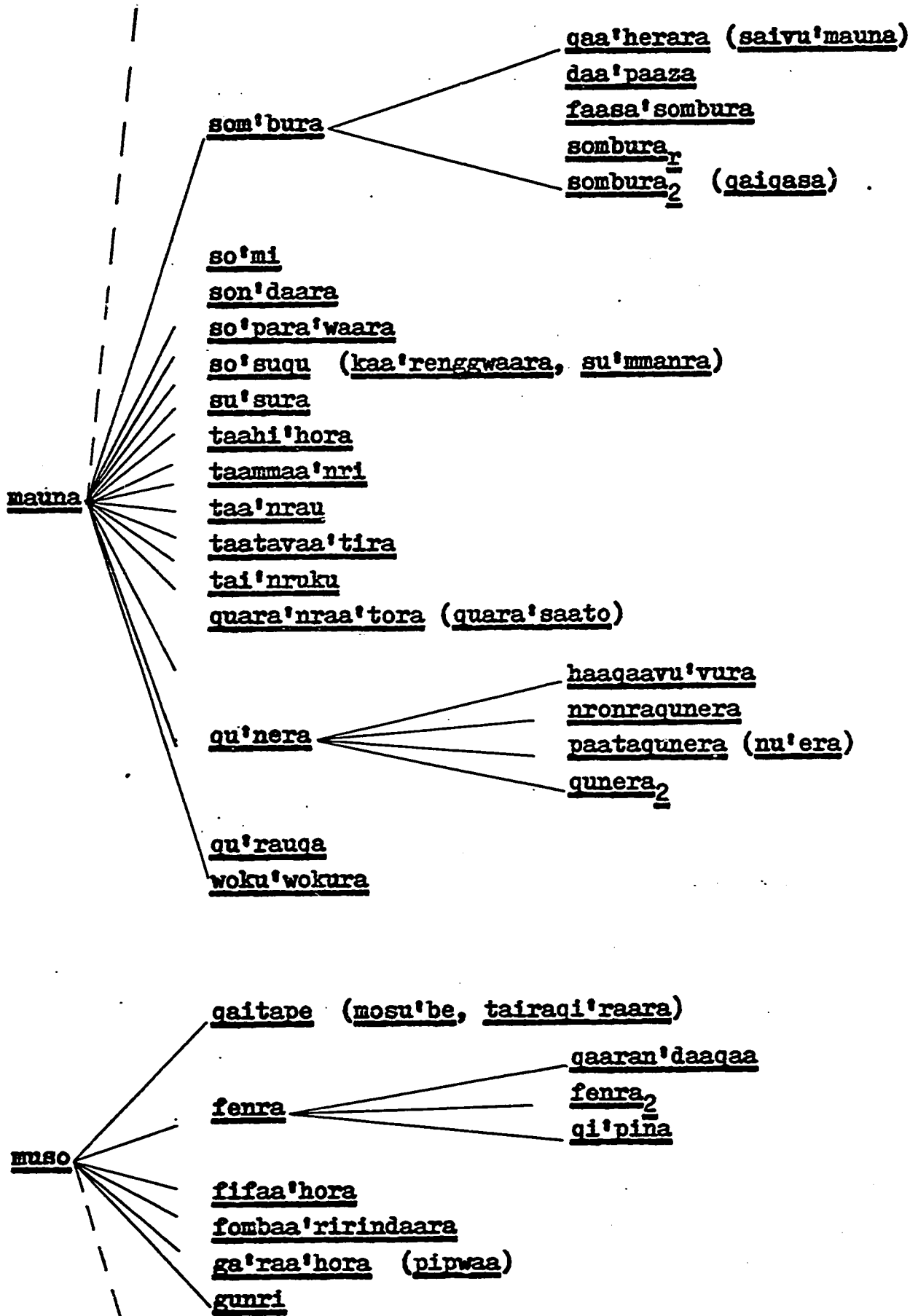
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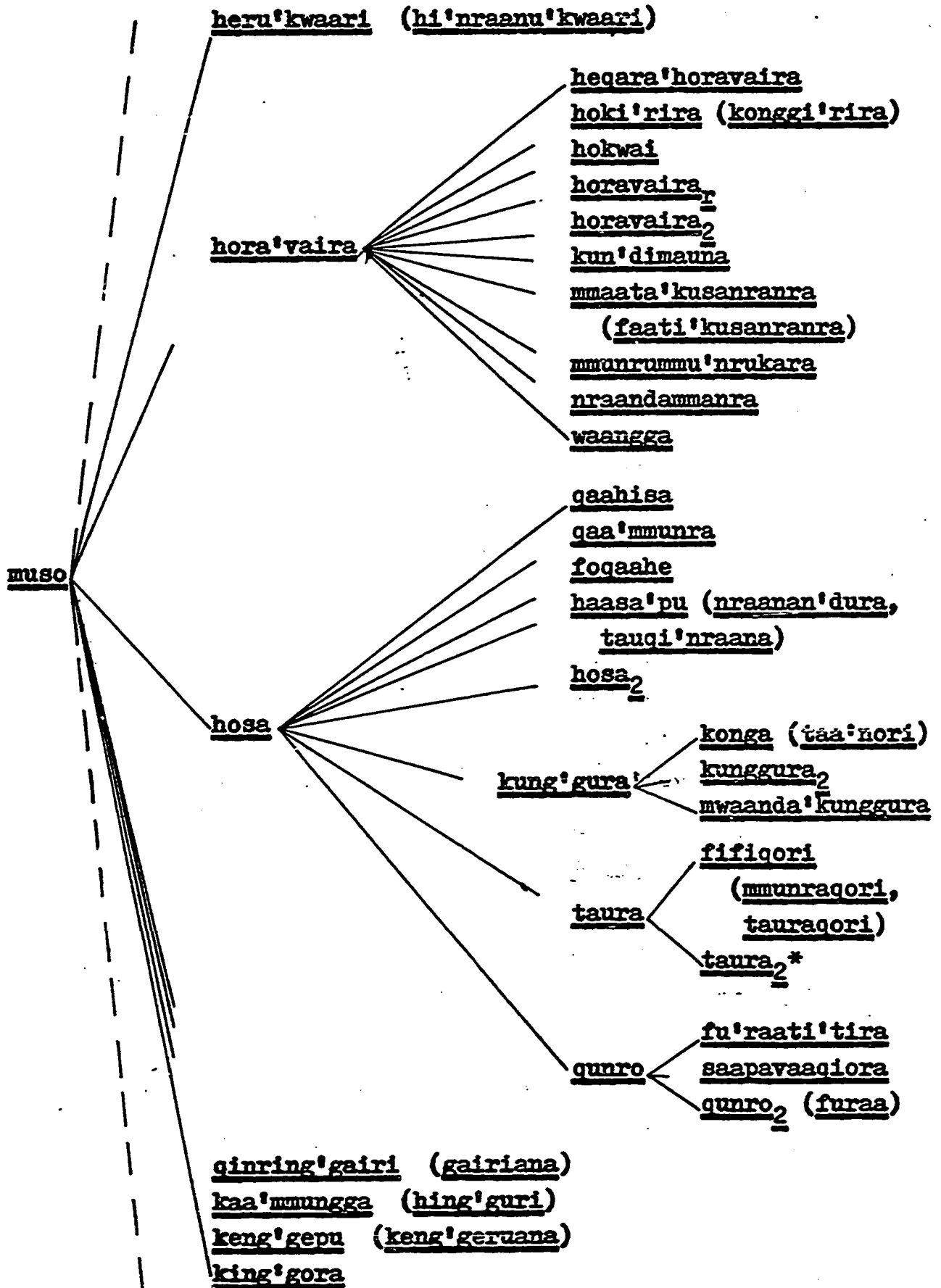


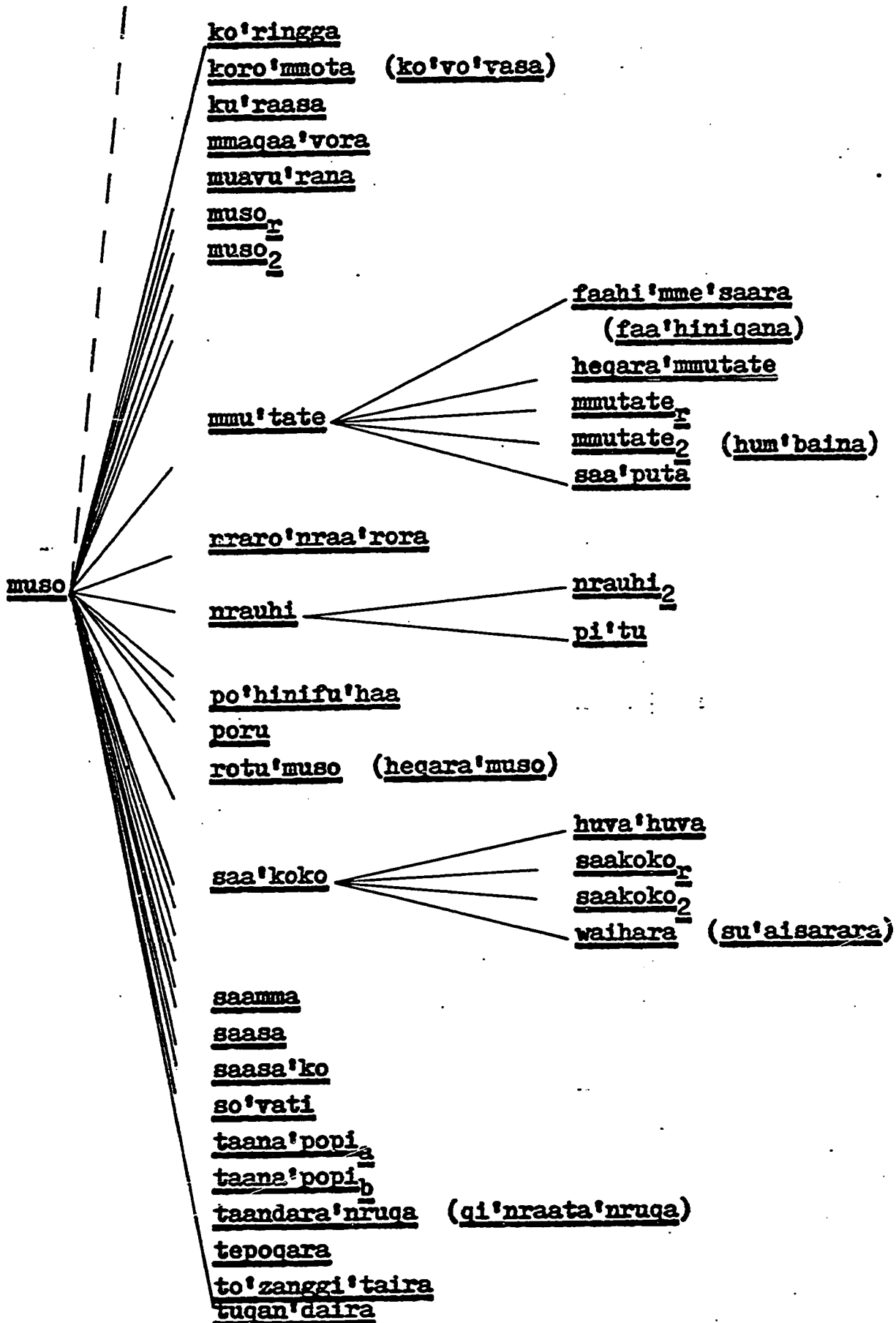


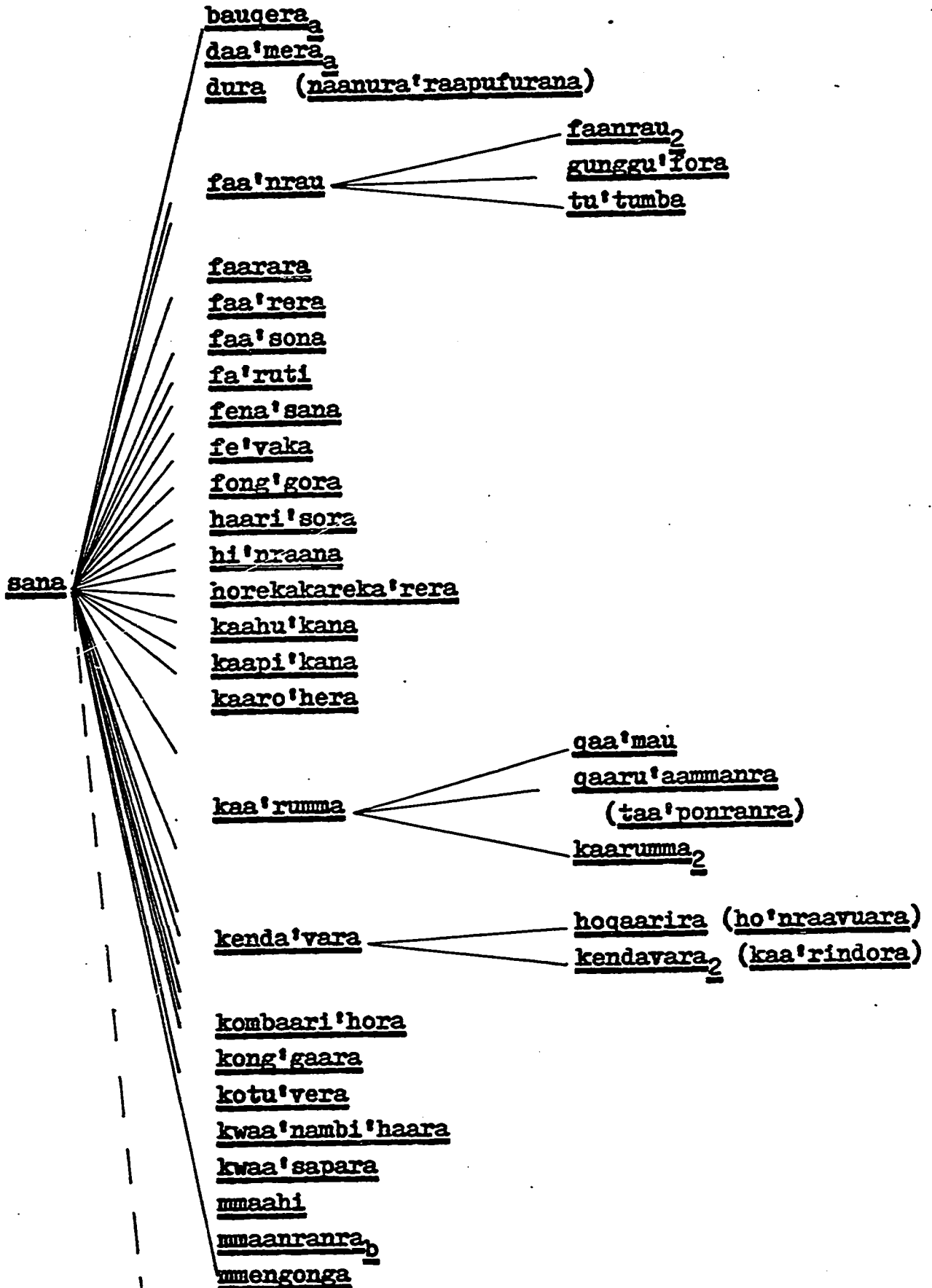


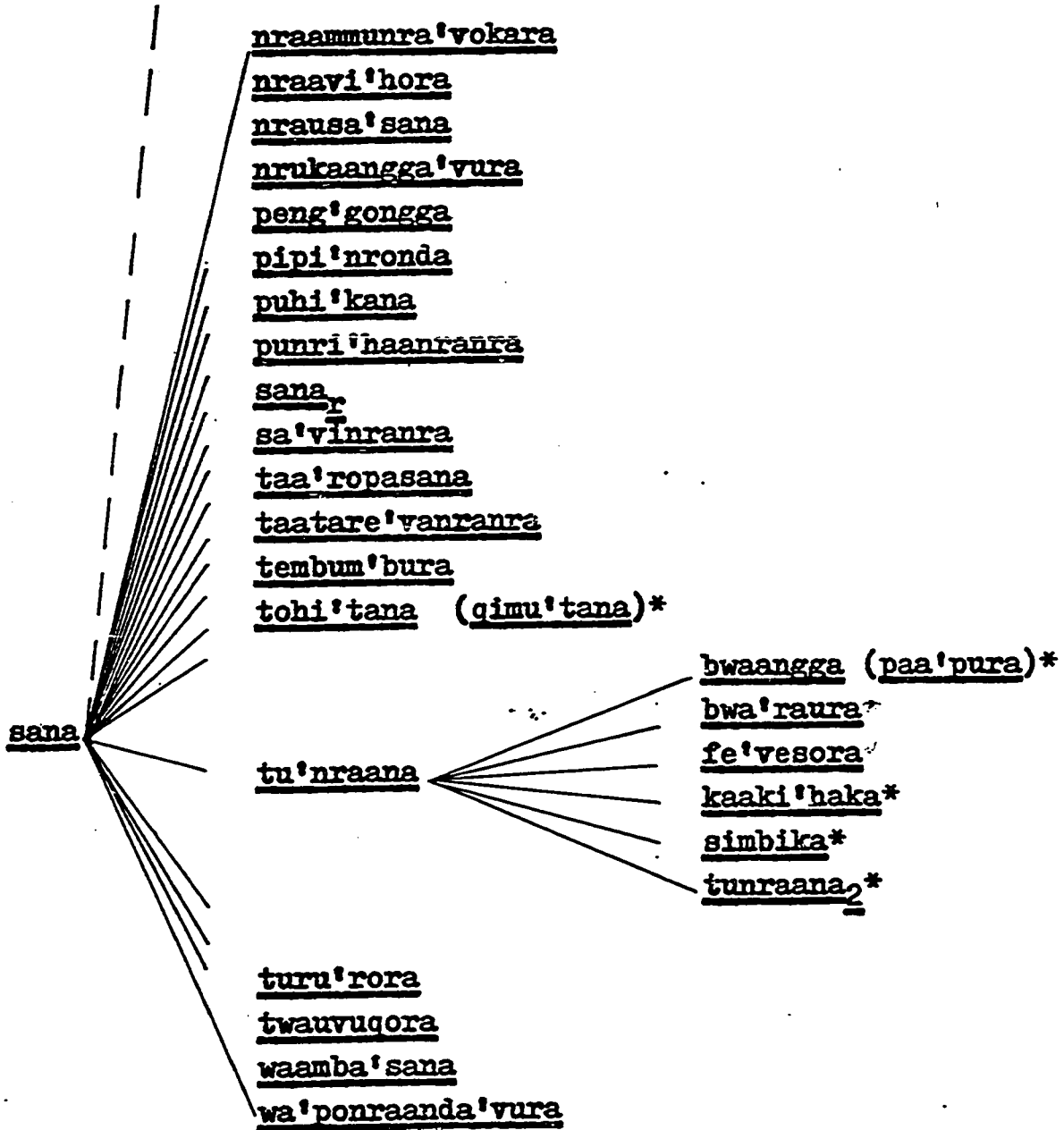






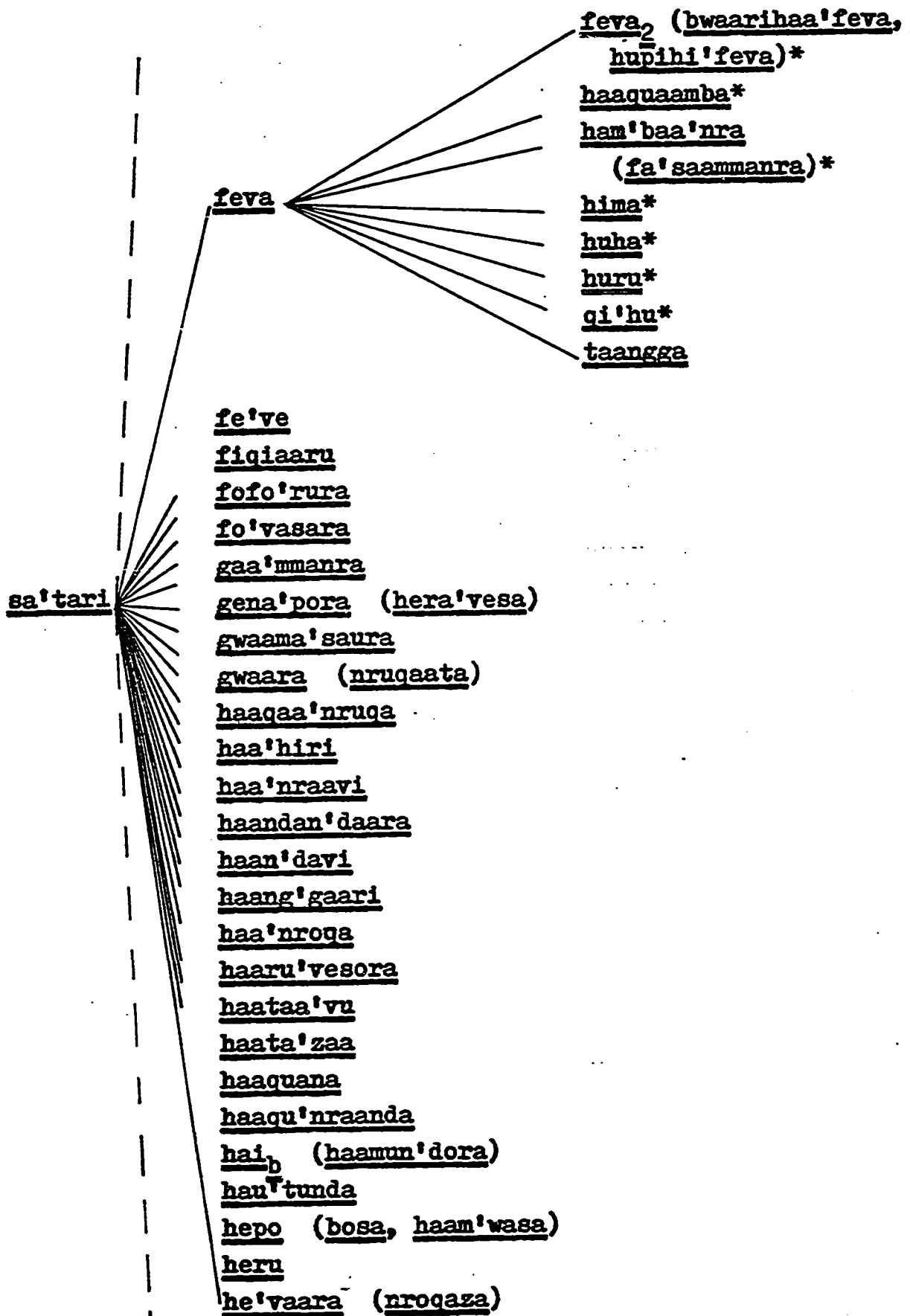






sa'tari

- qaa'heqa
- qaanranra (sikwaaru'eqata)
- qaan'dosa (pu'mmaasa)
- qaa'nrempa (kwaa'neva)
- qaa'va
- qausu'vera (nraangga'nraangga, go'henina)
- bara'waaqaa
- bwaati'haa
 - bwaarihaa_r
 - bwaarihaa₂
 - taan'dauna
 - taa'puqa
 - tove'nra
- bwaa'rura (nro'tara)
- daa'mera_b
- daa'mminra
- daavaa'ri*
- dan'vora (si'rummu)
- dwaari
- qe'kommanra (bai'vonranra)
- qegonda'vaa
- faaqe'mmaati
- faahifaan'daura (faahi'vaukwe)
- faanra'hopo
- faapa*
- faa'paza
- faari'vura (sora)
- fausa
- fa'vaasa
- feganammu'nrunra
- fekwasatum'bura
- fe'nasa*
- feri'mmaagu'nrunra



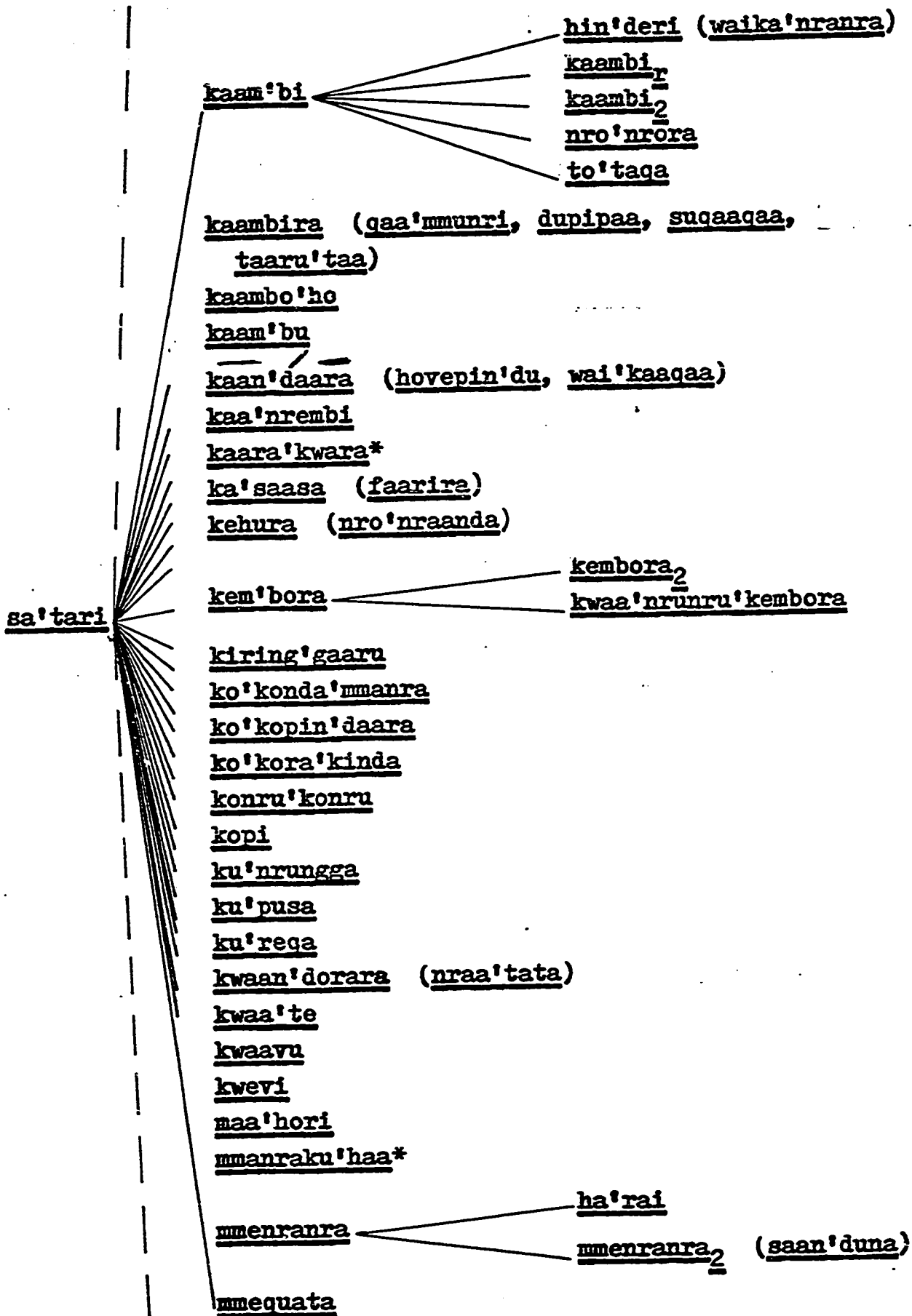
sa'tarihiqazahibimahimbu'hirihi'mminrihinga'hingahinggirahipirihi'raihi'riri (saa'rana)hi'ruhi'rumma (wa'mmanra)*hokori'aanranra (taani'mmaanranra)

<u>ho'nraamma</u>		<u>haasara'rora</u> <u>honraamma₂</u> <u>pim'baa</u>
-------------------	---	---

hon'daihon'dau (hari, kaa'hu)hongga'nrunra

<u>honrimma</u>		<u>honrimma₂</u> (<u>qaa'tera</u>) <u>pu'nrumma</u>
-----------------	---	---

horaangihorera'nraavurahorihori'oriho'ru (mmaamma)hotaarora (bina)ho'toho'vehovepu'mmaahu'mmeqi'haiga (faan'dori)*qimun'daarakaa'harakaam'baa (kau'veng'gara, ru'an'dai)



sa'tari

mia'nrau*

mmunri_a

mmwasa (nraa'mmenra)

nraaqaamu

nraamma'nraa'mmanra

nraamma'saasira

nraan'dai

namin'dura

nrau

nremmi

nona*

nrongge

nro'nru

nrugaahisa

qorafu'hara

paara'vuvu

paasa'sora

paa'ringga

paiha*

pe'pauru (taa'zo)

pepin'daara

pom'baami (saa'hommi)*

po'nraana

po'nraunra

popo_a

popo_b (paa'pai)

puraū_b*

pwaapu

raa'kema

reka'rausara

re'rau

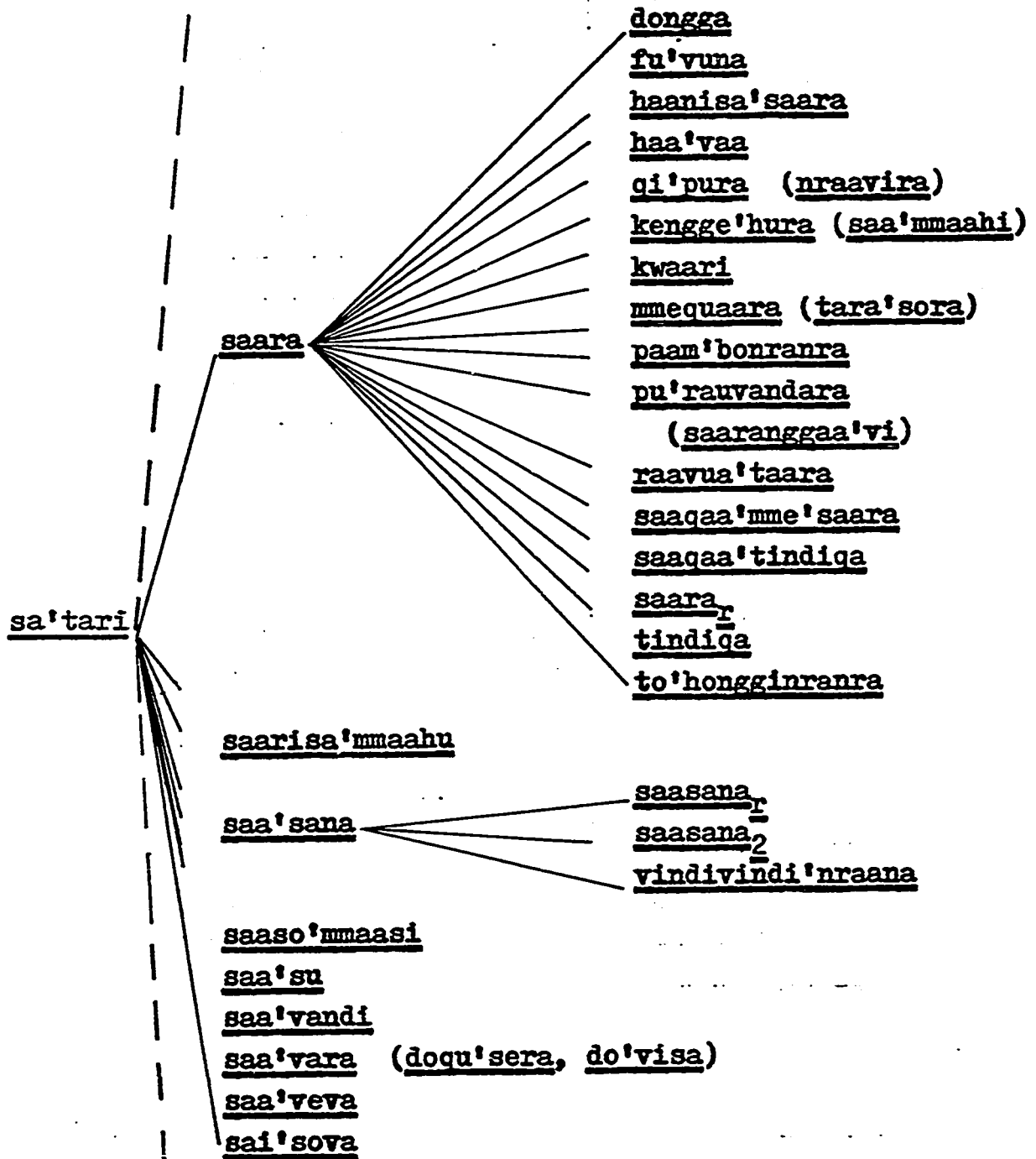
rira

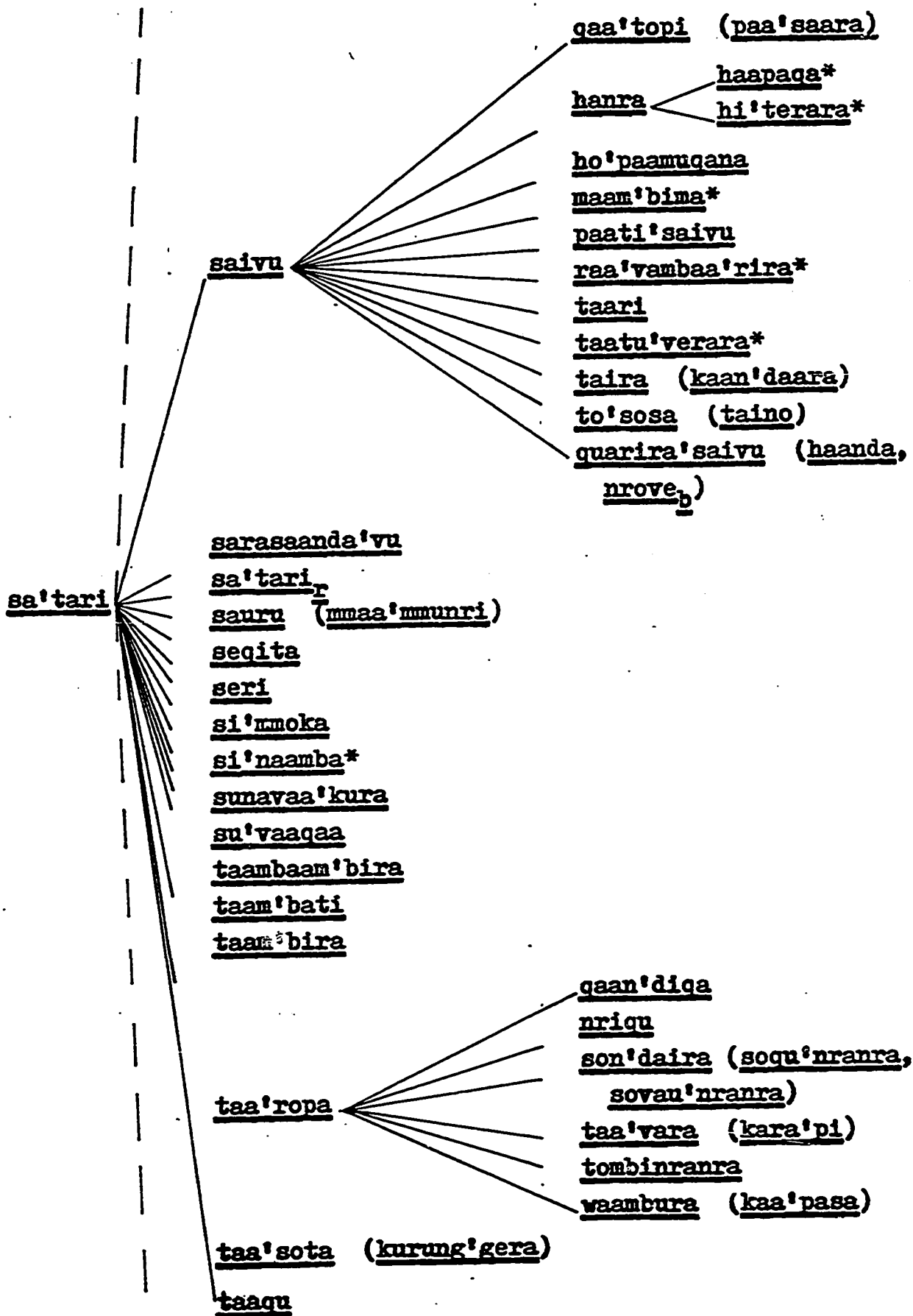
rovagara (faundagara, sun'dona)

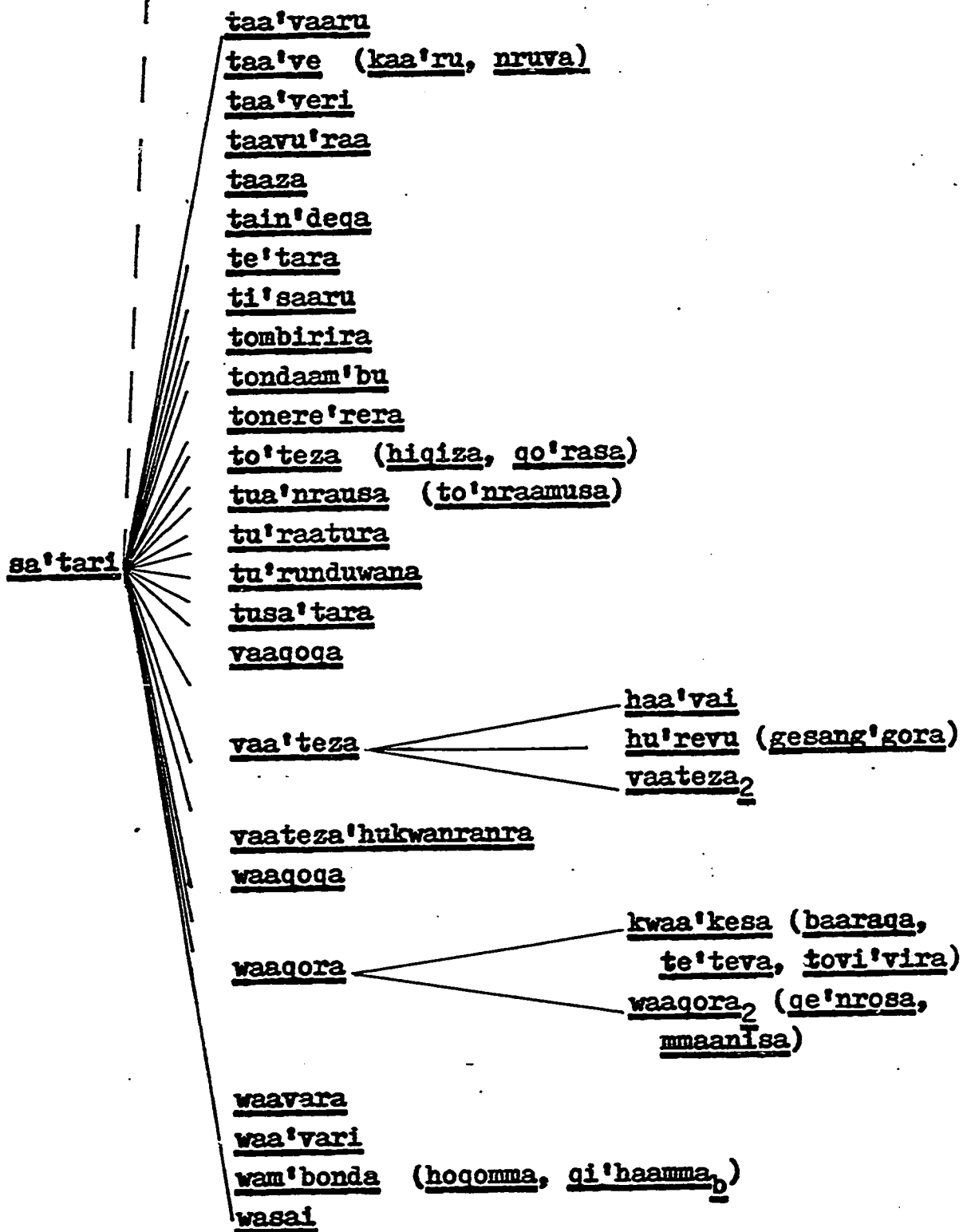
rukvara

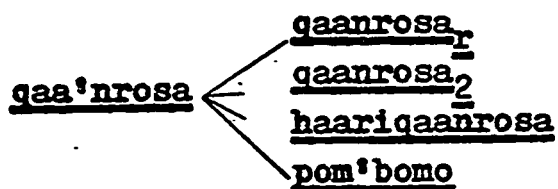
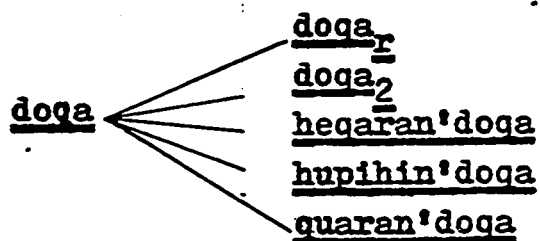
saaku'nra

saa'mmota

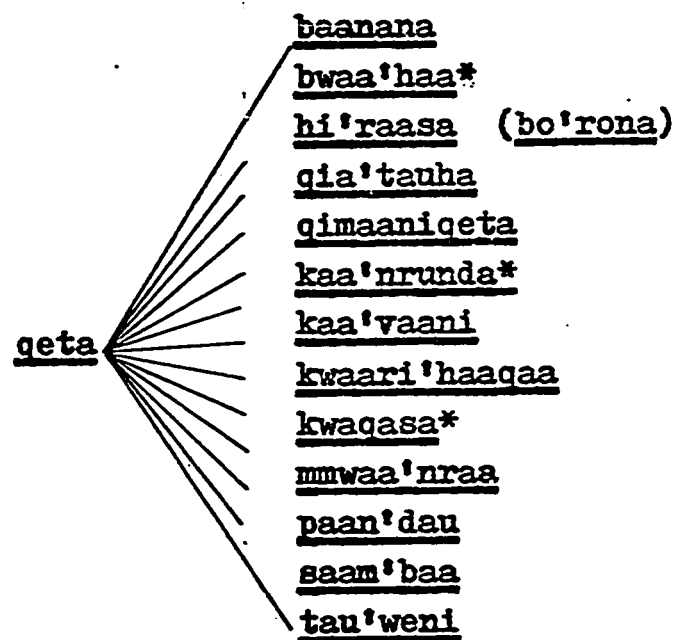
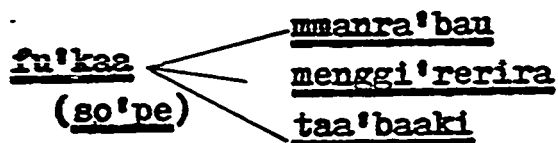


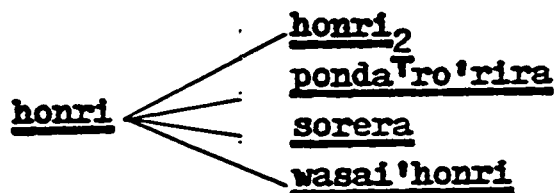
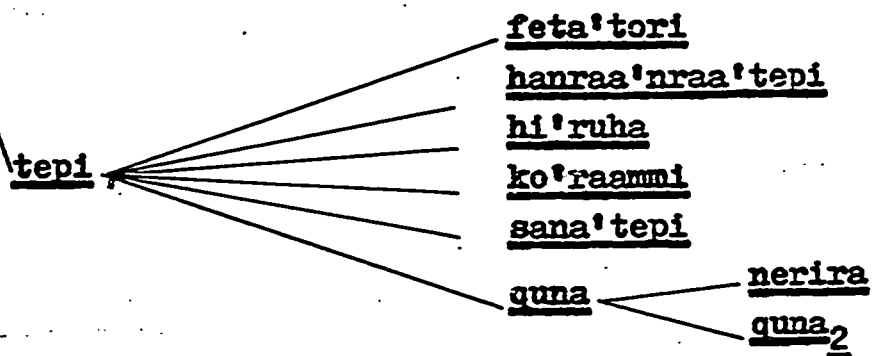
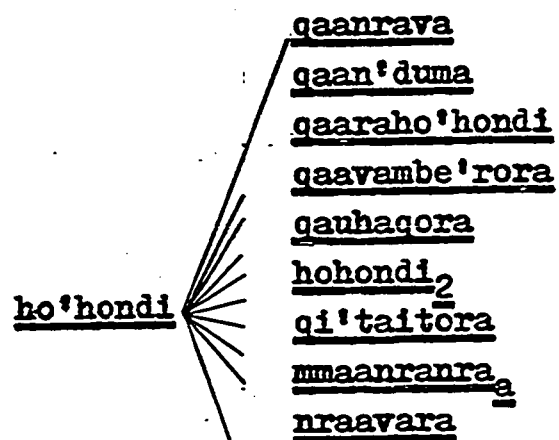
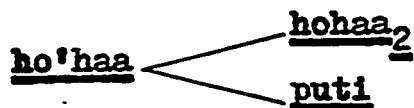
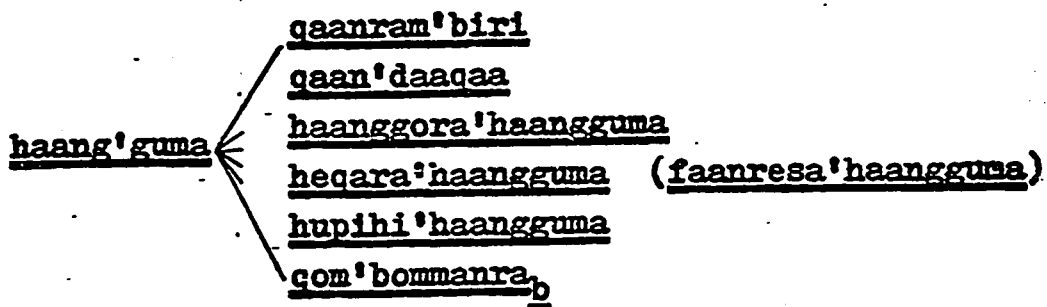


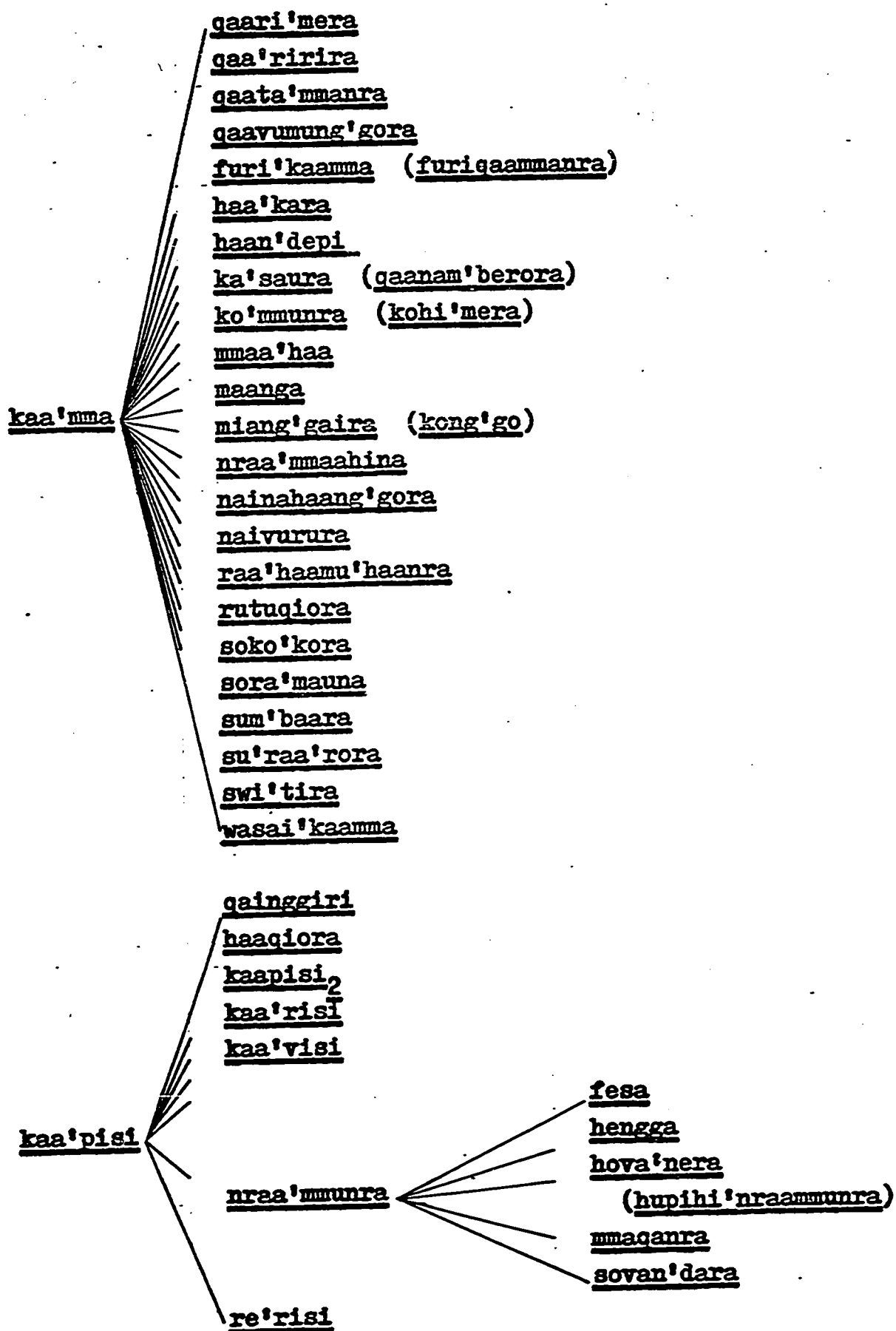


qaanigaanibum'buri

(additional synonym know by
all: dogana = titi'vona;
see Appendix 3)

faasa'tirifuri





kosa branches into:

- qaa'topikosa (pa'saara'kosa)
- qaa'vehaara
- hegara'kosa
- kosa₂ (hupihi'kosa)
- mwaanduqura
- nru'nranra

kwaanru branches into:

- kwaanru₂
- kwaa'vovina
- paa'runa
- sauna
- taapaa'pora

matate branches into:

- hegara'matate
- hupihi'matate
- kaambaara'matate
- matate₂

meru branches into:

- meru₂
- nrondaa'pu (hegara'meru)
- waundaa'vura (nrondaa'vura)

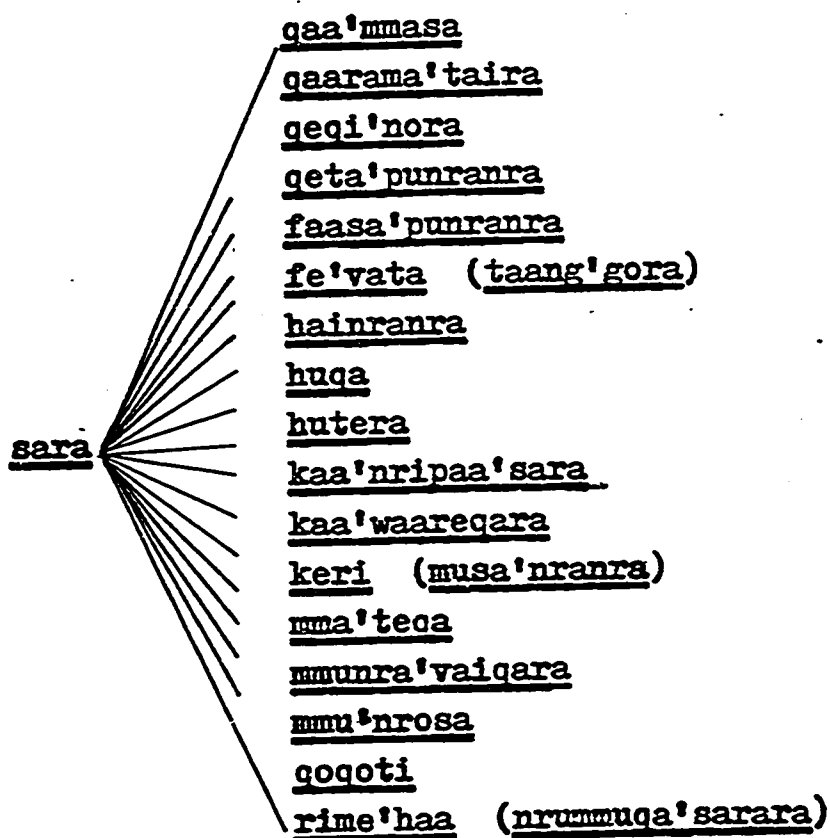
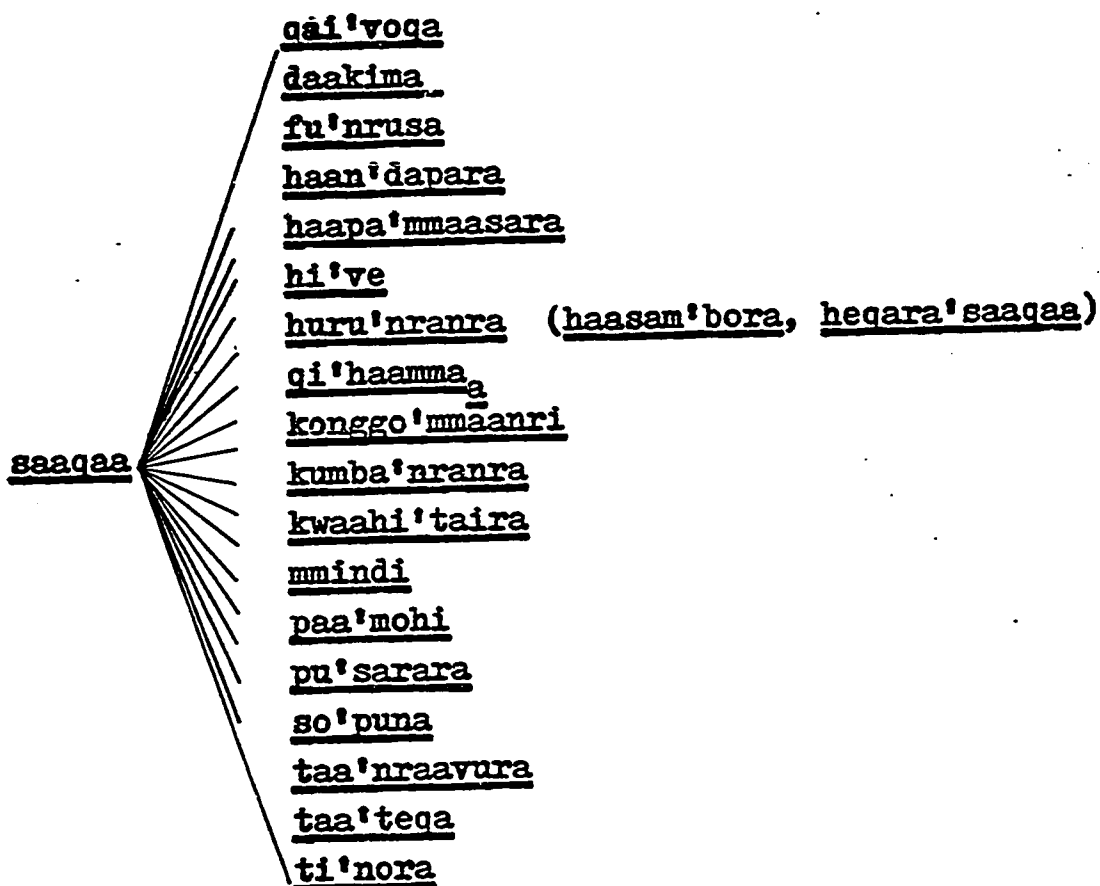
mwaake'rira (taandaambau'rera)

nraa'viga (kaa'ripi)

nra'nraasa

paangki branches into:

- paangki₂ (hupihi'paangki, ku'raama'paangki, mmanra'ke)
- to'ru

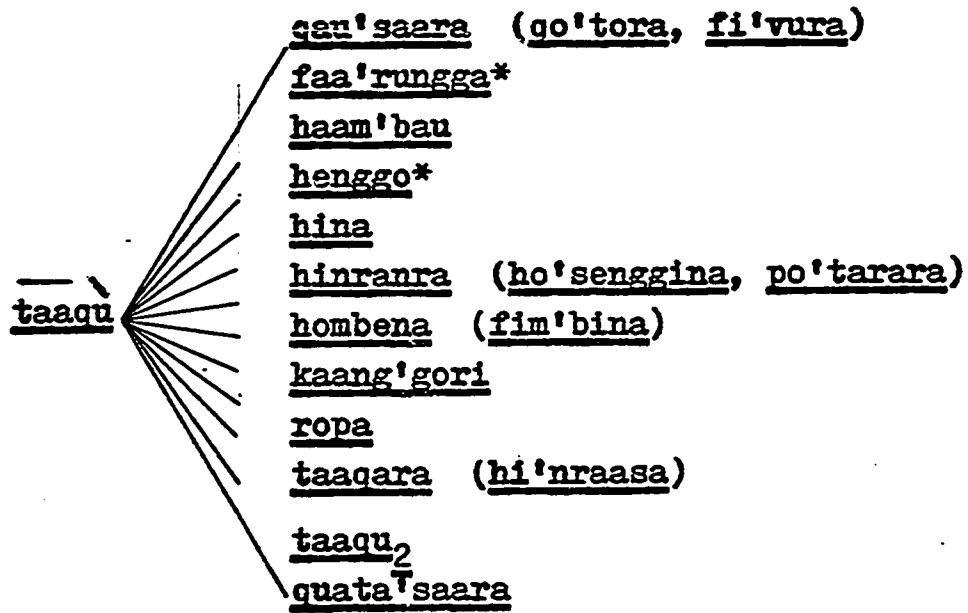


sara branches into:

- saandeqona
- taapinga
- taatuma'taira
- tonru'nrundra
- ququva

taana branches into:

- qaa'hira
- qaa'vona
- qau'hora
- fa'saavi
- fumbara
- haa'toza
- hinda'vara
- hosa'hera
- hova
- qi'naapa
- kaambaa'ri (fo'rori)
- kaam'bara
- kaa'rapitau
- raa'paangge
- saapin'daa
- sara'pina
- som'bara
- su'mminri
- taa'mme'mmunra



to'maato

waahē

TOTAL	LEVEL 0 TAXA	1 ('Plants')
	1	33
	2	525
	3	193
	4	15
	Total	766 (+1 "covert")

APPENDIX 3 VARIABLE LEXICON AND TAXONOMIC RELATIONSHIPS

The data presented here concern 311 plant names to which informants responded, on repeated trials, in ways inconsistent with each other in controlled eliciting situations as described in Chapter III. The terms in question are ordered in two groups based on the nature of these inconsistencies.

The first group includes those names which are variably known by the informants, but about which there is no disagreement as to the taxonomic statuses of the categories labeled by the names. For example, 5 informants (B, C, D, E and H) are familiar with the term hopiri'pirira, and all agree that it labels a taxon which is included in the higher-level taxon labeled by the name sana; the other 5 informants (A, F, G, I and J) reported, on at least three separate occasions, that they did not know the name. Thus this group of names reflects variation in the sizes of individuals' plant name lexicons.

At the extreme left of the page are listed the identification letters of the informants who are familiar with each term. In the middle column are the plant names, and in the right-hand column is the name of the more inclusive taxon or, in cases of reported synonymy, the named taxon (preceded by an equals sign) which is said to be also labeled by the name in the middle column.

The second group may be regarded as those plant names which are semantically ambiguous in addition to being variably known (except for the last set). For example, 3 informants (D, E and J) are familiar with the term geqiamm'bora; the other 7 informants report that they do not know the term as a plant name. However, those who say that they know it disagree as to its semantic relationship to other terms. In the example cited, Informants D and J report that it labels a kind of saara, whereas Informant E says that it is not the name of a kind of saara, but of a kind of sa'tari.

In the extreme left-hand column, these semantically ambiguous names are listed, followed in the middle column by in-

formant identification letters paired with their assignments of the taxa to other taxa listed in the right-hand column.

GROUP 1 -- VARIABLY KNOWN PLANT NAMES

<u>Informants</u>	<u>Plant Name</u>	<u>Higher Taxon</u>
<u>(IDIOSYNCRATIC)</u>		
A	<u>saavan'dara</u>	= <u>rukvara</u>
B	<u>qaa'munda</u>	<u>sana</u>
B	<u>qaa'tana</u>	<u>mauna</u>
B	<u>fe'tarana</u>	= <u>haanda'rana</u>
B	<u>furuqora</u>	<u>mauna</u>
B	<u>haandara'vaise</u>	<u>mauna</u>
B	<u>haasa'se'rana</u>	<u>muso</u>
B	<u>kaanggaagora</u>	= <u>nra'nraa'mmaia</u>
B	<u>nraamuqora</u>	= <u>nusamauna</u>
B	<u>nraa'tana</u>	= <u>teandara'nruqa</u>
B	<u>nraavo'nra</u>	<u>mauna</u>
B	<u>nusamauna</u>	<u>mauna</u>
B	<u>rugimauna</u>	<u>mauna</u>
B	<u>ta're'rora</u>	<u>sana</u>
B	<u>tunaa'pora</u>	<u>sana</u>
C	<u>qaaro'nranra</u>	= <u>wam'bonda</u>
C	<u>hena'saara</u>	<u>kaapi</u>
C	<u>kembura</u>	= <u>qora'kusanranra</u>
C	<u>kori</u>	<u>matate</u>
D	-----	-----
E	<u>nora'waara</u>	<u>mauna</u>
F	<u>qaamboas'saara</u>	<u>saara</u>
G	-----	-----

H	<u>hi'nrainra</u>	<u>hora'vaira</u>
H	<u>naasaqura</u>	<u>hora'vaira</u>
H	<u>gopi'aara</u>	<u>sana</u>
I	<u>mmaatatati'nrondaara</u>	= <u>mmaato'nronri</u>
J	<u>faanra'herima</u>	<u>mauna</u>
J	<u>gugara</u>	= <u>haava'risa</u>
J	<u>ho'raaro</u>	<u>saagaa</u>
J	<u>qimmunra'saara</u>	= <u>ku'hora</u>
J	<u>kaanggaa'mmunra</u>	= <u>sun'a'mmunra</u>
J	<u>kono</u>	<u>geta</u>
J	<u>kwaambara</u>	<u>hanra</u>
J	<u>kwaanranra</u>	<u>hanra</u>
J	<u>nondaahu'wera</u>	<u>haang'guma</u>
J	<u>saapu</u>	<u>sa'tari</u>

(KNOWN BY 2)

A C	<u>qaanigaani₂</u>	<u>qaanigaani</u>
A C	<u>rika</u>	<u>qaanigaani</u>
B D	<u>vaiku'kwaara</u>	= <u>taa'vara</u>
B H	<u>hoha'nrunra</u>	<u>mauna</u>
C I	<u>waa'sepa</u>	<u>taana</u>
C J	<u>butaagora</u>	<u>sa'tari</u>
C J	<u>furaa'raa</u>	= <u>qaaruva'saagaa</u>
C J	<u>hevo</u>	= <u>fiing'gungga</u>
C J	<u>hi'nraanda</u>	= <u>qe'kommanra</u>
C J	<u>pu'mmunra</u>	<u>qunro</u>
C J	<u>sun'a'mmunra</u>	<u>geta</u>
DE	<u>nraa'mme'haanra</u>	= <u>po'nraunra</u>
D I	<u>haasaru'aara</u>	<u>sa'tari</u>
E J	<u>huru'aari</u>	<u>sa'tari</u>
F J	<u>gaanuqora</u>	<u>kaa'mma</u>
G J	<u>saahimin'daara</u>	= <u>kaarifam'bara</u>

HI	<u>tare'nora</u>	= <u>geqi'nora</u>
H J	<u>taana'nrunra</u>	<u>mauna</u>
IJ	<u>gaagera</u>	= <u>rutuqiora</u>

(KNOWN BY 3)

BC G	<u>rau'hosa'vira</u>	<u>taana</u>
B D G	<u>haanda'rana</u>	<u>mauna</u>
B H J	<u>pia'sana</u>	= <u>henggunru₂</u>
CDE	<u>kwendaak'we</u>	= <u>hotaa'rorā</u>
CDE	<u>si'mmisa</u>	<u>saa'sana</u>
C E J	<u>naa'mori</u>	<u>hanra</u>
C G J	<u>faanra'vetara</u>	<u>foringa</u>
DE J	<u>qi'hwenranra</u>	<u>hanra</u>
DE J	<u>vuruvurugera</u>	<u>saara</u>
F IJ	<u>qaa'nremmi'nora</u>	<u>saara</u>
GHI	<u>naasi</u>	= <u>hu'mme</u>
HIJ	<u>bwaarara'saara</u>	<u>saara</u>
HIJ	<u>roro'mmunra</u>	<u>mauna</u>

(KNOWN BY 4)

ABC J	<u>tomma</u>	= <u>hosa</u>
BCDE	<u>taanarara</u>	= <u>kaa'pasa</u>
BC G J	<u>nro'nron'daara</u>	<u>mauna</u>
B DE I	<u>qiau</u>	= <u>muso</u>
B E HI	<u>wesara</u>	<u>gong'gona</u>
B E IJ	<u>qaa'yusa</u>	<u>sa'tari</u>
B FG J	<u>qi'naangkai'sora</u>	<u>ho'tera</u>
CDEF	<u>kaa'mmoka</u>	<u>geta</u>
CDE G	<u>haa'paanga</u>	= <u>puti</u>
CDE I	<u>taa'ropinranra</u>	<u>sa'tari</u>
C E H J	<u>mma'nraamma</u>	<u>hanra</u>
C G IJ	<u>haaka'nraunra</u>	= <u>haaqaavu'vura</u>
DE HI	<u>nrummuqaa'nranra</u>	<u>sana</u>
DE H J	<u>taunu'sora</u>	<u>kaandiri</u>
E HIJ	<u>haanda'roqera</u>	<u>kaa'mma</u>

FGHI	<u>taunia'nraana</u>	= <u>noraquarara</u>
FGH J	<u>pia'pina</u>	= <u>mmaanranra</u>
FG IJ	<u>taamaani'hotera</u>	= <u>kaambaara'hotera</u>
GHIJ	<u>horona'saara</u>	= <u>ponda'ro'rira</u>

(KNOWN BY 5)

ABCDE	<u>hokori'aara</u>	= <u>baugera₂</u>
ABCDE	<u>hungga'hungga</u>	<u>kwaza'kwaza</u>
ABCDE	<u>hura'rora</u>	<u>sa'tari</u>
ABCDE	<u>kwaa'rona</u>	<u>sa'tari</u>
ABCDE	<u>mmaammia'nrenra</u>	= <u>ng'gora'mmaatarera</u>
ABCDE	<u>mmaanri</u>	<u>sa'tari</u>
ABCDE	<u>mmaa'nriqa_b</u>	<u>sa'tari</u>
ABCDE	<u>mmia'nraunra</u>	<u>sa'tari</u>
ABCDE+	<u>saugia'rera</u>	<u>feva</u>
ABC FG	<u>mmunri_b</u>	<u>sa'tari</u>
BCDE H	<u>hopiri'pirira</u>	<u>sana</u>
BCDE J	<u>da'raa'rora</u>	= <u>kun'dimauna</u>
BCDE J	<u>haapa</u>	<u>geta</u>
BCDE J	<u>qi'nraammu'nrinra</u>	= <u>saa'vu</u>
BCDE J	<u>gom'wemauna</u>	= <u>kun'dimauna</u>
CDE IJ	<u>qaa'mani</u>	= <u>nro'nro</u>
C GHIJ	<u>hovong'gairi</u>	= <u>qinring'gairi</u>
C GHIJ	<u>mmaanraka'vaara</u>	<u>kosa</u>
C GHIJ	<u>wa'saunitara</u>	= <u>mmaanra'a'vaara</u>
D GHIJ	<u>su'haangga'nraana</u>	<u>nraa'mmunra</u>
FGHIJ	<u>hoveho'haa</u>	<u>ho'haa</u>
FGHIJ	<u>mmaan'dira</u>	= <u>haang'gora</u>
FGHIJ	<u>nraati'nrainra</u>	= <u>haang'gora</u>
FGHIJ	<u>so'woqi'raara</u>	= <u>qaitape</u>
FGHIJ	<u>ta'rangira</u>	= <u>mwaapuri</u>

(KNOWN BY 6)

ABCDE J	<u>dusam'baarara</u>	<u>foringa</u>
ABCDE J	<u>faa'haata</u>	= <u>dan'vora</u>

ABCDE J	<u>faanravaa'sera</u>	<u>sa'tari</u>
ABCDE J	<u>foraam'bora</u>	= <u>huva'huva</u>
ABCDE J	<u>kemo'haanra</u>	= <u>po'nraunra</u>
ABCDE J	<u>nruwaa'hoka</u>	<u>sa'tari</u>
ABCDE J	<u>pommo</u>	<u>qunro</u>
ABCD F J	<u>sau'haara</u>	= <u>paambu'wara</u>
A C EFG J	<u>mmaata'rera</u>	<u>mauna</u>
BCDEF H	<u>kwa'kwanda</u>	= <u>taaqu</u>
BCDE IJ	<u>mwaamun'dera</u>	<u>sa'tari</u>
CDE GH J	<u>muhisara</u>	<u>taana</u>
CDE G IJ	<u>qaatu'paa</u>	<u>doqa</u>
CDE G IJ	<u>qommaqanra</u>	= <u>hova</u>
CDE G IJ	<u>saat'we</u>	= <u>haa'toza</u>
CDE HIJ	<u>hunda'vira</u>	= <u>haanra</u>
GD F HIJ	<u>qaa'wana</u>	= <u>hu'samba</u>
D FGH IJ	<u>hi'vaari</u>	= <u>gom'bo'mmanra</u>
EFGHIJ	<u>nrommi'nrinra</u>	= <u>qogo'mmanra</u>

(KNOWN BY 7)

ABCDEFG	<u>nranranruganra</u>	<u>bwaari'haa</u>
ABCDE HI	<u>saa'va</u>	<u>sa'tari</u>
ABCDE HI	<u>taaqon'de</u>	<u>sa'tari</u>
ABCDE H J	<u>haa'tina</u>	= <u>qaa'mau</u>
ABCDE IJ	<u>gaa'haa</u>	= <u>huha</u>
ABCDE IJ	<u>kwaami</u>	<u>bwaari'haa</u>
A CDEF H J	<u>moqu</u>	= <u>honri</u>
BCDEF IJ	<u>faiga'rora</u>	<u>hora'vaira</u>
BCDEF IJ	<u>saapu'rera</u>	= <u>saara'mmanra</u>
BCDE GH J	<u>haara'haarara</u>	= <u>faarara</u>
BCDE G IJ	<u>ku'hora</u>	<u>honri</u>
BCDE G IJ	<u>mmaanri'mmanra</u>	= <u>sondira</u>
BCDE G IJ	<u>sugum'baarara</u>	<u>geta</u>
BCDE HIJ	<u>dumbu'sora</u>	= <u>hoqaarira</u>
BCDE HIJ	<u>haaru'aka</u>	<u>sa'tari</u>
BC E GHIJ	<u>nruqaagora</u>	<u>sa'tari</u>

B DE GHIJ
B EFGHIJ
CDE GHIJ
C EFGHIJ
C EFGHIJ

rum'baira
ku'vegan'doga
nru'mmaandara
haasapu'resa
ku'nraavaga

= naambi'hura
doga
sa'tari
= to'teza
saara

(KNOWN BY 8)

ABCDEF IJ
ABCDEF IJ
ABCDE GHI
ABCDE G IJ
ABCDE HIJ
ABCDE HIJ
ABCDEF GH J
AB D FGH IJ
AB D FGH IJ
BCDEFGH J
BCDEFG IJ
BCDEFG IJ
BCDE GHIJ
BCDE GHIJ
BCDE GHIJ
BCDE GHIJ
BCDE GHIJ
BCDE GHIJ
BCDE GHIJ
BCD FGH IJ
BCD FGH IJ
CDEFGHIJ
CDEFGHIJ

gegan
saasang'go
saunanranra
sondira
quarammaann'yora
waavara
baugera_b
noraquarara
saugutuvira
qaam'boqa
kaa'riri
peng'gonggo
qaaruva'saaqaa
qai'hora
faanra'honri
haang'gurira
qogo'mmunra
soquraran'daara
waahurum'baanana
nraang'gaura
naasi'hotera
dau'raara
toza'sarara

sa'tari
sa'tari
muso
sana
sana
= bwaa'haa
= faugora
matate
= noraquarara
= pom'bomo
= titi'vona
geta
saaqaa
= qi'pura
qaa'nrosa
= kaamminra
sa'tari
= faarereun'daara
qong'gona
= nambi'hura
ho'tera
= hengga
= nrummuqa'sarara

(KNOWN BY 9)

ABCDEFG IJ
ABCDEFG IJ
ABCDEFG IJ

haaki'tora
kwaa'nriga
qo'tomma

= matate₂
= haaguaamba
= to'vasara

ABCDEFG IJ	<u>torara</u>	= <u>faarara</u>
ABCDEF HIJ	<u>fasaiqunranra</u>	<u>sana</u>
ABCDEF HIJ	<u>hipu</u>	<u>sa'tari</u>
ABCDEF HIJ	<u>mwaa'haa</u>	= <u>tu'raatura</u>
ABCDE GHIJ	<u>faanra'hina</u>	<u>sana</u>
ABCDE GHIJ	<u>faifu'saato</u>	<u>sa'tari</u>
ABCDE GHIJ	<u>fu'seraman'daina</u>	<u>sana</u>
ABCDE GHIJ	<u>heara'nraammunra</u>	<u>nraa'mmunra</u>
ABCDE GHIJ	<u>kwaa'sanggi</u>	= <u>faifu'saato</u>
ABCDE GHIJ	<u>qo'taara</u>	<u>sa'tari</u>
ABCDE GHIJ	<u>saa'vevatau'taura</u>	<u>sa'tari</u>
ABCD FGHIJ	<u>kaa'tupi</u>	= <u>matate₂</u>
BCDEFGHIJ	<u>qaahisa'kwaanru</u>	= <u>paa'runa</u>
BCDEFGHIJ	<u>qaa'saura</u>	<u>faa'nresa</u>
BCDEFGHIJ	<u>du'vansagara</u>	<u>saagaa</u>
BCDEFGHIJ	<u>faage'tora</u>	<u>taana</u>
BCDEFGHIJ	<u>faanraqaanrosa</u>	<u>qaa'nrosa</u>
BCDEFGHIJ	<u>fa'raura</u>	= <u>qaa'hira</u>
BCDEFGHIJ	<u>fogini</u>	<u>sa'tari</u>
BCDEFGHIJ	<u>fovam'bova</u>	= <u>hori'ori</u>
BCDEFGHIJ	<u>haqaasa'kosa</u>	= <u>kosa₂</u>
BCDEFGHIJ	<u>haandararaa'toqa</u>	<u>hora'vaira</u>
BCDEFGHIJ	<u>hovequaahe</u>	= <u>waahē</u>
BCDEFGHIJ	<u>hupihi'hotera</u>	= <u>kaambaara'hotera</u>
BCDEFGHIJ	<u>kaarifam'bara</u>	= <u>waahē</u>
BCDEFGHIJ	<u>kaaripoqara</u>	= <u>tepogara</u>
BCDEFGHIJ	<u>kuru'torana</u>	= <u>dura</u>
BCDEFGHIJ	<u>maanawaa'ruhira</u>	<u>saara</u>
BCDEFGHIJ	<u>mmaa'nruhi</u>	<u>saara</u>
BCDEFGHIJ	<u>mmaatam'bausira</u>	= <u>hova'nera</u>
BCDEFGHIJ	<u>mmaanra'mmaga</u>	<u>mauna</u>
BCDEFGHIJ	<u>me'moramaang'gunusara</u>	= <u>mmunra'vaigara</u>
BCDEFGHIJ	<u>mmikiri</u>	<u>taana</u>
BCDEFGHIJ	<u>muavusa'kaihohondi</u>	= <u>qaaraho'hondi</u>
BCDEFGHIJ	<u>muavusa'kaihonri</u>	= <u>wasai'honri</u>
BCDEFGHIJ	<u>naambi'hura</u>	<u>sara</u>

BCDEFGHIJ	<u>nrevivi</u>	= <u>pom'bomo</u>
BCDEFGHIJ	<u>noqe'ovara</u>	<u>taana</u>
BCDEFGHIJ	<u>nruqanra</u>	<u>sa'tari</u>
BCDEFGHIJ	<u>qom'bommanra_p</u>	= <u>hi'terara</u>
BCDEFGHIJ	<u>raa'popainina</u>	= <u>qi'rerai'nitara</u>
BCDEFGHIJ	<u>raavumauna</u>	= <u>kun'dimauna</u>
BCDEFGHIJ	<u>saagaakong'gona</u>	= <u>naan'dina</u>
BCDEFGHIJ	<u>sau'waara</u>	<u>saara</u>
BCDEFGHIJ	<u>sorura'haangguma</u>	= <u>heqara'haangguma</u>
BCDEFGHIJ	<u>taataquaahē</u>	= <u>waahē</u>
BCDEFGHIJ	<u>qu'nesa</u>	= <u>haaquana</u>
BCDEFGHIJ	<u>waaheru'mmunra</u>	= <u>waundaa'vura</u>
BCDEFGHIJ	<u>wa'haasara</u>	= <u>nrummuqa'sarara</u>
BCDEFGHIJ	<u>wasai'kosa</u>	<u>kosa</u>
BCDEFGHIJ	<u>wesa</u>	= <u>qi'haamma_p</u>

TOTALS GROUP 1 -- VARIABLY KNOWN PLANT NAMES

IDIOSYNCRATIC	35
KNOWN BY 2	19
KNOWN BY 3	13
KNOWN BY 4	19
KNOWN BY 5	25
KNOWN BY 6	19
KNOWN BY 7	21
KNOWN BY 8	23
KNOWN BY 9	54

TOTAL 228

GROUP 2 -- SEMANTICALLY AMBIGUOUS PLANT NAMES

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
(KNOWN BY 2)		
<u>qautu'samba</u>	B	<u>mauna</u>
	J	= <u>hu'samba</u>
<u>dipaa'sera</u>	B	<u>sa'tari</u>
	J	= <u>sunavaa'sera</u>
<u>geporom'baara</u>	D	<u>saara</u>
	J	<u>sa'tari</u>
<u>fokaagera</u>	C	= <u>kun'dimauna</u>
	J	<u>sa'tari</u>
<u>hokiki'nraana</u>	C	= <u>to'honggi'nranra</u>
	J	= <u>raavua'taara</u>
<u>maandundin'dira</u>	B	<u>sa'tari</u>
	D	= <u>faari'vura</u>
<u>nraa'mmunru</u>	F	<u>mauna</u>
	J	<u>sa'tari</u>
<u>nronri'fora</u>	G	= <u>nroqinrom'be</u>
	J	<u>mauna</u>
(KNOWN BY 3)		
<u>geqiaam'bora</u>	D	<u>saara</u>
	E	<u>sa'tari</u>
<u>faanraquaahe</u>	C	<u>sa'tari</u>
	J	<u>mauna</u>
	H	

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>kaamma'uru</u>	H IJ	<u>mauna</u> <u>sa'tari</u>
<u>sunavaa'sera</u>	B C J	= <u>dipaa'sera</u> <u>sa'tari</u>
(KNOWN BY 4) <u>faindaa'sira</u>	CDE J	<u>sana</u> <u>sa'tari</u>
<u>nraam'we</u>	GHI J	= <u>qaa'topi'kosa</u> <u>kosa</u>
<u>na'saura</u>	GH J I	= <u>hengga</u> = <u>waaheru'mmunra</u>
<u>taa'bana</u>	ABC E	<u>sa'tari</u> <u>mauna</u>
(KNOWN BY 5) <u>fonro</u>	A E IJ G	<u>mauna</u> <u>hora'vaira</u>
<u>kaapi'kara</u>	ABC E D	<u>mauna</u> = <u>qaaran'daaqaa</u>
<u>kaura'kera</u>	CD G I J	= <u>mmaanranra</u> = <u>qauhaqora</u> = <u>qaavambe'rora</u> <u>ho'hondi</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>ki'rimbaagara</u>	F I GH J	= <u>qaari'mera</u> = <u>ko'mmunra</u> <u>kaa'mma</u>
<u>moruk'waa</u>	CD IJ E	= <u>mmanra'bau</u> = <u>menggi'rerira</u>
<u>saapwaa'hora</u>	B J CDE	<u>sa'tari</u> = <u>haaqu'nraanda</u>
(KNOWN BY 6)		
<u>feri'fai</u>	BC G D J H	= <u>tu'runduwana</u> <u>sa'tari</u> = <u>fesa</u>
<u>hovirira</u>	BC G J HI	<u>sara</u> = <u>qaan'daaqaa</u>
<u>ku'nrainra</u>	AB E G C D	<u>sa'tari</u> = <u>kaambo'ho</u> = <u>mmaa'nriqa_p</u>
<u>saa'mopa</u>	CD G IJ E	= <u>hinda'vara</u> <u>taana</u>
(KNOWN BY 7)		
<u>kaa'roti</u>	A CD J B FG	--- <u>kaa'pisi</u>
<u>mmaa'nregaanra</u>	DE GH IJ F	<u>haang'guma</u> = <u>hupihi'haangguma</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>riri'pondara</u>	AB D I C E J	<u>saara</u> = <u>ku'nraavaga</u>
<u>taa'rapasarasana</u>	AB EF C D I	<u>sa'tari</u> = <u>taa'bana</u> = <u>paasa'sora</u> <u>sana</u>
(KNOWN BY 8)		
<u>qaa'mmondira</u>	BCD GHIJ F	= <u>saa'su</u> <u>sa'tari</u>
<u>hipa</u>	AB D G J C E H	= <u>qau'saara</u> = <u>quata'saara</u> <u>taaqu</u>
<u>kaamba'raa</u>	ABCDE I H J	= <u>to'teza</u> = <u>nraammuqa</u> = <u>herora</u>
<u>ruve'vaura</u>	BCD GHIJ E	= <u>naambi'hura</u> <u>sara</u>
<u>taata'vaarisa</u>	B DE GHIJ C	= <u>qibaamma</u> _p <u>saagaa</u>
(KNOWN BY 9)		
<u>qaa'koku</u>	A BCD FGHIJ	= <u>bum'buri</u> = <u>taa'mme'mmunra</u>
<u>qaa'nrondaara</u>	B C EFGHIJ D	= <u>nronggaari'aara</u> <u>mauna</u> <u>doqa</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>qaaran'doga</u>	BCD FGHIJ E	= <u>hegaran'doga</u> <u>doga</u>
<u>firifi'rira</u>	ABC E D F HI J	<u>mauna</u> = <u>tcmbirira</u> <u>sa'tari</u>
<u>haa'nraqi'vaigunera</u>	ABCDE GH J I	<u>qu'nera</u> = <u>haaqaavu'vura</u>
<u>haasi'nranra</u>	ABCDE G IJ H	<u>sa'tari</u> = <u>ku'raara</u>
<u>hinggi'hora</u>	ABCDE GH J I	<u>sana</u> = <u>nrukaangga'vura</u>
<u>qi'rera'nitara</u>	BC EFGHIJ D	<u>mauna</u> <u>sara</u>
<u>qivi'nro</u>	B D FGHIJ C E	<u>qong'gona</u> <u>mauna</u>
<u>ku'raama'kosa</u>	BCD FGHIJ E	<u>kosa</u> = <u>qaa'topi'kosa</u>
<u>nru'aanru'fetara</u>	A BCDE GHIJ	<u>mauna</u> = <u>vaa'tegatan'daara</u>
<u>gora'kusanranra</u>	BCDEFGH I J	<u>hora'vaira</u> = <u>to'teza</u> <u>mauna</u>
<u>tove'haaquaa'nruqa- aanrosa</u>	BCDEFGH J I	= <u>pom'bomo</u> = <u>haarigaanrosa</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>vaa'kara</u>	A J BCDEFG I	= <u>waavara</u> = <u>he'vaara</u>
<u>vaa'teqatan'daara</u>	B CDEFGHIJ	<u>muso</u> <u>sa'tari</u>
(KNOWN BY 10)		
<u>qaa'toza</u>	A CDEFGHIJ B	<u>feva</u> = <u>qi'hu</u>
<u>baaru'se</u>	ABCD G I EF H J	<u>mauna</u> = <u>ko've</u>
<u>bora'taaqu</u>	A F HIJ BOD G E	= <u>henggo</u> = <u>qau'saara</u> = <u>hipa</u>
<u>don'da</u>	ABCDEF H J G I	<u>taa'ropa</u> = <u>nriqu</u>
<u>fukaa₂</u>	AB F HI CDE G J	= <u>mmanra'ban</u> = <u>menggi'rerira</u> <u>fu'kaa</u>
<u>gogaa'sura</u>	ABCDEFG IJ H	<u>saara</u> <u>mauna</u>
<u>haaran'dora</u>	A B E I CD FGH J	<u>mauna</u> <u>sa'tari</u> = <u>to'teza</u>
<u>hupihi'kovu</u>	A CDEFGHIJ B	= <u>kovu₂</u> = <u>kwanku</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>kaa'mminra</u>	ABCDEF HIJ G	<u>taana</u> = <u>qaa'vona</u>
<u>koko'saasira</u>	A J BCDEFGH I	<u>sa'tari</u> <u>hora'vaira</u> = <u>nraanda'mmanra</u>
<u>kori'si</u>	ABCDE GHIJ F	<u>feva</u> = <u>qi'hu</u>
<u>kwaavu'ruga</u>	AB DEFGH J C I	<u>heng'gunru</u> = <u>hu'samba</u>
<u>mmaanggapi'ri'hora</u>	A D B E GH C I J	= <u>tu'runduwana</u> = <u>nra'nraa'mmai</u> = <u>qora'kusanranra</u> <u>sa'tari</u> <u>mauna</u>
<u>munua'nera</u>	ABCDEF HIJ G	= <u>hipu</u> <u>sa'tari</u>
<u>naam'bufua'raara</u>	ABCDE H FG IJ	<u>mauna</u> <u>simmaa'nru</u>
<u>naa'rorugauqa</u>	A CDEFG IJ B H	<u>ho'tera</u> <u>kwaza'kwaza</u>
<u>nobisaa'rura</u>	A C EFGHIJ B D	<u>mauna</u> = <u>mau'na</u>
<u>nronrusau'honra</u>	ABCD FGHIJ E	<u>kwaza'kwaza</u> = <u>pim'baasora</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>pa'haara</u>	ABCDE GHIJ F	<u>mauna</u> = <u>mmaa'nriqa</u> _a
<u>paran'dana</u>	ABCDEFGH IJ H	<u>mauna</u> = <u>nro'peta</u>
<u>pin'do'nraana</u>	A B J C FGHI DE	<u>kaa'rumma</u> <u>mauna</u> = <u>to'teza</u> <u>sa'tari</u>
<u>rupu'rupu</u>	ABCDEFGH J HI	<u>mauna</u> = <u>mmaa'nriqa</u> _a
<u>saara'waa</u>	ABCDEFGH J I	= <u>huru'nranra</u> <u>saaqaa</u>
<u>simbu'raara</u>	A CDEFGHIJ B	= <u>fu'raatitira</u> = <u>pommo</u>
<u>sorataa'ropa</u>	AB HIJ CDEFG	<u>taa'ropa</u> = <u>gaan'diga</u>
<u>so'vovira</u>	A D BC EFGHIJ	<u>kovu</u> = <u>faarerun'daara</u>
<u>sum'bu</u>	ABCDE GHIJ F	<u>sa'tari</u> = <u>hotaa'rora</u>
<u>suvam'bara</u>	A D FGH J BC E I	= <u>kwaa'sapara</u> <u>sana</u>
<u>taapi'pira</u>	ABCDEFGH I J	<u>muso</u> = <u>king'gora</u> <u>saa'koko</u>

<u>Plant Name</u>	<u>Informants</u>	<u>Higher Taxon</u>
<u>titi'vona</u>	ABCDE GHIJ F	<u>dogo</u> = <u>hegaran'dogo</u>
<u>to'vaura</u>	AB DEFGHI C IJ	<u>saivu</u> = <u>taari</u>
<u>quara'raukondara</u>	A BCDEFGHIJ	<u>mauna</u> <u>sa'tari</u>
<u>waura</u>	ABCD FGHIJ E	= <u>pe'pauru</u> <u>sa'tari</u>

TOTALS GROUP 2 -- SEMANTICALLY AMBIGUOUS PLANT NAMES

KNOWN BY 2	8
KNOWN BY 3	4
KNOWN BY 4	4
KNOWN BY 5	6
KNOWN BY 6	4
KNOWN BY 7	4
KNOWN BY 8	5
KNOWN BY 9	15
KNOWN BY 10	33
TOTAL	83

RECAPITULATION - APPENDIX 3

	<u>Variably Known</u>	<u>Semantically Ambiguous</u>	<u>Total</u>
IDIOSYNCRATIC	35	0	35
KNOWN BY 2	19	8	27
KNOWN BY 3	13	4	17
KNOWN BY 4	19	4	23
KNOWN BY 5	25	6	31
KNOWN BY 6	19	4	23
KNOWN BY 7	21	4	25
KNOWN BY 8	23	5	28
KNOWN BY 9	54	15	69
KNOWN BY 10	0	33	33
TOTAL	228	83	311

APPENDIX 4 PLANT NAMING RESPONSES BY TEN NDUMBA ADULTS

The following are data derived from the Collection File described in Chapter III. A total of 517 plant collections were shown to ten Ndumba adults and their naming responses recorded. Of the total of 5,104 responses (given informant absences), 636 distinct lexical expressions (excluding phonological variants) were recorded. Of these, 98 were reported synonyms for other expressions and are not distinguished here from the more commonly used names under which they have been entered for present purposes. An additional 50 of the distinct naming responses were descriptive phrases rather than true plant names and appear here as if the informant had responded with the most general plant name for that type of organism; e.g., a response of 'tree that grows by the water' would be entered here simply as sa'tari ('tree'). With these exclusions, the total number of distinct responses is reduced to 488.

Of these 488, 16 are polysemous expressions as discussed in Chapter III; e.g., in the earliest naming sessions a response of "mauna" or "doqa" was not pursued to determine whether the residual generic or residual specific sense of the term was intended, or whether the informant was simply responding at the higher level of specificity. If the latter is assumed, there was a total of 504 conceptually distinct naming responses. In this appendix this assumption is not made and the polysemous expressions are entered without subscript for those earlier identifications (cf. Appendix 5).

In the extreme left-hand column appears the identification number of each plant collection. In the second column appear the various distinct naming responses which occurred for that collection, followed by the informants who responded with each particular name. Finally, in the fourth column are recorded the scientific determinations for each collection. A dash appearing among informant identification letters indicates that that informant was absent.

The data are grouped on the basis of the number of distinct responses which occurred; thus, the first group consists of all those collections which evoked only one naming response. Successive groups include those collections on which there was progressively decreasing agreement among the informants.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
GROUP 1 -- 1 RESPONSE ONLY (TOTAL AGREEMENT)			
113	<u>qaahisa</u>	ABCDEFGHJIJ	<u>Pennisetum macrostachyum</u>
462	<u>qaan'dosa</u>	AB-DEFGHIJ	<u>Galbulimima belgraveana</u>
215	<u>qaa'nrempa</u>	ABCDEFGHJIJ	<u>Casuarina oligodon</u>
248	<u>qaari'mera</u>	ABCDEFGHJIJ	<u>Ipomoea batatas</u>
151	<u>da'taa'tara</u>	ABCDEFGH-J	<u>Triumfetta nigricans</u>
310	<u>da'taa'tara</u>	ABCDEFGH-J	Unidentified shrub
399	<u>dau'vora</u>	ABCDEFGHJIJ	<u>Macaranga pleioneura</u>
451	<u>faanrau₂</u>	AB-DEFGHIJ	<u>Trichosanthes tricuspid- ata</u>
287	<u>faanra'vesa</u>	ABCDEFGHJIJ	<u>Alpinia</u> sp.
327	<u>faanra'vesa</u>	ABCDEFGHJIJ	? <u>Alpinia</u> sp.
411	<u>faa'rera</u>	ABCDEFGHJIJ	<u>Mucuna ?stanleyi</u>
298	<u>faasa'tiri</u>	ABCDEFGHJIJ	<u>Mitrastemon yamamotoi</u>
403	<u>figiaaru</u>	ABCDEFGHJIJ	<u>Acalypha</u> sp.
224	<u>fing'gungga</u>	ABCDEFGHJIJ	<u>Dendrobium</u> sp.
308	<u>fing'gungga</u>	ABCDEFGH-J	<u>Dendrobium</u> sp.
278	<u>furi</u>	ABCDEFGHJIJ	<u>Cucurbita pepo</u>
401	<u>gaa'mmanra</u>	ABCDEFGHJIJ	<u>Omalanthus novoguineen- sis</u>
108	<u>gwaara</u>	ABCDEFGHJIJ	<u>Maoutia</u> sp.
388	<u>haan'davi</u>	ABCDEFGHJIJ	<u>Myristica womersleyi</u>
272	<u>haang'gora</u>	ABCDEFGHJIJ	<u>Coleus scutellarioides</u>
276	<u>haang'gora</u>	ABCDEFGHJIJ	<u>Coleus scutellarioides</u>
161	<u>haaru'vesora</u>	ABCDEFGH-J	<u>Schuermansia henningsii</u>
187	<u>haaru'vesora</u>	ABCDEFGHJIJ	<u>Schuermansia henningsii</u>
299	<u>haaru'vesora</u>	ABCDEFGH-J	<u>Schuermansia henningsii</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
425	<u>haava'risa</u>	ABCDEFGH IJ	<u>Dendrobium</u> sp.
457	<u>hang'gaamunggora</u>	AB-DEFGHIJ	<u>Hornstedtia</u> sp.
449	<u>hengga</u>	AB-DEFGHIJ	<u>Rorippa</u> sp.
450	<u>hepo</u>	AB-DEFGHIJ	<u>Ficus</u> <u>copiosa</u>
067	<u>hin'deri</u>	ABCDEFGH IJ	<u>Rhododendron</u> <u>macgregoriae</u>
262	<u>hohaa₂</u>	ABCDEFGH IJ	<u>Cucumis</u> <u>sativus</u>
182	<u>hokwai</u>	ABCDEFGH IJ	<u>Erigeron</u> <u>canadensis</u>
269	<u>hon'dai</u>	ABCDEFGH IJ	<u>Timonius</u> <u>tricanthus</u>
363	<u>hon'dai</u>	ABCDEFGH IJ	<u>Timonius</u> <u>trichocladus</u>
080	<u>honri₂</u>	ABCDEFGH IJ	<u>Rungia</u> <u>klossii</u>
304	<u>honrimma₂</u>	ABCDEFGH-J	<u>Castanopsis</u> <u>acuminatissima</u>
511	<u>horavaira₂</u>	ABCDEFGH IJ	<u>Bidens</u> <u>pilosa</u>
125	<u>hori'ori</u>	ABCDEFGH IJ	<u>Saurauia</u> sp.
112	<u>hosa₂</u>	ABCDEFGH IJ	<u>Miscanthus</u> <u>floridulus</u>
181	<u>hosa₂</u>	ABCDEFGH IJ	<u>Miscanthus</u> <u>floridulus</u>
016	<u>ho'tera</u>	ABCDEFGH IJ	<u>Trifonia</u> sp.
022	<u>ho'tera</u>	ABCDEFGH IJ	<u>Dendrobium</u> sp.
246	<u>ho've</u>	ABCDEFGH IJ	<u>Solanum</u> <u>aviculare</u>
216	<u>hure'vu</u>	ABCDEFGH IJ	<u>Elaeocarpus</u> <u>nubigenus</u>
267	<u>huru'hina</u>	ABCDEFGH IJ	<u>Ocimum</u> <u>basilicum</u>
309	<u>qinring'gairi</u>	ABCDEFGH-J	<u>Equisetum</u> sp.
177	<u>qi'pura</u>	ABCDEFGH IJ	<u>Cordyline</u> <u>fruticosa</u>
217	<u>kaam'baa</u>	ABCDEFGH IJ	<u>Maclura</u> <u>cochinchinensis</u>
509	<u>kaambaara'hotera</u>	ABCDEFGH IJ	<u>Dendrobium</u> sp.
331	<u>kaa'mmunga</u>	ABCDEFGH IJ	<u>Setaria</u> <u>palmifolia</u>
266	<u>kaan'daara</u>	ABCDEFGH IJ	<u>Ricinus</u> <u>communis</u>
443	<u>kaang'gaami</u>	ABCDEFGH IJ	<u>Elatostema</u> sp.
437	<u>kaapi'kana</u>	ABCDEFGH IJ	<u>Clematis</u> <u>phanerophlebia</u>
031	<u>kaapisi₂</u>	ABCDEFGH IJ	<u>Brassica</u> ? <u>juncea</u>
014	<u>kaaro'hara</u>	ABCDEFGH IJ	<u>Ipomoea</u> sp.
156	<u>ka'haara</u>	ABCDEFGH-J	<u>Schefflera</u> sp.
107	<u>ka'saasa</u>	ABCDEFGH IJ	<u>Ficus</u> <u>calopilina</u>
242	<u>ka'saasa</u>	ABCDEFGH IJ	<u>Ficus</u> <u>calopilina</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
344	<u>kehura</u>	ABCDEFGHJ	<u>Phyllocladus hypophyllus</u>
372	<u>kembora₂</u>	ABCDEFGHJ	<u>Ficus dammaropsis</u>
221	<u>kendavara₂</u>	ABCDEFGHJ	<u>Dimorphanthera robbinsii</u>
428	<u>kendavara₂</u>	ABCDEFGHJ	<u>Dimorphanthera elegatissima</u>
247	<u>kengge'hura</u>	ABCDEFGHJ	<u>Cordyline fruticosa</u>
273	<u>ko'mmunra</u>	ABCDEFGHJ	<u>Ipomoea batatas</u>
056	<u>ko've</u>	ABCDEFGHJ	<u>Peperomia</u> sp.
501	<u>ko've</u>	ABCDEFGHJ	<u>Peperomia</u> sp.
219	<u>kunggura₂</u>	ABCDEFGHJ	<u>Coix lachryma-jobi</u>
001	<u>ku'raara</u>	ABCDEFGHJ	<u>Dichrotrichum</u> sp.
469	<u>kwaanrunru'kembora</u>	AB-DEFGHJ	<u>Ficus dammaropsis</u>
402	<u>mmaahi</u>	ABCDEFGHJ	<u>Pueraria triloba</u>
385	<u>mmaa'nriqa_a</u>	ABCDEFGHJ	<u>Marattia</u> sp.
515	<u>mmaata'kusanranra</u>	ABCDEFGHJ	<u>Dicrocephala bicolor</u>
190	<u>mmaato'nronri</u>	ABCDEFGHJ	<u>Dawsonia</u> sp.
488	<u>mauna</u>	ABCDEFGHJ	<u>Gentiana</u> c.f. <u>lorentzii</u>
384	<u>min'do</u>	ABCDEFGHJ	<u>Asplenium</u> sp.
225	<u>mmunri_a</u>	ABCDEFGHJ	<u>Dodonaea viscosa</u>
312	<u>mmutate₂</u>	ABCDEFGH-J	<u>Arthraxon ciliaris</u>
026	<u>mwaapuri</u>	ABCDEFGHJ	<u>Coleus scutellarioides</u>
152	<u>mwaapuri</u>	ABCDEFGH-J	<u>Coleus scutellarioides</u>
244	<u>mwaapuri</u>	ABCDEFGHJ	<u>Coleus scutellarioides</u>
109	<u>nraagaammu</u>	ABCDEFGHJ	<u>Pipturus argenteus</u>
319	<u>nraagaammu</u>	ABCDEFGHJ	Unidentified tree
497	<u>nraa'mmaahinra</u>	ABCDEFGHJ	<u>Pueraria triloba</u>
389	<u>nremmi</u>	ABCDEFGHJ	<u>Scleropyrum aurantiacum</u>
406	<u>nerira</u>	ABCDEFGHJ	<u>Phaseolus lunatus</u>
013	<u>nrondaa'pu</u>	ABCDEFGHJ	<u>Oenanthé javanica</u>
261	<u>nrondaa'pu</u>	ABCDEFGHJ	<u>Oenanthé javanica</u>
150	<u>nrong'ge</u>	ABCDEFGH-J	<u>Wendlendia paniculata</u>
470	<u>qonggona₂</u>	AB-DEFGHJ	<u>Homalomena</u> sp.
452	<u>paa'ringga</u>	AB-DEFGHJ	<u>Acalypha</u> sp.
517	<u>pi'tu</u>	ABCDEFGHJ	<u>Imperata conferta</u>
270	<u>po'nraunra</u>	ABCDEFGHJ	<u>Carpodetus arboreus</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
454	<u>popo_a</u>	AB-DEFGHIJ	<u>Macaranga</u> sp.
212	<u>purau_a</u>	ABCDEFGHIJ	<u>Euphorbia pulcherrima</u>
498	<u>rira</u>	ABCDEFGHIJ	<u>Broussonetia papyrifera</u>
435	<u>ropa</u>	ABCDEFGHIJ	<u>Nastus productus</u>
460	<u>rovagara</u>	AB-DEFGHIJ	<u>Calycacanthus magnusi-</u> <u>anus</u>
422	<u>saaku'nra</u>	ABCDEFGHIJ	<u>Pittosporum ramifloru</u>
185	<u>saamma</u>	ABCDEFGHIJ	<u>Elaeocharis dulcis</u>
324	<u>saasa</u>	ABCDEFGHIJ	<u>Cyclosorus</u> sp.
236	<u>saasa'ko</u>	ABCDEFGHIJ	<u>Lactuca indica</u>
135	<u>saasana₂</u>	ABCDEFGHIJ	<u>Symplocos</u> sp.
408	<u>saa'vara</u>	ABCDEFGHIJ	<u>Araucaria cunninghamii</u>
447	<u>saa'vu</u>	ABCDEFGHIJ	<u>Hemigraphis</u> sp.
106	<u>sa'haa'haa</u>	ABCDEFGHIJ	<u>Hornstedtia</u> sp.
320	<u>si'mmoka</u>	ABCDEFGHIJ	<u>Maesa</u> sp.
042	<u>so'mi</u>	ABCDEFGHIJ	<u>Trachymene adenodes</u>
123	<u>so'mi</u>	ABCDEFGHIJ	<u>Trachymene adenodes</u>
486	<u>so'mi</u>	ABCDEFGHIJ	<u>Trachymene adenodes</u>
048	<u>so'rera</u>	ABCDEFGHIJ	<u>Graptophyllum</u> sp.
328	<u>taambaam'bira</u>	ABCDEFGHIJ	<u>Mussaenda ferruginea</u>
381	<u>taa'nrau</u>	ABCDEFGHIJ	<u>Asplenium nidus</u>
374	<u>taan'dauna</u>	ABCDEFGHIJ	<u>Hypolepis</u> sp.
354	<u>taa'puqa</u>	ABCDEFGHIJ	<u>Cyathea</u> sp.
355	<u>taa'puqa</u>	ABCDEFGHIJ	<u>Cyathea</u> sp.
314	<u>taa'vara</u>	ABCDEFGH-J	Unidentified shrub
229	<u>taa've</u>	ABCDEFGHIJ	<u>Alphitonia incana</u>
513	<u>taavu'raa</u>	ABCDEFGHIJ	<u>Macaranga</u> sp.
259	<u>taaza</u>	ABCDEFGHIJ	<u>Casuarina papuana</u>
021	<u>tain'dega</u>	ABCDEFGHIJ	<u>Salvia splendens</u>
241	<u>tembum'bura</u>	ABCDEFGHIJ	<u>Piper macropiper</u>
020	<u>tepoqara</u>	ABCDEFGHIJ	<u>Helichrysum bracteatum</u>
348	<u>te'vora</u>	ABCDEFGHIJ	<u>Dendrobium</u> sp.
518	<u>ti'saaru</u>	ABCDEFGHIJ	<u>Euphorbia buxoides</u>
030	<u>tombirira</u>	ABCDEFGHIJ	<u>Desmodium gyroides</u>
053	<u>tombirira</u>	ABCDEFGHIJ	<u>Desmodium gyroides</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
077	<u>tombirira</u>	ABCDEFGH IJ	<u>Desmodium sequax</u>
226	<u>tombirira</u>	ABCDEFGH IJ	<u>Desmodium sequax</u>
281	<u>tonere'rera</u>	ABCDEFGH IJ	<u>Amyema</u> sp.
174	<u>tonggaga</u>	ABCDEFGH IJ	<u>Alpinia floccosa</u>
441	<u>to'sosa</u>	ABCDEFGH IJ	<u>Pandanus jiulianettii</u>
237	<u>guna₂</u>	ABCDEFGH IJ	<u>Lablab purpureus</u>
012	<u>gunera</u>	ABCDEFGH IJ	<u>Rubus rosaefolius</u>
064	<u>gunera</u>	ABCDEFGH IJ	<u>Rubus</u> sp.
101	<u>waagoga</u>	ABCDEFGH IJ	<u>Cassia floribunda</u>
117	<u>waagora₂</u>	ABCDEFGH IJ	<u>Ficus augusta</u>
423	<u>waavara</u>	ABCDEFGH IJ	<u>Schefflera</u> sp.
GROUP 2 -- 2 RESPONSES			
189	<u>baugera_a</u> <u>sana</u>	ABCDE GH IJ F	<u>Palmeria fengeriana</u>
400	<u>bim'bira</u> <u>fing'gungga</u>	ABCD FGHIJ E	<u>Dendrobium</u> sp.
200	<u>dura</u> <u>sana_r</u>	ABCDE GHI F J	<u>Ficus camptandra</u>
120	<u>fenra₂</u> <u>mauna_r</u>	A CDEFGHIJ	<u>Gleichenia</u> c.f. <u>erecta</u>
507	<u>feri'mmaaqu'nrunra</u> <u>ho'ru</u>	ABCDEF HIJ G	<u>Poikilogyne</u> sp.
090	<u>fesa</u> <u>hengga</u>	ABCDEFG IJ H	<u>Solanum nigrum</u>
502	<u>fo'vasara</u> <u>tu'raatura</u>	ABCDEF HIJ G	<u>Saurauia</u> sp.
296	<u>haang'gora</u> <u>mwaapuri</u>	A CDEFGHIJ B	<u>Coleus scutellarioides</u>
468	<u>haa'rai</u> <u>mnenranra₂</u>	AB-D FGHI E J	<u>Lithocarpus</u> c.f. <u>rufo-villosus</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
458	<u>hi'nrunru</u> <u>kaang'gaami</u>	AB- EFGHIJ D	<u>Pilea</u> sp.
096	<u>hi'rera</u> <u>foringa</u>	ABCD GHIJ EF	<u>Usnea</u> sp.
027	<u>horavaira</u> ₂ <u>so'mi</u>	ABCD FGHJ E	<u>Bidens pilosa</u>
083	<u>ho've</u> <u>sa'tari</u>	E ABCD FGHJ	<u>Solanum</u> sp. aff. <u>S.</u> <u>belense</u>
057	<u>gia'tai'para</u> <u>mauna</u>	ABCD FGHJ E	<u>Buchnera tomentosa</u>
306	<u>gia'tai'para</u> <u>mauna</u> _r	C AB DEFGH-J	<u>Haloragis chinensis</u>
227	<u>gia'tai'para</u> <u>mauna</u> _r	C AB DEFGHIJ	<u>Hedyotis hispida</u>
489	<u>gia'tai'para</u> <u>mauna</u> _r	C AB DEFGHIJ	<u>Hypericum</u> ? <u>macgregorii</u>
069	<u>kaam'bi</u> <u>to'taga</u>	ABCDEFG J HI	<u>Vaccinium striicaule</u>
446	<u>kaambira</u> <u>taam'bira</u>	ABCDE GHIJ F	<u>Piper</u> sp.
379	<u>kaandiri</u> ₂ <u>ku'hingguhina</u>	A CDEFGHIJ B	<u>Diplazium</u> sp.
456	<u>kaapi'kana</u> <u>fong'gora</u>	- EFGHIJ AB D	<u>Dioscorea</u> sp.
417	<u>kaa'rapitau</u> <u>kaa'mminra</u>	A C F HIJ B DE G	<u>Dioscorea</u> sp.
383	<u>kaa'risi</u> <u>hengga</u>	ABCD FGHJ E	<u>Nasturtium</u> sp.
512	<u>ko'konda'mmanra</u> <u>sa'tari</u> _r	ABCDEF HIJ G	<u>Helicia saruwagedica</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
330	<u>koro'mmota</u> <u>koringga</u>	ABC EFGHIJ D	<u>Ischaemum</u> <u>barbatum</u>
390	<u>kotu'vera</u> <u>tembum'bura</u>	ABCD FGHI E J	<u>Piper</u> sp.
297	<u>kovu₂</u> <u>kwanku</u>	A DEFGHIJ BC	<u>Impatiens</u> sp.
302	<u>kun'dimauna</u> <u>hokirira</u>	A CD FGH-J B E	<u>Crassocephalum</u> <u>crepi-</u> <u>dioides</u>
392	<u>kwaa'kesa</u> <u>waagora₂</u>	ABCDEFG J HI	<u>Ficus</u> <u>xylosycia</u>
484	<u>kwazakwaza_r</u> <u>mauna_r</u>	E ABCD FGHIJ	<u>Astelia</u> <u>papuana</u>
265	<u>meru₂</u> <u>waundaa'vura</u>	ABC EFGH J D I	<u>Oenanthe</u> <u>javanica</u>
039	<u>merura</u> <u>mmanra'mmaqa</u>	ABCD FGHIJ E	<u>Elatostema</u> sp.
429	<u>naam'bufua'raara</u> <u>kim'buenranra</u>	A DEFG IJ BC H	<u>Begonia</u> sp.
440	<u>naam'bufua'raara</u> <u>kim'buenranra</u>	A DEFGHIJ BC	<u>Begonia</u> sp.
045	<u>naam'bufua'raara</u> <u>mauna</u>	E ABCD FGHIJ	<u>Oxalis</u> <u>corniculata</u>
104	<u>namin'dura</u> <u>mauna</u>	E ABCD FGHIJ	<u>Lindernia</u> <u>pusilla</u>
240	<u>nraro'nraa'roro</u> <u>mauna₂</u>	ABCD FG IJ E H	<u>Crotalaria</u> <u>ferruginea</u>
008	<u>nrukaanggaa'vura</u> <u>nraanda'mmanra</u>	ABCDEF HIJ G	<u>Desmodium</u> <u>repandum</u>
025	<u>nrukaanggaa'vura</u> <u>nraanda'mmanra</u>	BCDEF HIJ A G	<u>Desmodium</u> <u>repandum</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
347	<u>gora'hotera</u> <u>hotera</u> _r	BC FG IJ A DE H	<u>Dendrobium</u> sp.
164	<u>paangki</u> ₂ <u>to'ru</u>	ABCD H- EFG J	<u>Cucurbita</u> <u>moschata</u>
333	<u>paasa'sora</u> <u>sa'tari</u> _r	ABCDEF HIJ G	Unidentified Rubiaceae
214	<u>pera'rosa</u> <u>mauna</u> _r	ABC FGHIJ DE	<u>Canna</u> <u>indica</u>
065	<u>po'hinifu'haa</u> <u>mauna</u>	I ABCDEFGH J	<u>Polygala</u> <u>paniculata</u>
118	<u>po'hinifu'haa</u> <u>mauna</u>	A DE IJ BC FGH	<u>Polygala</u> <u>paniculata</u>
455	<u>pu'nrumma</u> <u>honrimma</u> ₂	AB- EFGHIJ D	<u>Castanopsis</u> <u>acuminatis-</u> <u>sima</u>
424	<u>pwaapu</u> <u>hinggira</u>	ABCDEFGH J I	<u>Harmsiopanax</u> <u>ingens</u>
139	<u>raa'kema</u> <u>hi'mminri</u>	ABCDE GHIJ F	<u>Gardenia</u> <u>lamingtonii</u>
264	<u>raavua'taara</u> <u>to'honggi'nranra</u>	A CDEFGHIJ B	<u>Cordyline</u> <u>fruticosa</u>
397	<u>saa'puta</u> <u>muso</u> _r	ABC EFGHIJ D	<u>Eulalia</u> <u>leptostachys</u>
375	<u>saasa</u> <u>mauna</u> _r	E G ABCD F HIJ	<u>Adiantum</u> sp.
168	<u>saasana</u> ₂ <u>si'mmisa</u>	AB DEFGHIJ C	<u>Amaracarpus</u> <u>clemensae</u>
480	<u>saasana</u> _r <u>mauna</u> _r	J ABCDEFGHI	<u>Parahebe</u> <u>albiflora</u>
434	<u>saa'vevatau'taura</u> <u>saa'veva</u>	ABCDE GHIJ F	<u>Ardisia</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
295	<u>soko'kora</u> <u>su'raa'rora</u>	ABCD FGHIJ E	<u>Ipomoea batatas</u>
238	<u>sondara</u> <u>sa'tari_r</u>	A CDEFGHIJ B	<u>Malvaviscus arboreus</u>
239	<u>sondara</u> <u>sa'tari_r</u>	A CDEFGHIJ B	<u>Malvaviscus arboreus</u>
316	<u>so'rera</u> <u>qi'rera'i'nitara</u>	ABCDEFGH- J	<u>Graptophyllum</u> sp.
412	<u>so'vati</u> <u>mauna_r</u>	A CDEFGHIJ B	<u>Pteris</u> sp.
431	<u>taam'bira</u> <u>kaambira</u>	AB EF H J CD G I	<u>Piper</u> sp.
504	<u>taagon'de</u> <u>sa'tari_r</u>	ABC HI DEFG J	<u>Coriaria papuana</u>
105	<u>taatavaa'tira</u> <u>mauna</u>	BCDEF HIJ A G	<u>Euphorbia serrulata</u>
033	<u>tai'nruku</u> <u>mauna</u>	BCDEFGHIJ A	<u>Viola betonicifolia</u>
317	<u>taura₂</u> <u>fifiqori</u>	ABC EF H-J D G	<u>Themeda intermedia</u>
479	<u>tepoqara</u> <u>mauna_r</u>	A C GHI B DEF J	<u>Anaphalis mariae</u>
448	<u>te'tara</u> <u>kaa'nrembi</u>	AB EFG IJ CD H	<u>Graptophyllum</u> sp.
459	<u>tombi'nranra</u> <u>son'daira</u>	AB-DE G J F HI	<u>Laportea decumana</u>
294	<u>tondaam'bu</u> <u>hori'ori</u>	ABCDEFGHI J	<u>Saurauia c.f. conferta</u>
485	<u>tonere'rera</u> <u>sa'tari_r</u>	ABCDE GHIJ F	<u>Amyema</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
508	<u>to'taga</u> <u>kaambi</u> ₂	ABC E G I D F H J	<u>Vaccinium albicans</u>
307	<u>to'taga</u> <u>kaambi</u> ₂	CDE GH- AB F J	Unidentified shrub
465	<u>to'teza</u> <u>nraamma'saasira</u>	A - FGHIJ B DE	<u>Bubbia</u> sp.
335	<u>toti'nron'daara</u> <u>mauna</u> _r	DE ABC FGHIJ	<u>Ceratostylis</u> sp.
371	<u>tove'nra</u> <u>bwaarihaa</u> _r	ABCDEF HI G J	<u>Cyathea</u> sp.
313	<u>tu'raatura</u> <u>tondaam'bu</u>	ABC EFCH-J D	<u>Saurauia</u> sp.
082	<u>tu'runduwana</u> <u>sa'tari</u>	ABC EFGHIJ D	<u>Phaleria</u> sp. nov.
282	<u>tu'runduwana</u> <u>sa'tari</u> _r	ABC EFGHIJ	<u>Phaleria</u> sp. nov.
046	<u>qu'nera</u> <u>mauna</u>	ABCDEF HIJ G	<u>Rubus rosaefolius</u>
049	<u>qu'nera</u> <u>haagaavu'vura</u>	ABCDEFG J HI	<u>Rubus</u> sp.
073	<u>qu'nera</u> <u>paataqunera</u>	BCDEFGHIJ A	<u>Rubus rosaefolius</u>
245	<u>gunro</u> ₂ <u>saapa'vaqiora</u>	ABCDEFG I H J	<u>Miscanthus floridulus</u>
493	<u>qu'rauqa</u> <u>nro'nro</u>	ABC EF H J D G I	<u>Rhododendron beyerinckianum</u>
208	<u>qu'rauqa</u> <u>nro'nro</u>	AB D F H J C E G I	<u>Rhododendron</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
350	<u>qu'rauqa</u> <u>nro'nroa</u>	ABC EF H J D G I	<u>Rhododendron</u> sp.
058	<u>waam'buri</u> <u>pim'baa'sora</u>	A CDEF HIJ B G	<u>Spathoglottis</u> sp.
078	<u>waangga</u> <u>nrukaanggaa'vura</u>	ABCD FGHIJ E	<u>Polygonum nepalense</u>
GROUP 3 -- 3 RESPONSES			
002	<u>qaa'herara</u> <u>daa'paaza</u> <u>qi'rera'nitara</u>	BC GHI A DEF J	<u>Impatiens hawkeri</u>
011	<u>qaa'herara</u> <u>kovu</u> <u>waaki'kora</u>	C FGH A DE I B J	<u>Impatiens hawkeri</u>
188	<u>qaa'herara</u> <u>daa'paaza</u> <u>sombura</u> _r	ABC EFGHI D J	<u>Impatiens</u> sp.
271	<u>qaari'mera</u> <u>qaa'ririra</u> <u>haan'depi</u>	BCD FG IJ A E H	<u>Ipomoea batatas</u>
311	<u>qaitape</u> <u>kaa'mmunga</u> <u>rotu'muso</u>	ABCD F H-J E G	<u>Melinus minutiflora</u>
166	<u>bara'waagaa</u> <u>kun'dimauna</u> <u>mauna</u> _r	A H J C B DEFG-	<u>Crotalaria semperflorens</u>
066	<u>bara'waagaa</u> <u>tain'deqa</u> <u>sa'tari</u>	A C E GH J B F I D	<u>Tephrosia vogelii</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
142	<u>baugera</u> _a <u>gegau</u> <u>punri'haanranra</u>	ABCD GHIJ E F	<u>Palmeria</u> c.f. <u>fengeriana</u>
254	<u>da'taa'tara</u> <u>nraanda'mmanra</u> <u>mauna</u> _r	BC E IJ F A D GH	<u>Triumfetta</u> <u>pilosa</u>
499	<u>doqa</u> ₂ <u>titi'vona</u> <u>quaran'doqa</u>	AB DEF HIJ C G	<u>Cyanotis</u> sp.
137	<u>dura</u> <u>kaapi'kana</u> <u>sana</u> _r	ABCDE HI F G J	<u>Ficus</u> sp.
230	<u>faahifaan'daura</u> <u>kwevi</u> <u>saarisa'mmaahu</u>	A FGHIJ BC E D	<u>Eugenia</u> sp.
075	<u>faahi'mme'saara</u> <u>mmutate</u> <u>saa'puta</u>	ABCD GHIJ EF G	<u>Sacciolepis</u> <u>indica</u>
252	<u>faahi'mme'saara</u> <u>mmutate</u> _r <u>muso</u> _r	ABCD HIJ E G F	<u>Setaria</u> <u>montana</u>
023	<u>faa'nresa</u> <u>ki'saasa</u> <u>mmondira</u>	A CD F H B E G I J	<u>Riedelia</u> sp.
032	<u>faarerun'daara</u> <u>so'vovira</u> <u>kovu</u>	BC EFGHIJ D A	<u>Impatiens</u> <u>hawkeri</u>
250	<u>faarerun'daara</u> <u>so'vovira</u> <u>waaki'kora</u>	AB EFGHIJ D C	<u>Impatiens</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
393	<u>fai'kaapi</u> <u>kaapi</u> ₂ <u>kwaam'bimba</u>	ABC H EFG J D I	<u>Curcuma longa</u>
432	<u>feganrammu'nrunra</u> <u>tu'runduwana</u> <u>saapwaa'hora</u>	A CDEFGHI B J	<u>Medinilla</u> sp.
334	<u>fe'vaka</u> <u>baaru'se</u> <u>naam'bufua'raara</u>	EFGHI ABCD J	<u>Begonia</u> sp.
206	<u>fing'gungga</u> <u>mmaqaa'vora</u> <u>mauna</u> _r	A C FGHJ D B E	<u>Glossorhyncha</u> sp.
353	<u>fing'gungga</u> <u>bim'bira</u> <u>hungga'hungga</u>	ABC FGH D J E	Unidentified Orchid- aceae
370	<u>fo'tana</u> <u>tugan'daira</u> <u>mauna</u> _r	I J ABCDEFGH	<u>Lindernia anagallis</u>
505	<u>haari'sora</u> <u>sunravaa'kura</u> <u>mmaanranra</u> _b	AB DEFGHI C J	<u>Derris</u> sp.
427	<u>haasa'pu</u> <u>qaa'mmunra</u> <u>hosa</u> ₂	ABC EF I D GH J	<u>Miscanthus floridulus</u>
478	<u>hai</u> _b <u>saasana</u> _r <u>sa'tari</u> _r	BCDEF HI J A G	<u>Gaultheria mundula</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
211	<u>hi'mminri</u> <u>po'nraunra</u> <u>saaku'nra</u>	ABCD FGHI E J	<u>Pittosporum pullifolium</u>
442	<u>hi'nraana</u> <u>gunggu'fora</u> <u>sana_r</u>	ABCDE H J I FG	<u>Stephania grandiflora</u>
419	<u>hi'ru</u> <u>hon'dai</u> <u>himbu'hiri</u>	ABCDEF H J G I	<u>Ficus adenosperma</u>
345	<u>hogaarira</u> <u>tonere'rera</u> <u>sa'tari_r</u>	AB DEF C HIJ G	<u>Vaccinium keysseri</u>
162	<u>hora'vaira_r</u> <u>bara'waqaa</u> <u>mauna_r</u>	ABC F H- J DE G	<u>Cosmos ?bipinnatus</u>
506	<u>ho'ru</u> <u>waavaa'ri</u> <u>sa'tari_r</u>	ABCDE H J I FG	<u>Rhus taitensis</u>
097	<u>ho'tera</u> <u>heqara'hotera</u> <u>mauna</u>	AB FGH J D I C E	<u>Tritonia x crocosmiflora</u>
194	<u>ho've</u> <u>hovepu'mmaa</u> <u>sa'tari_r</u>	C E AB D FGHIJ	<u>Claoxylon capillipes</u>
418	<u>huva'huva</u> <u>saakoko₂</u> <u>waihara</u>	ABC EF H J D G I	<u>Scleria sp.</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
095	<u>kaa'mo'kura</u> <u>sunravaa'kura</u> <u>mauna</u>	A CDEF HIJ B G	<u>Gunnera macrophylla</u>
223	<u>kaang'gaami</u> <u>hi'nrunru</u> <u>qaa'va</u>	A CDEFG IJ B H	<u>Elatostema integri-</u> <u>folium</u>
015	<u>kim'buenranra</u> <u>naam'bufua'raara</u> <u>nroginrom'be</u>	CDEF HIJ AB G	<u>Begonia</u> sp.
040	<u>kim'buenranra</u> <u>naam'bufua'raara</u> <u>qaa'nrondaara</u>	A DEFGHIJ B C	<u>Begonia</u> sp.
084	<u>kim'buenranra</u> <u>naam'bufua'raara</u> <u>mauna</u>	BC F HI D G J A E	<u>Begonia</u> sp.
091	<u>ki'ringga</u> <u>kaare'vora</u> <u>tonggaga</u>	ABCD EFGHI E J	<u>Riedelia monticola</u>
339	<u>ki'ringga</u> <u>fekwa'so'vainranra</u> <u>faanresa</u> <u>r</u>	A CD FG I B H J E	<u>Riedelia</u> sp.
283	<u>ki'ringga</u> <u>ki'saasa</u> <u>fekwa'so'vainranra</u>	ABCD FG I E H J	<u>Riedelia</u> sp.
093	<u>ko'kopin'daara</u> <u>fo'vasara</u> <u>sa'tari</u>	AB EFGHIJ C D	<u>Melastoma polyantha</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
332	<u>koringga</u> <u>saa'puta</u> <u>muso_r</u>	BCD FGHIJ E A	<u>Ischaemum polystachyum</u>
089	<u>kovu</u> <u>saa'vevana'saara</u> <u>waaki'kora</u>	A CDEFGHI J B	<u>Impatiens hawkeri</u>
318	<u>kovu_r</u> <u>wasai'kovu</u> <u>faarerun'daara</u>	ABC E - D FGH J	<u>Impatiens sp.</u>
186	<u>ku'nraavaga</u> <u>kengge'hura</u> <u>saara_r</u>	C FG IJ B E H A D	<u>Cordyline fruticosa</u>
303	<u>kwaa'te</u> <u>hon'dau</u> <u>faanra'hopo</u>	CDE -J A FG B H	<u>Ficus wassa</u>
131	<u>kwaza'kwaza</u> <u>naa'roruqauqa</u> <u>mauna</u>	A C E HIJ B D FG	<u>Bulbophyllum sp.</u>
005	<u>kwaza'kwaza</u> <u>fing'gungga</u> <u>saa'koko</u>	ABC E GHIJ D F	<u>Liparis sp.</u>
228	<u>kwazakwaza_r</u> <u>hungga'hungga</u> <u>naa'roruqauqa</u>	AB DEF H C G IJ	<u>Liparis sp.</u>
165	<u>matate₂</u> <u>kori</u> <u>noraguarara</u>	AB DE GH-J C F	<u>Solanum tuberosum</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
134	<u>muso₂</u> <u>heru'kwaari</u> <u>gunri</u>	ABCD FGH J E I	<u>Themeda australis</u>
286	<u>mmutate_r</u> <u>fing'gungga</u> <u>muso_r</u>	A C FGHIJ B E D F H	<u>Oplismenus undulati-</u> <u>folius</u>
004	<u>naam'bufua'raara</u> <u>kim'buenranra</u> <u>simmaa'nru</u>	A CDE GHIJ B F	<u>Symbegonia</u> sp.
143	<u>nraavo'nra</u> <u>taatavaa'tira</u> <u>mauna_r</u>	B D A C EFGH-J	<u>Hypericum gramineum</u>
467	<u>nronggaari'aara</u> <u>naam'bufua'raara</u> <u>mauna_r</u>	A -DE HIJ FG B	<u>Elatostema</u> sp.
024	<u>nro'nrorra</u> <u>qu'rauga</u> <u>saaku'nra</u>	ABCDE HIJ F G	<u>Rhododendron multi-</u> <u>nervium</u>
213	<u>nrummuga'maunranra</u> <u>nora'waara</u> <u>so'para'waara</u>	ABCD FG J E HI	<u>Iresine herbstii</u>
414	<u>qogo'mmmnra</u> <u>qaa'vusa</u> <u>sa'tari_r</u>	C E IJ AB D FGH	<u>Solanum verbascifolium</u>
029	<u>po'hinifu'haa</u> <u>tai'nruku</u> <u>mauna</u>	F C AB DE GHIJ	<u>Polygala paniculata</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
500	<u>pom'bomo</u> <u>haarigaanrosa</u> <u>gaanrosa</u> _r	B D HIJ C EFG A	<u>Dicliptera papuana</u>
128	<u>reka'rausara</u> <u>hovepu'mmaa</u> <u>sa'tari</u> _r	C E AB D FGH IJ	<u>Lycianthes</u> sp.
415	<u>ruku</u> <u>pera'rosa</u> <u>fekwa'so'vainranra</u>	ABCD F H J E G I	<u>Alpinia</u> sp.
367	<u>saasa</u> <u>mmaato'nronri</u> <u>mauna</u> _r	E I ABCD FGH J	<u>Sphenomeris chinensis</u>
232	<u>saasa'ko</u> <u>saa'vu</u> <u>mauna</u> _r	C I D AB EFGH J	<u>Youngia japonica</u>
492	<u>saasana</u> _r <u>hai</u> _b <u>sa'tari</u> _r	E H J F ABCD G I	<u>Rhododendron nummatum</u>
477	<u>saasana</u> ₂ <u>hai</u> _b <u>sa'tari</u> _r	C H AB DEFG IJ	<u>Symplocos</u> sp.
167	<u>sai'sova</u> <u>taa'vaaru</u> <u>sa'tari</u> _r	A CDE IJ F B GH	<u>Harpullia</u> c.f. <u>lepto-</u> <u>cocca</u>
063	<u>so'para'waara</u> <u>bara'waagaa</u> <u>mauna</u>	BC FG H J A DE I	<u>Lupinus</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
275	<u>su'raa'rora</u> <u>soko'kora</u> <u>miang'gaira</u>	A D F HI B E G J C	<u>Ipomoea batatas</u>
274	<u>swi'tira</u> <u>qaari'mera</u> <u>raa'haamu'haana</u>	ABCD FG IJ E H	<u>Ipomoea batatas</u>
305	<u>taana'popi</u> <u>kusa'nrunra</u> <u>mauna_r</u>	ABCD F H-J E G	<u>Thelymitra papuana</u>
325	<u>taan'dauna</u> <u>kaandiri₂</u> <u>tove'nra</u>	AB D G IJ C E H F	<u>Hypolepis</u> sp.
172	<u>taatavaa'tira</u> <u>faasa'tiri</u> <u>mauna_r</u>	E J ABCD FGHI	<u>Sciaphila</u> sp.
130	<u>taa'vaaru</u> <u>sai'sova</u> <u>sa'tari_r</u>	ABCDEF HI J G	<u>Phyllanthus flaviflorus</u>
426	<u>te'tara</u> <u>kaa'nrembi</u> <u>qaa'nron'daara</u>	C GHIJ AB D F E	<u>Graptophyllum</u> sp.
439	<u>tondaam'bu</u> <u>hori'ori</u> <u>tu'raatura</u>	CD F I B E G J A H	<u>Saurauia</u> sp.
134	<u>tonggaga</u> <u>ki'ringga</u> <u>ki'saasa</u>	ABCDEFGH J I	<u>Alpinia</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
103	<u>waam'buri</u> <u>pim'baa'sora</u> <u>kim'buenranra</u>	A CDEFGHI B J	<u>Spathoglottis</u> sp.
GROUP 4 -- 4 RESPONSES			
360	<u>qaaru'aa'mmanra</u> <u>hotera_r</u> <u>po'rera</u> <u>mauna_r</u>	F J I ABCDE GH	Unidentified Orchid-
464	<u>qaa'va</u> <u>kaa'rera</u> <u>naam'bufua'raara</u> <u>sa'tari_r</u>	-DE HI G J AB F	<u>Cyrtandra</u> sp.
138	<u>baaru'se</u> <u>ko've</u> <u>naa'rorugauqa</u> <u>mauna_r</u>	C H E AB D FG IJ	<u>Bulbophyllum</u> sp.
037	<u>bim'bira</u> <u>kwaza'kwaza</u> <u>nro'nrorra</u> <u>mauna</u>	D FG G J E AB HI	<u>Epiblastus</u> sp.
222	<u>daa'mera_a</u> <u>fenra₂</u> <u>taatare'vanranra</u> <u>sana_r</u>	A CDE I B H FG J	<u>Alyxia</u> <u>lamii</u>
159	<u>daa'mera_b</u> <u>fekwasatum'bura</u> <u>ta're'rora</u> <u>sa'tari_r</u>	D H C E B A FG -J	<u>Melicope</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
405	<u>da'taa'tara</u> <u>koko'saasira</u> <u>nraanda'mmanra</u> <u>sa'tari</u> _r	BC E HIJ G F A D	<u>Triumfetta c.f. nigri-</u> <u>cans</u>
044	<u>doqa</u> <u>faanra'hina</u> <u>so'vati</u> <u>sana</u>	HI J F ABCDE G	<u>Trigonotis procumbens</u>
199	<u>dusam'baarara</u> <u>mmaqaavu</u> <u>nra'nraang'go'sara</u> <u>foringa</u> _r	ABC E FG H J D I	<u>Spiridens sp.</u>
176	<u>dusam'baarara</u> <u>hi'rera</u> <u>taandara'nruqa</u> <u>foringa</u> _r	C I H AB DEFG J	Unidentified Fungus
122	<u>duvaa'ri</u> <u>hotera</u> _r <u>kaambaara'hotera</u> <u>qora'hotera</u>	BCDEF A GH I J	<u>Dendrobium sp.</u>
362	<u>duvaa'ri</u> <u>hotera</u> _r <u>kaambaara'hotera</u> <u>qora'hotera</u>	A DEF H G B IJ C	<u>Dendrobium sp.</u>
180	<u>faahi'mme'saara</u> <u>mmutate</u> _r <u>mmutate</u> ₂ <u>muso</u> _r	A CD H J B E G I F	<u>Setaria montana</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
373	<u>faanravaa'sera</u> <u>mmaa'hori</u> <u>nraan'dai</u> <u>sa'tari_r</u>	ABCDE J I H FG	<u>Euodia</u> sp.
510	<u>faanravaa'sera</u> <u>ko'kopin'daara</u> <u>mmaa'hori</u> <u>sa'tari_r</u>	AB DE J C I FGH	<u>Evodiella</u> sp.
038	<u>faanraqaahe</u> <u>ka'haara</u> <u>nriqu</u> <u>sa'tari</u>	J C F AB DE GHI	<u>Boerlagiodendron</u> <u>micranthum</u>
087	<u>faa'nresa</u> <u>faanresa₂</u> <u>ki'saasa</u> <u>paata'faanresa</u>	FGHI B CDE J A	<u>Riedelia</u> sp.
209	<u>faasa'tiri</u> <u>to'taga</u> <u>qaati'nenta</u> <u>mauna_r</u>	C F J G A B DE HI	<u>Exocarpus erythrocaulis</u>
490	<u>faita'tera</u> <u>hengga</u> <u>quara'nraa'tora</u> <u>mauna_r</u>	J H I ABCDEFG	<u>Geranium</u> <u>potentilloides</u>
461	<u>fa'vaasa</u> <u>nraamma'nraa'mmanra</u> <u>sara'saandavu</u> <u>sa'tari_r</u>	AB-DE G I H J F	<u>Randia</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
157	<u>feganrammu'nrunra</u> <u>qaa'va</u> <u>qi'rera'i'nitara</u> <u>sa'tari</u> _r	BC EF D J A GH-	<u>Psychotria</u> sp.
204	<u>fi'ng'gungga</u> <u>hungga'hungga</u> <u>mmaqaa'vora</u> <u>mauna</u> _r	J C I AB DEFGH	<u>Ceratostylis</u> <u>scirpoides</u>
060	<u>fonro</u> <u>firifi'rira</u> <u>kun'dimauna</u> <u>mauna</u>	A E IJ C B D FGH	<u>Sida</u> <u>rhombifolia</u>
233	<u>fo'tana</u> <u>mmunrummu'nrukara</u> <u>faita'tera</u> <u>oimun'daara</u>	C EF I A D GH B J	<u>Polygonum</u> <u>barbatum</u>
094	<u>fo'tana</u> <u>mmaata'kusanranra</u> <u>mmunrummu'nrukara</u> <u>mauna</u>	HIJ C A D F B E G	<u>Polygonum</u> <u>minus</u>
116	<u>ga'raa'hora</u> <u>mmutate</u> _r <u>rotu'muso</u> <u>muso</u> _r	BC H J E F A D G I	<u>Eragrostis</u> <u>tenuifolia</u>
155	<u>gena'pora</u> <u>hovepu'mmaa</u> <u>tu'runduwana</u> <u>sa'tari</u> _r	ABCD F - E H G J	<u>Kibara</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
158	<u>gena'pora</u> <u>sai'sova</u> <u>taa'vaaru</u> <u>sa'tari_r</u>	ABC EF - J H D G	<u>Kibara sp.</u>
416	<u>haariqaanrosa</u> <u>faanra'honri</u> <u>pom'bomo</u> <u>wasai'honri</u>	A DEF H G B IJ C	<u>Dicliptera papuana</u>
474	<u>haaquana</u> <u>fo'vasara</u> <u>hi'ru</u> <u>sa'tari_r</u>	A CDE G IJ F H B	<u>Olearia spectabilis</u>
472	<u>hai_p</u> <u>nro'nro_r</u> <u>vindivindi'nraana</u> <u>sa'tari_r</u>	D C G AB EF HIJ	<u>Styphelia suaveolens</u>
514	<u>himbu'hiri</u> <u>sáarisa'mmaahu</u> <u>tua'nrausa</u> <u>sa'tari_r</u>	ABCDE IJ G H F	<u>Syzygium sp.</u>
196	<u>hi'rera</u> <u>mmagaavu</u> <u>taandara'nruqa</u> <u>foringa_r</u>	BC F I G H J A DE	Unidentified Fungus
068	<u>hoha'nrunra</u> <u>faita'tera</u> <u>tai'nruku</u> <u>mauna</u>	HI J C AB DEFG	<u>Mitrasacme pygmaea</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
076	<u>hokwai</u>	F J	<u>Sopubia trifida</u>
	<u>mmaato'nronri</u>	E	
	<u>tepogara</u>	B	
	<u>mauna</u>	A CD GHI	
100	<u>hora'vaira</u>	B F H J	<u>Tagetes ?patula</u>
	<u>hegara'horavaira</u>	I	
	<u>hokirira</u>	E	
	<u>mauna</u> _r	A CD G	
163	<u>horavaira</u> _r	ABC F H-	<u>Cosmos ?bipinnatus</u>
	<u>bara'waagaa</u>	J	
	<u>ga'raa'hora</u>	E	
	<u>mauna</u> _r	D G	
148	<u>horavaira</u> _r	AB F -	<u>Tagetes</u> sp.
	<u>bara'waagaa</u>	H J	
	<u>kun'dimauna</u>	C	
	<u>mauna</u> _r	DE G	
141	<u>hovepu'mmaa</u>	EF H	<u>Rhyticarium novogui-</u>
	<u>saaso'mmaasi</u>	J	<u>neense</u>
	<u>quara'raukondara</u>	I	
	<u>sa'tari</u> _r	ABCD G	
366	<u>huva'huva</u>	BCD J	<u>Carex</u> sp.
	<u>keng'gepu</u>	GH	
	<u>king'gora</u>	EF I	
	<u>muso</u> _r	A	
235	<u>gia'tai'para</u>	AB	<u>Crotalaria linifolia</u>
	<u>nraro'nraa'rora</u>	C I	
	<u>ng'gora'mmaatarera</u>	D	
	<u>mauna</u> _r	EFGH J	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
062	<u>qia'tai'para</u> <u>ko'kopin'daara</u> <u>mmaata'rera</u> <u>mauna</u> _r	B F C H J A DE G I	<u>Osbeckia chinensis</u>
043	<u>qia'tai'para</u> <u>fombaa'ririndaara</u> <u>hoha'nrunra</u> <u>mauna</u>	C J E H AB D FG I	<u>Sagina papuana</u>
257	<u>qia'tai'para</u> <u>hokwai</u> <u>saasa'ko</u> <u>mauna</u> _r	CD H J B F I A E G	<u>Vernonia cinerea</u>
444	<u>qi'rera'nitara</u> <u>kaang'gaami</u> <u>naam'bufua'raara</u> <u>mauna</u> _r	GHIJ C D AB EF	Unidentified Rubiaceae
007	<u>kehura</u> <u>rau'kondara</u> <u>qu'rauqa</u> <u>sana</u>	J G G AB DEF HI	<u>Aeschynanthus</u> sp.
394	<u>keng'gepu</u> <u>king'gora</u> <u>taapi'pira</u> <u>to'zanggi'taira</u>	A E G IJ C F D B H	<u>Cyperus sesquiflorus</u>
368	<u>keng'gepu</u> <u>taatavaa'tira</u> <u>titi'vona</u> <u>mauna</u> _r	H J B A CDEFG I	<u>Smithia sensitiva</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
284	<u>ki'ringga</u> <u>fekwa'so'vainranra</u> <u>kaare'vora</u> <u>ki'saasa</u>	A FGHI BCD E J	<u>Riedelia</u> sp.
356	<u>ki'saasa</u> <u>faanresa_r</u> <u>ki'ringga</u> <u>paata'faanresa</u>	B DEF IJ A H G C	<u>Riedelia</u> sp.
173	<u>kusa'nrunra</u> <u>kwazakwaza_r</u> <u>pim'baa'sora</u> <u>mauna_r</u>	DE C J HI AB FG	<u>Calanthe micrantha</u>
409	<u>kwazakwaza_r</u> <u>kwazakwaza₂</u> <u>hungga'hungga</u> <u>pim'baa'sora</u>	B DEFG I A J C H	<u>Coelogyne</u> sp.
198	<u>kwazakwaza_r</u> <u>naa'rorugauga</u> <u>toti'nron'daara</u> <u>mauna_r</u>	A C F H I DE B G J	<u>Pedilochilus</u> sp.
207	<u>kwazakwaza₂</u> <u>naa'rorugauga</u> <u>saakoko_r</u> <u>mauna_r</u>	ABCDEF J I H G	<u>Liparis</u> sp.
487	<u>mmaqaa'vora</u> <u>bim'bira</u> <u>saa'puta</u> <u>muso_r</u>	AB EFGHI J C D	<u>Anthoxanthum angustum</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
175	<u>mmaqaa'vora</u> <u>mmaqaavu</u> <u>haigonrinra</u> <u>foringa_r</u>	J FG I ABCDE H	<u>Leucobryum</u> sp.
234	<u>mmaqaa'vora</u> <u>mmutate_r</u> <u>rotu'muso</u> <u>waihara</u>	ABCD FG E HI J	<u>Poa saruwagedica</u>
110	<u>mmaata'kusanranra</u> <u>nro'nron'daara</u> <u>tai'nruku</u> <u>mauna_r</u>	E C B A D FGHIJ	<u>Mazus pumilus</u>
231	<u>mmaata'rera</u> <u>naam'bufua'raara</u> <u>guara'nraa'tora</u> <u>mauna_r</u>	J F I ABCDE GH	<u>Ranunculus basilobatus</u>
471	<u>mmaato'nronri</u> <u>faanra'honri</u> <u>mmaatun'durura</u> <u>mauna_r</u>	G I J C E AB D F H	<u>Tetramolopium</u> ?sp. nov.
197	<u>nraammunra'vokara</u> <u>faa'sonra</u> <u>horekakareka'rera</u> <u>sana_r</u>	ABCD E I F H G J	<u>Parsonsia curvisepala</u>
364	<u>nraanda'mmanra</u> <u>haan'dararaa'toga</u> <u>mmaata'kusanranra</u> <u>mauna_r</u>	BCD H J G I A EF	<u>Sigesbeckia orientalis</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
430	<u>nra'nraa'mmai</u> <u>mmanra'mmaqa</u> <u>nronggaari'aara</u> <u>qora'kusanranra</u>	EFGHI B D A J C	<u>Pilea</u> sp.
377	<u>nranra</u> <u>po'rera</u> <u>taunu'sora</u> <u>mauna_r</u>	CD HIJ B E A FG	<u>Cyclosorus</u> sp.
145	<u>ng'gora'mmaatarera</u> <u>faita'tera</u> <u>gia'tai'para</u> <u>mauna_r</u>	AB F -J H C DE G	<u>Wahlenbergia marginata</u>
006	<u>nro'nrora</u> <u>raukondara</u> <u>qu'rauqa</u> <u>sana</u>	G C J AB DEF HI	<u>Aeschynanthus</u> sp.
133	<u>nrugaahisa</u> <u>fa'vaasa</u> <u>foqini</u> <u>hi'riri</u>	ABCDE HI F J G	<u>Glochidion</u> sp.
340	<u>qora'hotera</u> <u>duvaa'ri</u> <u>hotera₂</u> <u>kaambaara'hotera</u>	BC FGHI E J A D	<u>Dendrobium</u> sp.
491	<u>qora'hotera</u> <u>hinga'hinga</u> <u>te'vora</u> <u>mauna_r</u>	E H J C I AB D FG	<u>Glossorhyncha</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
036	<u>gora'kusanranra</u> <u>hengga</u> <u>naam'bufua'raara</u> <u>mauna</u>	FG H J ABCDE I	<u>Cardamine africana</u>
495	<u>gora'kusanranra</u> <u>sauru</u> <u>taa'bana</u> <u>sa'tari_r</u>	H D C AB EFG IJ	<u>Drimys piperita</u> entity <u>coriacea</u>
079	<u>pepin'daara</u> <u>geqau</u> <u>namin'dura</u> <u>sa'tari_r</u>	A C F H J E B D G I	<u>Callicarpa caudata</u>
018	<u>pepin'daara</u> <u>qia'tai'para</u> <u>ko'kopin'daara</u> <u>mauna</u>	C H F A B DE G IJ	<u>Osbeckia chinensis</u>
420	<u>ponda'ro'rira</u> <u>honri₂</u> <u>ku'hora</u> <u>wasai'honri</u>	A C E HI B D J FG	<u>Rungia</u> sp.
115	<u>saa'koko</u> <u>huva'huva</u> <u>king'gora</u> <u>muso_r</u>	B EFGH CD J I A	<u>Carex brownii</u>
047	<u>saa'koko</u> <u>waihara</u> <u>huva'huva</u> <u>so'vati</u>	B D FGHI A C E J	<u>Carex xestogyne</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
086	<u>saa'koko</u> <u>huva'huva</u> <u>taapi'pira</u> <u>waihara</u>	A EFGHI CD J B	<u>Cyperus pedunculatus</u>
121	<u>saakoko_r</u> <u>huva'huva</u> <u>king'gora</u> <u>waihara</u>	AB EFGH CD I J	<u>Carex neoguineensis</u>
359	<u>saasana_r</u> <u>haa'nraavi</u> <u>hai_b</u> <u>sa'tari_r</u>	ABCD J G I E H F	<u>Helicia</u> ?sp. nov.
003	<u>som'bura</u> <u>qaa'herara</u> <u>daa'paaza</u> <u>kovu</u>	A CD J EFG B H I	<u>Impatiens hawkeri</u>
404	<u>sunravaa'kura</u> <u>namin'dura</u> <u>tu'raatura</u> <u>sa'tari_r</u>	A EF H J B D I G C	<u>Buddleia asiatica</u>
268	<u>taa'baaki</u> <u>menggi'rerira</u> <u>mmanra'bau</u> <u>fu'kaa</u>	AB D I C FG H E J	<u>Nicotiana tabacum</u>
421	<u>taa'nrau</u> <u>faanra'vesa</u> <u>min'do</u> <u>mauna_r</u>	BCDEFGH J I A	<u>Belvisia</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
114	<u>taapi'pira</u> <u>keng'gepu=</u> <u>king'gora</u> <u>so'vati</u>	B DE H J FG A I C	<u>Juncus effusus</u>
055	<u>taapi'pira</u> <u>faiga'rora</u> <u>nusa'mauna</u> <u>mauna</u>	G J C B A DEF HI	<u>Ludwigia octovalvis</u>
365	<u>taapi'pira</u> <u>fo'tana</u> <u>tombirira</u> <u>mauna_r</u>	GH J E I ABCD F	<u>Ludwigia octovalvis</u>
386	<u>taa'puga</u> <u>pa'haara</u> <u>po'hinifu'haa</u> <u>mauna_r</u>	C E HIJ A G F B D	<u>Polystichum</u> sp.
249	<u>titi'vona</u> <u>fo'tana</u> <u>taandara'nruqa</u> <u>mauna_r</u>	A C E J F HI B D G	<u>Commelina diffusa</u>
315	<u>tonggaga</u> <u>fekwa'so'vainranra</u> <u>kaare'vora</u> <u>ki'ringga</u>	D FGH- ABC E J	<u>Alpinia</u> sp.
191	<u>qunera₂</u> <u>haaqaavu'vura</u> <u>haa'nraqi'vaigunera</u> <u>paatagunera</u>	BCD G J F HI A E	<u>Rubus moluccanus</u> & <u>Rubus ledermannii</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
034	<u>qu'rauga</u> <u>naa'rorugauqa</u> <u>to'teza</u> <u>sana</u>	CD J E G AB F HI	<u>Aeschynanthus</u> sp.
463	<u>vaa'tegatan'daara</u> <u>kaang'gaami</u> <u>nru'aanrufe'tara</u> <u>sa'tari_r</u>	-DE GHIJ B A F	<u>Chloranthus officinalis</u>
277	<u>waaki'kora</u> <u>faarerun'daara</u> <u>kwauku</u> <u>saa'vevana'saara</u>	BC E GHIJ D A F	<u>Impatiens</u> sp.

GROUP 5 -- 5 RESPONSES

051	<u>gausu'vera</u> <u>faita'tera</u> <u>mmaata'kusanranra</u> <u>quara'nraa'tora</u> <u>mauna</u>	B J G A CDEF HI	<u>Oxalis corniculata</u>
098	<u>bara'waaqaa</u> <u>heqara'horavaira</u> <u>hora'vaira</u> <u>saa'sana</u> <u>mauna</u>	H J I F E ABCD G	<u>Cosmos ?bipinnatus</u>
179	<u>da'taa'tara</u> <u>fesa</u> <u>nraro'nraa'roro</u> <u>taaqon'de</u> <u>mauna_r</u>	E IJ F B D C A GH	<u>Physalis peruviana</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
351	<u>dura</u>	C GHI	<u>Prunus ?pullei</u>
	<u>hai_b</u>	F	
	<u>saasana_r</u>	J	
	<u>taa'ropi'nraana</u>	E	
	<u>sa'tari_r</u>	AB D	
410	<u>faanra'honri</u>	C E I	<u>Lepidagathis</u> sp.
	<u>haariqaanrosa</u>	A H	
	<u>pom'bomo</u>	B J	
	<u>ponda'ro'rira</u>	D	
	<u>mauna_r</u>	FG	
019	<u>faita'tera</u>	CD	<u>Emilia prenanthoidea</u>
	<u>gia'tai'para</u>	B	
	<u>saasa'ko</u>	F J	
	<u>taatavaa'tira</u>	G	
	<u>mauna</u>	A E HI	
099	<u>faita'tera</u>	J	<u>Oxalis corniculata</u>
	<u>fombaa'ririndaara</u>	D	
	<u>kaamma'nru</u>	H	
	<u>nraanda'mmanra</u>	E	
	<u>mauna</u>	ABC FG I	
243	<u>faita'tera</u>	E J	<u>Oxalis corniculata</u>
	<u>furuqora</u>	B	
	<u>hinggi'hora</u>	I	
	<u>nro'nron'daara</u>	C	
	<u>mauna_r</u>	A D FGH	
433	<u>feganrammu'nrunra</u>	ABC E J	<u>Psychotria</u> sp.
	<u>faifu'saato</u>	H	
	<u>paasa'sora</u>	D	
	<u>sara'saandavu</u>	I	
	<u>sa'tari_r</u>	FG	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
473	<u>fe'vaka</u>	J	<u>Rapanea</u> sp.
	<u>hai_b</u>	H	
	<u>hinga'hinga</u>	E	
	<u>saaso'mmaasi</u>	C	
	<u>sa'tari_r</u>	AB D FG I	
171	<u>fing'gungga</u>	A FGH	<u>Phreatia</u> sp.
	<u>hungga'hungga</u>	BC	
	<u>kwazakwaza_r</u>	I	
	<u>te'vora</u>	D J	
	<u>toti'nron'daara</u>	E	
251	<u>fonro</u>	A G	<u>Sida rhombifolia</u>
	<u>butaaqora</u>	C	
	<u>gia'tai'para</u>	J	
	<u>nruqaqora</u>	B	
	<u>mauna_r</u>	DEF HI	
483	<u>fo'vasara</u>	E J	<u>Olearia monticola</u>
	<u>haaquana</u>	H	
	<u>po'ru</u>	C	
	<u>tu'raatura</u>	G	
	<u>sa'tari_r</u>	AB D F I	
438	<u>haaqu'nraanda</u>	A CDE HI	<u>Astronia c.f. papuana</u>
	<u>feganrammu'nrunra</u>	G	
	<u>haang'gari</u>	B	
	<u>kombaari'hora</u>	J	
	<u>sa'tari_r</u>	F	
481	<u>hai_b</u>	DE I	<u>Rhododendron womersleyi</u>
	<u>quara'raukondara</u>	H	
	<u>qu'rauqa</u>	AB J	
	<u>vindivindi'nraana</u>	G	
	<u>sa'tari_r</u>	C F	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
476	<u>hai_b</u> <u>si'mmisa</u> <u>taagon'de</u> <u>taa'rapasarasana</u> <u>sa'tari_r</u>	H C I F AB DE G J	<u>Trochocarpa papuana</u>
127	<u>hau'tunda</u> <u>hongga'nrunra</u> <u>saa'pu</u> <u>waavaa'ri</u> <u>sa'tari_r</u>	D HI C F J E AB G	<u>Pullea glabra</u>
453	<u>hipiri</u> <u>saarisa'mmaahu</u> <u>saasana_r</u> <u>saa'vevatau'taura</u> <u>sa'tari_r</u>	AB-DE I G J H F	<u>Garcinia</u> sp.
382	<u>hivi'hivi</u> <u>kaandiri₂</u> <u>saasa</u> <u>taa'puqa</u> <u>mauna_r</u>	A CDE J B GH I F	<u>Cyclosorus</u> sp.
111	<u>hoha'nrunra</u> <u>mmaata'kusanranra</u> <u>naam'bufua'raara</u> <u>quara'nraa'tora</u> <u>mauna_r</u>	H C F E AB D G IJ	<u>Lysimachia japonica</u>
343	<u>hotera_r</u> <u>fing'gungga</u> <u>hivi'hivi</u> <u>qora'hotera</u> <u>mauna_r</u>	ABC F H J E I D G	<u>Dendrobium</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
503	<u>hotera_r</u> <u>hungga¹hungga</u> <u>kaambaara¹hotera</u> <u>naa¹rorugauqa</u> <u>mauna_r</u>	AB DE C FGH I J	<u>Dendrobium sp.</u>
396	<u>huva¹huva</u> <u>qinring¹gairi</u> <u>ku¹raasa</u> <u>mmaqaa¹vora</u> <u>mmutate_r</u>	D F I C H J G B A E	<u>Leersia hexandra</u>
516	<u>huva¹huva</u> <u>king¹gora</u> <u>so¹vati</u> <u>taapi¹pira</u> <u>waihara</u>	ABCDE I J G F H	<u>Scirpus ternatanus</u>
081	<u>qi¹rerai¹nitara</u> <u>kaang¹gaami</u> <u>mmaanra¹mmaqa</u> <u>naam¹bufua¹raara</u> <u>mauna</u>	GHIJ BC D E A F	<u>Ophiorrhiza ?nervosa</u>
129	<u>qi¹rerai¹nitara</u> <u>ko¹ve</u> <u>naam¹bufua¹raara</u> <u>nronri¹fora</u> <u>mauna_r</u>	H B D J A C EFG I	<u>Trigonotis inoblita</u>
289	<u>gitai¹tora</u> <u>qaaraho¹hondi</u> <u>gaavam¹berora</u> <u>hohondi₂</u> <u>nraavara</u>	C HIJ E A G D F B	<u>Phaseolus vulgaris</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
349	<u>kaambaara'hotera</u> <u>bim'bira</u> <u>duvaa'ri</u> <u>qora'hotera</u> <u>mauna</u> _r	F H J C E D I AB G	Unidentified Orchid- aceae
323	<u>kaandiri</u> ₂ <u>kaa'nraamma</u> <u>taa'puga</u> <u>tove'nra</u> <u>mauna</u> _r	A CD HIJ B E F G	<u>Diplazium</u> sp.
329	<u>king'gora</u> <u>keng'gepu</u> <u>taapi'pira</u> <u>to'zanggi'taira</u> <u>muso</u> _r	C EF HIJ G D B A	<u>Scirpus mucronatus</u>
088	<u>ki'saasa</u> <u>faahifaan'daura</u> <u>faa'nresa</u> <u>kaare'vora</u> <u>ki'ringga</u>	A CDEFG J H I B	<u>Riedelia</u> sp.
028	<u>kun'dimauna</u> <u>haan'dararaa'toga</u> <u>hokirira</u> <u>mmaata'kusanranra</u> <u>mauna</u>	BCD HIJ F E G A	<u>Ageratum conyzoides</u>
288	<u>kwaa'sapara</u> <u>hopiri'pirira</u> <u>nrummyqaanranra</u> <u>qopi'aara</u> <u>sana</u> _r	BC E I H A D FG J	<u>Mikania cordata</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
154	<u>kwazakwaza</u> _r <u>bim'bira</u> <u>hungga'hungga</u> <u>ki'saasa</u> <u>naa'rorugauga</u>	B H-J FG A C D E	<u>Liparis</u> sp.
140	<u>kwazakwaza</u> _r <u>bim'bira</u> <u>hungga'hungga</u> <u>ki'saasa</u> <u>pim'baa'sora</u>	B DE I FG A C J H	<u>Phreatia</u> sp.
482	<u>mmaqaa'vora</u> <u>bim'bira</u> <u>heru'kwaari</u> <u>saakoko</u> _r <u>waihara</u>	ABCD F I J G H E	<u>Danthonia archboldii</u>
059	<u>mmaata'rera</u> <u>ng'gora'mmaatarera</u> <u>nusa'mauna</u> <u>taana'nrunra</u> <u>mauna</u>	F J B H A CDE G I	<u>Polygala japonica</u>
035	<u>mmaato'nronri</u> <u>ku'raara</u> <u>taana'popi</u> <u>waam'buri</u> <u>mauna</u>	C F I J D AB E GH	<u>Corsia</u> sp.
378	<u>min'do</u> <u>faanra'herima</u> <u>nranra</u> <u>taa'nrau</u> <u>mauna</u> _r	D HI J BC G A EF	<u>Selliguea</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
017	<u>ng'gora'mmaatarera</u> <u>faita'tera</u> <u>mmaata'rera</u> <u>saasa'ko</u> <u>mauna</u>	DE H J B I FG C A	<u>Wahlenbergia marginata</u>
144	<u>ng'gora'mmaatarera</u> <u>faanra'honri</u> <u>faita'tera</u> <u>gia'tai'para</u> <u>mauna</u> _r	AB EF -J C H D G	<u>Wahlenbergia marginata</u>
146	<u>ng'gora'mmaatarera</u> <u>faita'tera</u> <u>gia'tai'para</u> <u>saasana</u> _r <u>mauna</u> _r	AB F -J H CD E G	<u>Wahlenbergia marginata</u>
072	<u>punri'haanranra</u> <u>baugera</u> _a <u>da'taa'tara</u> <u>nraammugapu'nraapu'nri</u> <u>tunaa'porana</u>	C FGHJ D E A B	<u>Scaevola oppositifolia</u>
119	<u>saakoko</u> _r <u>king'gora</u> <u>so'vati</u> <u>taapi'pira</u> <u>waihara</u>	A D FGH I. C E J B	<u>Cyperus cyperoides</u>
255	<u>saasa'ko</u> <u>doga</u> _r <u>taata'vaa'tira</u> <u>tai'nruku</u> <u>mauna</u> _r	C F+ J G D AB E H	<u>Emilia prenanthoidea</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
070	<u>saasa'ko</u> <u>taatavaa'tira</u> <u>tai'nruku</u> <u>quaran'doga</u> <u>mauna</u>	C F I B D J A E GH	<u>Youngia japonica</u>
322	<u>taapi'pira</u> <u>bim'bira</u> <u>fo'tana</u> <u>namin'dura</u> <u>mauna</u> _r	B H J E G A CD F I	<u>Ludwigia octovalvis</u>
205	<u>taa'ropasana</u> <u>faaso'nra</u> <u>nrausa'sana</u> <u>saa'vinranra</u> <u>sana</u> _r	A GHI B F CDE J	<u>Parsonsia c.f. wollastonii</u>
291	<u>tonggaqa</u> <u>faanra'vesa</u> <u>fekwa'so'vainranra</u> <u>ki'ringga</u> <u>pu'nranra</u>	E GHI B A J CD F	<u>Riedelia hollandiae</u>
010	<u>quara'raukondara</u> <u>raukon'dara</u> <u>туру'ror</u> <u>quara'mmaanu'vora</u> <u>mauna</u>	B GHI J C D A EF	<u>Aeschynanthus sp.</u>
256	<u>waam'buri</u> <u>kusa'nrunra</u> <u>nonusau'hona</u> <u>pim'baa'sora</u> <u>mauna</u> _r	CD GHI E F B J A	<u>Spathoglottis grandiflora</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
496	<u>waavara</u>	GHIJ	<u>Schefflera</u> sp.
	<u>hura'rora</u>	OD	
	<u>ka'haara</u>	F	
	<u>ku'nrungga</u>	B E	
	<u>go'taara</u>	A	

GROUP 6 -- 6 RESPONSES

136	<u>qaa'va</u>	E H	<u>Cyrtandra</u> sp.
	<u>haanda'rana</u>	B	
	<u>qi'rera'i'nitara</u>	J	
	<u>kaang'gaami</u>	C I	
	<u>kim'buenranra</u>	D	
	<u>sa'tari_r</u>	A FG	
380	<u>bim'bira</u>	D FG J	<u>Epiblastus</u> sp.
	<u>hungga'hungga</u>	C	
	<u>kwazakwaza_r</u>	A E	
	<u>naa'rorugauga</u>	I	
	<u>pairepai'rera</u>	H	
	<u>mauna_r</u>	B	
220	<u>daa'mera_a</u>	I	<u>Embelia</u> sp.
	<u>fe'vaka</u>	J	
	<u>nrummuqaa'nranra</u>	E	
	<u>saasana_r</u>	B	
	<u>sunravaa'kura</u>	C	
	<u>sana_r</u>	A D FGH	
253	<u>da'taa'tara</u>	FGHI	<u>Urena lobata</u>
	<u>firifi'rira</u>	C	
	<u>nra'nraa'mmai</u>	B	
	<u>ng'gora'mmaatarera</u>	D	
	<u>tombirira</u>	E	
	<u>sa'tari_r</u>	A J	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
279	<u>dipaa'sera</u> <u>fekwasatum'bura</u> <u>gwaama'saura</u> <u>hon'dau</u> <u>mwaamun'dera</u> <u>sa'tari</u> _r	B C A G E D F HIJ	<u>Symplocos c.f. lutei-</u> <u>folia</u>
292	<u>don'da</u> <u>faanra'hopo</u> <u>faanraqaahe</u> <u>nriqu</u> <u>quara'raukondara</u> <u>sa'tari</u> _r	F B J G I A CDE H	<u>Boerlagiodendron</u> <u>micranthum</u>
413	<u>duvaa'ri</u> <u>qi'nraangkai'sora</u> <u>kaambaara'hotera</u> <u>naa'roruqauqa</u> <u>naasi'hotera</u> <u>mauna</u> _r	E HI B F C A J D G	<u>Dendrobium</u> sp.
061	<u>faahifaan'daura</u> <u>keng'gepu</u> <u>ng'gora'mmaatarera</u> <u>rugimauna</u> <u>taana'popi</u> <u>muso</u> _r	G J E D B C A F HI	<u>Curculigo orchiodes</u>
160	<u>faahifaan'daura</u> <u>paasa'sora</u> <u>pepin'daara</u> <u>saa'vevatau'taura</u> <u>tu'raatura</u> <u>sa'tari</u> _r	E D C J F AB GH-	<u>Geniostoma arfakense</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
193	<u>feganrammu'nrunra</u> <u>fekwasatum'bura</u> <u>paasa'sora</u> <u>sara'saandavu</u> <u>vaa'teqatan'daara</u> <u>sa'tari</u> _r	B D J C E I H A FG	<u>Psychotria leucococca</u>
300	<u>ling'gungga</u> <u>hinga'hinga</u> <u>hungga'hungga</u> <u>te'vora</u> <u>toti'nron'daara</u> <u>mauna</u> _r	E G C B D H A F -J	<u>Glossorhyncha</u> sp.
290	<u>fo'tana</u> <u>doqa</u> _r <u>kusa'nrunra</u> <u>saivu'kusanranra</u> <u>titi'vona</u> <u>mauna</u> _r	C I J DE B H FG A	<u>Polia macrophylla</u>
169	<u>haang'gari</u> <u>nruqaahisa</u> <u>reka'rausara</u> <u>saa'vevatan'taura</u> <u>sara'saandavu</u> <u>sa'tari</u> _r	F H G C E J I AB D	<u>Conandrium polyanthum</u>
436	<u>haasaru'aara</u> <u>gwaama'saura</u> <u>mwaamun'dera</u> <u>tusa'tara</u> <u>quara'raukondara</u> <u>sa'tari</u> _r	D I A E C H B FG J	<u>Symplocos</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
357	<u>hai_b</u> <u>nro^Tnrora</u> <u>saasana_r</u> <u>si'mmisa</u> <u>taagon'de</u> <u>sa'tari_r</u>	B F C E H J D I A G	<u>Diplycosia morobensis</u>
475	<u>hoqaarira</u> <u>hin'deri</u> <u>kendavara₂</u> <u>nro'nrora</u> <u>tonere'rera</u> <u>sa'tari_r</u>	A E H C D I J B FG	<u>Vaccinium amplifolium</u>
338	<u>huva'huva</u> <u>hinga'hinga</u> <u>nra'nraang'go'sara</u> <u>saakoko_r</u> <u>waam'bu_ri</u> <u>mauna_r</u>	DE J F H G I C AB	<u>Dianella ensifolia</u>
085	<u>gi'reraⁱ'nitara</u> <u>qaa'munda</u> <u>kaang'gaami</u> <u>kim'buenranra</u> <u>saa'sana</u> <u>mauna</u>	GHIJ B A C D E F	<u>Ophiorrhiza ?nervosa</u>
153	<u>gi'reraⁱ'nitara</u> <u>haanda'rana</u> <u>naam'bufua'raara</u> <u>nronri'fora</u> <u>qogo'mmanra</u> <u>mauna_r</u>	FG B D J C A EF -	<u>Ophiorrhiza sp.</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
494	<u>kaambi_r</u> <u>kaambi₂</u> <u>faahifaan'daura</u> <u>hau'tunda</u> <u>to'taga</u> <u>sa'tari_r</u>	I D G A J H BC I EF	<u>Vaccinium stricaule</u>
398	<u>kaa'mmunga</u> <u>gunri</u> <u>ku'raasa</u> <u>mmutate_r</u> <u>rotu'muso</u> <u>muso_r</u>	E H G C J A I B D F	<u>Sporobolus diander</u>
387	<u>kaapi'kara</u> <u>nraammugapu'nraapu'nri</u> <u>nranra</u> <u>po'rera</u> <u>taan'dauna</u> <u>mauna_r</u>	A I D C J B EFGH	<u>Asplenium sp.</u>
258	<u>kengge'hura</u> <u>qi'pura</u> <u>ku'nraavaga</u> <u>kwaari</u> <u>mmequaara</u> <u>saara_r</u>	B F H E G IJ D C A	<u>Cordyline fruticosa</u>
369	<u>keng'gepu</u> <u>faanra'hina</u> <u>king'gora</u> <u>ng'gora'mmaatarera</u> <u>so'vati</u> <u>taapi'pira</u>	A FGH J I D C B E	<u>Juncus effusus</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
346	<u>ki'ringga</u> <u>faanresa</u> _r <u>fekwa'so'vainranra</u> <u>kaare'vora</u> <u>ki'saasa</u> <u>mmondira</u>	A C FGH B J D E I	<u>Riedelia</u> sp.
285	<u>ki'saasa</u> <u>qaa'saura</u> <u>fekwa'so'vainranra</u> <u>ki'ringga</u> <u>paata'faanresa</u> <u>roro'mmunra</u>	DE G J B F I A C H	<u>Riedelia</u> c.f. <u>geluensis</u>
218	<u>kusa'nrunra</u> <u>kwazakwaza</u> _r <u>naa'rorugauga</u> <u>pim'baa'sora</u> <u>waam'buri</u> <u>mauna</u> _r	B DE J G I C H A F	<u>Calanthe</u> <u>micrantha</u>
041	<u>kusa'nrunra</u> <u>bim'bira</u> <u>nonusau'hona</u> <u>pim'baa'sora</u> <u>taana'popi</u> <u>mauna</u> _r	CD J F I B A E GH	<u>Malaxis</u> sp.
195	<u>mmaqaavu</u> <u>dusam'baarara</u> <u>hagaariga</u> <u>haiqonrinra</u> <u>mmaatun'durura</u> <u>foringa</u> _r	FG C H I E AB D J	<u>Dicranoloma</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
293	<u>naam'bufua'raara</u> <u>gaa'nron'daara</u> <u>gautu'samba</u> <u>kim'buenranra</u> <u>nroginrom'be</u> <u>mauna_r</u>	E G J C B I H A D F	<u>Begonia</u> sp.
124	<u>namin'dura</u> <u>hi'nrainra</u> <u>hokirira</u> <u>hokwai</u> <u>qimun'daara</u> <u>mauna_r</u>	ABCD H E F IJ G	<u>Microglossa</u> <u>pyrifolia</u>
074	<u>namin'dura</u> <u>firifi'rira</u> <u>hokwai</u> <u>qia'tai'para</u> <u>saasa'ko</u> <u>mauna_r</u>	C J B F D G I A E H	<u>Vernonia</u> <u>cinerea</u> var. <u>cinerea</u>
361	<u>naa'rorugauqa</u> <u>fe'vaka</u> <u>kaambaara'hotera</u> <u>roro'mmunra</u> <u>te'vora</u> <u>mauna_r</u>	E I J G H CD AB F	Unidentified Orchid- aceae
376	<u>nranra</u> <u>faanra'herima</u> <u>min'do</u> <u>po'rera</u> <u>vindivindi'nraana</u> <u>mauna_r</u>	C G J D H I AB EF	<u>Cyclosorus</u> sp.

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
147	<u>ng'gora'mmaatarera</u> <u>faita'tera</u> <u>gia'tai'para</u> <u>nraa'mmunru</u> <u>saasana</u> _r <u>mauna</u> _r	AB -J H C F E D G	<u>Wahlenbergia marginata</u>
132	<u>paasa'sora</u> <u>feganrammu'nrunra</u> <u>fekwasatum'bura</u> <u>gena'pora</u> <u>sara'saandavu</u> <u>sa'tari</u> _r	DE J C F I AB GH	<u>Psychotria</u> sp.
337	<u>rekarau'sara</u> <u>haandan'dara</u> <u>haaru'aka</u> <u>paasa'sora</u> <u>taagu</u> <u>sa'tari</u> _r	HI J C D B A EFG	<u>Drimys piperita</u> entity <u>heteromera</u>
149	<u>saakoko</u> _r <u>bim'bira</u> <u>hinga'hinga</u> <u>hovirira</u> <u>kwazakwaza</u> _r <u>mauna</u> _r	FG J C B E A D H-	<u>Dianella ensifolia</u>
050	<u>saasa'ko</u> <u>qi'rera'nitara</u> <u>taatavaa'tira</u> <u>tai'nruku</u> <u>quaran'doqa</u> <u>mauna</u>	BC F I G E D J A H	<u>Emilia prenanthoidea</u>

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
052	<u>taatavaa'tira</u> <u>gia'tai'para</u> <u>mmunrummu'nrukara</u> <u>nusa'mauna</u> <u>saa'sana</u> <u>mauna</u>	G J C F B E A D HI	<u>Hypericum gramineum</u>
102	<u>titi'vona</u> <u>doqa</u> <u>fo'tana</u> <u>hinggi'hora</u> <u>taandara'nruqa</u> <u>mauna</u>	B IJ E H C F A D G	<u>Commelina diffusa</u>
395	<u>tugan'daira</u> <u>ga'raa'hora</u> <u>haasa'se'rana</u> <u>keng'gepu</u> <u>mmutate_r</u> <u>muso_r</u>	E I C B H A D FG J	<u>Paspalum longifolium</u>

GROUP 7 -- 7 RESPONSES

407	<u>bara'waagaa</u> <u>kun'dimauna</u> <u>nraro'nraa'rora</u> <u>so'para'waara</u> <u>tain'dega</u> <u>waagoga</u> <u>mauna_r</u>	GH J C I D B A EF	<u>Crotalaria mucronata</u>
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<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
203	<u>bim'bira</u>	C J	<u>Ceratostylis</u> sp.
	<u>fing'gungga</u>	D	
	<u>hungga'hungga</u>	A	
	<u>po'rera</u>	I	
	<u>saakoko_r</u>	F	
	<u>taapi'pira</u>	E H	
	<u>mauna_r</u>	B G	
192	<u>dog_a_r</u>	GHI	<u>Zeuxine</u> sp.
	<u>baarū'se</u>	B	
	<u>kusa'nrunra</u>	C	
	<u>kwazakwaza_r</u>	D	
	<u>nronri'fora</u>	J	
	<u>quaran'doga</u>	E	
	<u>mauna_r</u>	A F	
260	<u>geporom'baara</u>	D	<u>Anisomeles indica</u>
	<u>faanra'honri</u>	C	
	<u>haariqaanrosa</u>	H	
	<u>nraro'nraa'rora</u>	B	
	<u>nrukaangga'vura</u>	J	
	<u>titi'vona</u>	I	
	<u>mauna_r</u>	A EFG	
341	<u>faanra'vesa</u>	BC	<u>Alpinia</u> sp.
	<u>fekwa'so'vainranra</u>	F I	
	<u>ki'ringga</u>	H	
	<u>pu'nranra</u>	E	
	<u>teti'rerira</u>	D	
	<u>tonggaqa</u>	G J	
	<u>mauna_r</u>	A	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
466	<u>faasc'nra</u>	B	<u>Parsonsia</u> sp.
	<u>horekakareka'rera</u>	G	
	<u>mmengonga</u>	E	
	<u>nraammunra'vokara</u>	J	
	<u>taa'ropasana</u>	H	
	<u>taatare'vanranra</u>	I	
	<u>sana_r</u>	A -D F	
170	<u>fe'vaka</u>	J	<u>Mediocalcar</u> sp.
	<u>fing'gungga</u>	D	
	<u>hinga'hinga</u>	C	
	<u>hungga'hungga</u>	E	
	<u>kwazakwaza_r</u>	A	
	<u>naa'roruqauqa</u>	I	
	<u>mauna_r</u>	B FGH	
202	<u>fing'gungga</u>	E H	<u>Bulbophyllum</u> sp.
	<u>bim'bira</u>	F	
	<u>hungga'hungga</u>	C	
	<u>kwazakwaza_r</u>	A	
	<u>naa'roruqauqa</u>	I	
	<u>toti'nron'daara</u>	D	
	<u>mauna_r</u>	B G J	
210	<u>fing'gungga</u>	D F	<u>Phreatia</u> sp.
	<u>hungga'hungga</u>	C	
	<u>kwazakwaza_r</u>	A	
	<u>mmaqaa'vora</u>	J	
	<u>naa'roruqauqa</u>	B I	
	<u>toti'nron'daara</u>	E	
	<u>mauna_r</u>	GH	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
342	<u>haaquana</u>	CDE G	<u>Olearia</u> ? <u>platyphylla</u>
	<u>fausa</u>	J	
	<u>fo'vasara</u>	F	
	<u>haa'nroqa</u>	A	
	<u>kwaan'dorara</u>	H	
	<u>namin'dura</u>	I	
	<u>sa'tari</u> _r	B	
201	<u>hihima</u>	CD	<u>Eugenia</u> sp.
	<u>fa'vaasa</u>	F	
	<u>hi'riri</u>	G	
	<u>saarisa'mmaahu</u>	E	
	<u>taam'bati</u>	IJ	
	<u>tua'nrausa</u>	H	
	<u>sa'tari</u> _r	AB	
280	<u>huru'aari</u>	E	<u>Psychotria</u> <u>leucococca</u>
	<u>kaang'gaami</u>	B	
	<u>paasa'sora</u>	D	
	<u>saasana</u> _r	C	
	<u>saa'vevatau'taura</u>	J	
	<u>sara'saandavu</u>	I	
	<u>sa'tari</u> _r	A FGH	
263	<u>kovu</u> _r	AB D	<u>Impatiens</u> <u>balsamina</u>
	<u>qaa'herara</u>	G I	
	<u>daa'paaza</u>	F	
	<u>faasa'sombura</u>	H	
	<u>qora'kusanranra</u>	C	
	<u>saa'vevana'saara</u>	E	
	<u>sombura</u> _r	J	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
301	<u>kovu_r</u> <u>qaa'herara</u> <u>daa'paaza</u> <u>faasa'sombura</u> <u>sombura_r</u> <u>waaki'kora</u> <u>mauna_r</u>	AB PG E H F J C D -	<u>Impatiens</u> sp.
092	<u>kwaza'kwaza</u> <u>haaqiora</u> <u>hengga</u> <u>ho'tera</u> <u>saa'koko</u> <u>saasa'ko</u> <u>mauna</u>	BC J I H G F D A E	<u>Dianella ensifolia</u>
326	<u>mmaqaa'vora</u> <u>faahi'mme'saara</u> <u>gunri</u> <u>kaa'mmunga</u> <u>ko'ringga</u> <u>so'vati</u> <u>muso_r</u>	BC F J I G E D H A	<u>Garnotia mezii</u>
178	<u>tai'nruku</u> <u>fo'tana</u> <u>hopiri'pirira</u> <u>mmaata'rera</u> <u>nrukaangga'vura</u> <u>quara'nraa'tora</u> <u>mauna_r</u>	C H I E F B J A D G	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
391	<u>to'taga</u>	BC	<u>Vaccinium</u> sp.
	<u>hoqaarira</u>	D	
	<u>kaambi</u> ₂	J	
	<u>kendavara</u> ₂	F	
	<u>nro'nrra</u>	E	
	<u>tonere'rera</u>	HI	
	<u>sa'tari</u> _r	A G	
336	<u>to'teza</u>	F HI	<u>Drimys piperita</u> entity
	<u>geqiaam'bora</u>	E	<u>heteromera</u>
	<u>haandan'dara</u>	J	
	<u>haaru'aka</u>	C	
	<u>reka'rausara</u>	G	
	<u>taaqu</u>	B	
	<u>sa'tari</u> _r	A D	

GROUP 8 -- 8 RESPONSES

445	<u>gwaama'saura</u>	A E	<u>Symplocos</u> sp.
	<u>haataa'vu</u>	H	
	<u>haau'nraanda</u>	D	
	<u>kwaavu</u>	B	
	<u>saa'veva</u>	J	
	<u>taaqu</u>	I	
	<u>vaateza'hukwanranra</u>	C	
	<u>sa'tari</u> _r	FG	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
126	<u>hi'riri</u>	GH J	<u>Eugenia</u> sp.
	<u>fa'vaasa</u>	F	
	<u>hau'tunda</u>	A	
	<u>hihima</u>	C	
	<u>nruqaahisa</u>	I	
	<u>quara'raukondara</u>	D	
	<u>waa'vari</u>	B	
	<u>sa'tari</u> _r	E	
071	<u>hokwai</u>	F	<u>Blumea</u> <u>lacera</u>
	<u>gia'tai'para</u>	C	
	<u>koko'saasira</u>	E	
	<u>maandundin'dira</u>	B	
	<u>namin'dura</u>	J	
	<u>ng'gora'mmaatarera</u>	D	
	<u>tepogara</u>	I	
	<u>mauna</u>	A GH	
358	<u>horera'nraavura</u>	A D	<u>Elaeocarpus</u> <u>crenulatus</u>
	<u>geqiaam'bora</u>	E	
	<u>faari'vura</u>	F	
	<u>fausa</u>	I	
	<u>haandan'dara</u>	J	
	<u>hau'tunda</u>	H	
	<u>vaateza'hukwanranra</u>	C	
	<u>sa'tari</u> _r	B G	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
183	<u>keng'gepu</u>	GH	<u>Fimbristylis dichotoma</u>
	<u>huva'huva</u>	C	
	<u>king'gora</u>	F	
	<u>muavu'rana</u>	D	
	<u>so'vati</u>	J	
	<u>taapi'pira</u>	E	
	<u>tugan'daira</u>	I	
	<u>muso_r</u>	AB	
054	<u>tai'nruku</u>	C G	<u>Viola arcuata</u>
	<u>haaqiora</u>	I	
	<u>hopiri'pirira</u>	E	
	<u>nraa'mmunru</u>	F	
	<u>naasagura</u>	H	
	<u>simmaa'nru</u>	B	
	<u>quara'nraa'tora</u>	J	
	<u>mauna</u>	A D	

GROUP 9 -- 9 RESPONSES

321	<u>huva'huva</u>	BC	<u>Cyperus pilosus</u>
	<u>keng'gepu</u>	I	
	<u>king'gora</u>	E	
	<u>saakoko_r</u>	F	
	<u>saakoko₂</u>	D	
	<u>so'vati</u>	J	
	<u>taapi'pira</u>	G	
	<u>to'zanggi'taira</u>	H	
	<u>muso_r</u>	A	

<u>Coll.</u>	<u>Plant Name</u>	<u>Informants</u>	<u>Determination</u>
352	<u>saa'va</u>	A C	<u>Caldcluvia brassii</u>
	<u>qaa'va</u>	I	
	<u>faa'paza</u>	G	
	<u>fo'vasara</u>	H	
	<u>kaambo'ho</u>	D	
	<u>kun'dimauna</u>	J	
	<u>po'ru</u>	E	
	<u>saa'mmota</u>	B	
	<u>sa'tari</u> _r	F	

GROUP 10 -- 10 RESPONSES

NONE

RECAPITULATION

<u>Number of Distinct Responses</u>	<u>Number of Collections</u>
GROUP 1 -- 1 RESPONSE ONLY	136
GROUP 2 -- 2 RESPONSES	86
GROUP 3 -- 3 RESPONSES	81
GROUP 4 -- 4 RESPONSES	93
GROUP 5 -- 5 RESPONSES	52
GROUP 6 -- 6 RESPONSES	42
GROUP 7 -- 7 RESPONSES	19
GROUP 8 -- 8 RESPONSES	6
GROUP 9 -- 9 RESPONSES	2
GROUP 10 -- 10 RESPONSES	0
TOTAL	517

APPENDIX 5 IDENTIFICATION FILE

The data presented below relate to the 504 conceptually distinct naming responses which occurred among 5,104 informant applications of labels to 517 plant collections. In this appendix I assume that in the early cases of the uses of polysemous expressions the residual sense of the terms was meant and have so combined such responses as "mauna" and "mauna_r", leaving a total of 488 plant names which are listed here.

The plant names are listed alphabetically in the extreme left-hand column. In the second column appear the collection numbers for which each expression occurred as a naming response, followed by the identification letters of the informant(s) who gave the response in question. Finally, in the extreme right-hand column are listed the scientific determinations of the collections, alphabetized by genus within any particular group of instances of the occurrence of a name. This last column, then, reflects the range of empirical referents for each plant name, although of course it can only represent the range as it was manifested by the necessarily incomplete plant collections. Thus it might be the case that additional species or even genera of plants would have been included in referential ranges of terms had those plants been collected.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>qaa'herara</u>	263	G I	<u>Impatiens</u> <u>balsamina</u>
	002	BC GHI	<u>Impatiens</u> <u>hawkeri</u>
	003	EFG	<u>Impatiens</u> <u>hawkeri</u>
	011	C FGH	<u>Impatiens</u> <u>hawkeri</u>
	188	ABC EFGHI	<u>Impatiens</u> sp.
	301	G	<u>Impatiens</u> sp.
<u>qaahisa</u>	113	ABCDEFGHJIJ	<u>Pennisetum</u> <u>macro-</u> <u>stachyum</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>qaa'mmunra</u>	427	I	<u>Miscanthus floridulus</u>
<u>qaa'munda</u>	085	B	<u>Ophiorrhiza ?nervosa</u>
<u>qaan'dosa</u>	462	AB-DEFGHIJ	<u>Galbulimima belgrave-</u> <u>ana</u>
<u>qaa'nrempa</u>	215	ABCDEFGHJIJ	<u>Casuarina oligodon</u>
<u>qaa'nron'daara</u>	040	C	<u>Begonia</u> sp.
	293	C	<u>Begonia</u> sp.
	426	E	<u>Graptophyllum</u> sp.
<u>qaanrosa_r</u>	500	A	<u>Dicliptera papuana</u>
<u>qaaraho'hondi</u>	289	E	<u>Phaseolus vulgaris</u>
<u>qaari'mera</u>	248	ABCDEFGHJIJ	<u>Ipomoea batatas</u>
	271	BCD FG IJ	<u>Ipomoea batatas</u>
	274	E	<u>Ipomoea batatas</u>
<u>qaa'ririra</u>	271	A E	<u>Ipomoea batatas</u>
<u>qaaru'aa'mmanra</u>	360	F	Unident. Orchidaceae
<u>qaa'saura</u>	285	B	<u>Riedelia c.f. geluens-</u> <u>is</u>
<u>qaa'va</u>	352	I	<u>Caldcluvia brassii</u>
	136	E H	<u>Cyrtandra</u> sp.
	464	DE HI	<u>Cyrtandra</u> sp.
	223	H	<u>Elatostema integri-</u> <u>folium</u>
	157	D	<u>Psychotria</u> sp.
<u>qaavam'berora</u>	289	A G	<u>Phaseolus vulgaris</u>
<u>qaa'yusa</u>	414	IJ	<u>Solanum verbascifolium</u>
<u>qaitape</u>	311	ABCD F H-J	<u>Melinis minutiflora</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>gausu'vera</u>	051	B	<u>Oxalis corniculata</u>
<u>gautu'samba</u>	293	B	<u>Begonia</u> sp.
<u>baaru'se</u>	334	ABCD	<u>Begonia</u> sp.
	138	C	<u>Bulbophyllum</u> sp.
	192	B	<u>Zeuxine</u> sp.
<u>bara'waaqaa</u>	098	H J	<u>Cosmos</u> ? <u>bipinnatus</u>
	162	J	<u>Cosmos</u> ? <u>bipinnatus</u>
	163	J	<u>Cosmos</u> ? <u>bipinnatus</u>
	407	GH J	<u>Crotalaria mucronata</u>
	166	A H J	<u>Crotalaria semper-</u> <u>florens</u>
	063	H J	<u>Lupinus</u> sp.
	148	H J	<u>Tagetes</u> sp.
	066	A C E GH J	<u>Tephrosia vogelii</u>
<u>baugera_a</u>	142	ABCD GHIJ	<u>Palmeria</u> c.f. <u>fengeri-</u> <u>ana</u>
	189	ABCDE GHIJ	<u>Palmeria fengeriana</u>
	072	D	<u>Scaevola oppositifolia</u>
<u>bim'bira</u>	487	J	<u>Anthoxanthum angustum</u>
	202	F	<u>Bulbophyllum</u> sp.
	203	C J	<u>Ceratostylis</u> sp.
	482	J	<u>Danthonia archboldii</u>
	400	ABCD FGHIJ	<u>Dendrobium</u> sp.
	149	J	<u>Dianella ensifolia</u>
	037	D FG	<u>Epiblastus</u> sp.
	380	D FG J	<u>Epiblastus</u> sp.
	154	FG	<u>Liparis</u> sp.
	322	J	<u>Ludwigia octovalvis</u>
	041	J	<u>Malaxis</u> sp.
	140	FG	<u>Phreatia</u> sp.
	349	C	Unident. Orchidaceae
	353	D J	Unident. Orchidaceae

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>butaagora</u>	251	C	<u>Sida rhombifolia</u>
<u>bwaarihaa_r</u>	371	G J	<u>Cyathea</u> sp.
<u>daa'mera_a</u>	222	A CDE I	<u>Alyxia lamii</u>
	220	I	<u>Embelia</u> sp.
<u>daa'mera_b</u>	159	D H	<u>Melicope</u> sp.
<u>daa'paaza</u>	263	F	<u>Impatiens balsamina</u>
	002	A DEF	<u>Impatiens hawkeri</u>
	003	B H	<u>Impatiens hawkeri</u>
	188	D	<u>Impatiens</u> sp.
	301	E	<u>Impatiens</u> sp.
<u>da'taa'tara</u>	179	E IJ	<u>Physalis peruviana</u>
	072	E	<u>Scaevola oppositifolia</u>
	405	BC E HIJ	<u>Triumfetta</u> c.f. <u>nigricans</u>
	151	ABCDEFGH-J	<u>Triumfetta nigricans</u>
	254	BC E IJ	<u>Triumfetta pilosa</u>
	253	FGHI	<u>Urena lobata</u>
	310	ABCDEFGH-J	Unident. shrub
<u>dau'vora</u>	399	ABCDEFGH IJ	<u>Macaranga pleioneura</u>
<u>dipaa'sera</u>	279	B	<u>Symplocos</u> c.f. <u>luteifolia</u>
<u>doga & dogas_r</u>	102	E	<u>Commelina diffusa</u>
	255	J	<u>Emilia prenanthoidea</u>
	290	J	<u>Polia macrophylla</u>
	044	HI	<u>Trigonotis procumbens</u>
	192	GHI	<u>Zeuxine</u> sp.
<u>doga₂</u>	499	AB DEF HIJ	<u>Cyanotis</u> sp.
<u>don'da</u>	292	F	<u>Boerlagiodendron micranthum</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>dura</u>	200	ABCDE GHI	<u>Ficus camptandra</u>
	137	ABCDE HI	<u>Ficus</u> sp.
	351	C GHI	<u>Prunus ?pullei</u>
<u>dusam'baarara</u>	195	C	<u>Dicranoloma</u> sp.
	199	ABC E	<u>Spiridens</u> sp.
	176	C	Unident. Fungus
<u>duvaa'ri</u>	122	BCDEF	<u>Dendrobium</u> sp.
	340	E J	<u>Dendrobium</u> sp.
	362	A DEF H	<u>Dendrobium</u> sp.
	413	E HI	<u>Dendrobium</u> sp.
	349	E	Unident. Orchidaceae
<u>qegan</u>	079	E	<u>Callicarpa caudata</u>
	142	E	<u>Palmeria</u> c.f. <u>fengeriana</u>
<u>qeqiaam'bora</u>	336	E	<u>Drimys piperita</u> entity <u>heteromera</u>
	358	E	<u>Elaeocarpus crenulatus</u>
<u>geporom'baara</u>	260	D	<u>Anisomeles indica</u>
<u>faahifaan'daura</u>	061	G J	<u>Curculigo orchioides</u>
	230	A FGHIJ	<u>Eugenia</u> sp.
	160	E	<u>Geniostoma arfakense</u>
	038	J	<u>Riedelia</u> sp.
	494	J	<u>Vaccinium stricaule</u>
<u>faahi'mme'saara</u>	326	I	<u>Garnotia mezii</u>
	075	ABCD HIJ	<u>Sacciolepis indica</u>
	180	A CD H J	<u>Setaria montana</u>
	252	ABCD HIJ	<u>Setaria montana</u>
<u>faanra'hopo</u>	292	B	<u>Boerlagiodendron</u> <u>micranthum</u>
	303	B H	<u>Ficus wassa</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>faanra'herima</u>	376	J	<u>Cyclosorus</u> sp.
	378	J	<u>Selliguea</u> sp.
<u>faanra'hina</u>	369	J	<u>Juncus effusus</u>
	044	J	<u>Trigonotis procumbens</u>
<u>faanra'honri</u>	260	C	<u>Anisomeles indica</u>
	416	G	<u>Dicliptera papuana</u>
	410	C E I	<u>Lepidagathis</u> sp.
	471	J	<u>Tetramolopium</u> ?sp. nov.
	144	C	<u>Wahlenbergia marginata</u>
<u>faanrau</u> ₂	451	AB-DEFGHIJ	<u>Trichosanthes tri-</u> <u>cuspidata</u>
<u>faanravaa'sera</u>	373	ABCDE J	<u>Euodia</u> sp.
	510	AB DE J	<u>Evodiella</u> sp.
<u>faanra'vesa</u>	287	ABCDEFGHJIJ	<u>Alpinia pulchra</u>
	341	BC	<u>Alpinia</u> sp.
	327	ABCDEFGHJIJ	? <u>Alpinia</u> sp.
	421	J	<u>Belvisia</u> sp.
	291	B	<u>Riedelia hollandiae</u>
<u>faanraqaaha</u>	038	J	<u>Boerlagiodendron</u> <u>micranthum</u>
	292	J	<u>Boerlagiodendron</u> <u>micranthum</u>
<u>faanresa</u> & <u>faanresa</u> _r	023	A CD F H	<u>Riedelia</u> sp.
	087	FGHI	<u>Riedelia</u> sp.
	088	H	<u>Riedelia</u> sp.
	339	E	<u>Riedelia</u> sp.
	346	B	<u>Riedelia</u> sp.
	356	A H	<u>Riedelia</u> sp.
<u>faanresa</u> ₂	087	B	<u>Riedelia</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>faa'paza</u>	352	G	<u>Caldcluvia brassii</u>
<u>faa'rera</u>	411	ABCDEFGHJ	<u>Mucuna ?stanleyi</u>
<u>faarerun'daara</u>	032	BC EFGHIJ	<u>Impatiens hawkeri</u>
	250	AB EFGHIJ	<u>Impatiens</u> sp.
	277	D	<u>Impatiens</u> sp.
	318	J	<u>Impatiens</u> sp.
<u>faari'vura</u>	358	F	<u>Elaeocarpus crenulatus</u>
<u>faasa'sombura</u>	263	H	<u>Impatiens balsamina</u>
	301	H	<u>Impatiens</u> sp.
<u>faasa'tiri</u>	209	C F J	<u>Exocarpus erythro-</u> <u>caulis</u>
	298	ABCDEFGHJ	<u>Mitrastemon yamamotoi</u>
	172	J	<u>Sciaphila</u> sp.
<u>faaso'nra</u>	197	E I	<u>Parsonsia curvisepala</u>
	205	B	<u>Parsonsia</u> c.f. <u>wolla-</u> <u>stonii</u>
	466	B	<u>Parsonsia</u> sp.
<u>faiga'rora</u>	055	C	<u>Ludwigia octovalvis</u>
<u>faifu'saato</u>	433	H	<u>Psychotria</u> sp.
<u>fai'kaapi</u>	393	ABC H	<u>Gurcuma longa</u>
<u>faita'tera</u>	019	CD	<u>Emilia prenanthoidea</u>
	490	J	<u>Geranium potentilloi-</u> <u>des</u>
	068	J	<u>Mitrasacme pygmaea</u>
	051	J	<u>Oxalis corniculata</u>
	099	J	<u>Oxalis corniculata</u>
	243	E J	<u>Oxalis corniculata</u>
	233	B	<u>Polygonum barbatum</u>
	017	B I	<u>Wahlenbergia marginata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>faita'tera</u> (cont'd)	144	H	<u>Wahlenbergia marginata</u>
	145	H	<u>Wahlenbergia marginata</u>
	146	H	<u>Wahlenbergia marginata</u>
	147	H	<u>Wahlenbergia marginata</u>
<u>fausa</u>	358	I	<u>Elaeocarpus crenulatus</u>
	342	J	<u>Olearia ?platyphylla</u>
<u>fa'vaasa</u>	126	F	<u>Eugenia</u> sp.
	201	F	<u>Eugenia</u> sp.
	133	F	<u>Glochidion</u> sp.
	461	AB-DE G I	<u>Randia</u> sp.
<u>feganrammu'nrunra</u>	438	G	<u>Astronia</u> c.f. <u>papua</u>
	432	A CDEFGHI	<u>Medinilla</u> sp.
	193	B D J	<u>Psychotria leucococca</u>
	132	J	<u>Psychotria</u> sp.
	157	BC EF	<u>Psychotria</u> sp.
	433	ABC E J	<u>Psychotria</u> sp.
<u>fekwasatum'bura</u>	159	C E	<u>Melicope</u> sp.
	193	C	<u>Psychotria leucococca</u>
	132	C	<u>Psychotria</u> sp.
	279	C	<u>Symplocos</u> c.f. <u>lutei-</u> <u>folia</u>
<u>fekwa'so'vainranra</u>	315	ABC	<u>Alpinia</u> sp.
	341	F I	<u>Alpinia</u> sp.
	415	I	<u>Alpinia</u> sp.
	285	F	<u>Riedelia</u> c.f. <u>geluens-</u> <u>is</u>
	291	A	<u>Riedelia hollandiae</u>
	283	H J	<u>Riedelia</u> sp.
	284	BCD	<u>Riedelia</u> sp.
	339	B H J	<u>Riedelia</u> sp.
	346	J	<u>Riedelia</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>fenra</u> ₂	222	B	<u>Alyxia lamii</u>
	120	A CDEFGHIJ	<u>Gleichenia c.f. erecta</u>
<u>feri'mmaagunrunra</u>	507	ABCDEF HIJ	<u>Poikilogyne sp.</u>
<u>fesa</u>	179	F	<u>Physalis peruviana</u>
	090	ABCDEF G IJ	<u>Solanum nigrum</u>
<u>fe'vaka</u>	334	EFGHI	<u>Begonia sp.</u>
	220	J	<u>Embelia sp.</u>
	170	J	<u>Mediocalcar sp.</u>
	473	J	<u>Rapanea sp.</u>
	361	J	Unident. Orchidaceae
<u>fifiqori</u>	317	D G	<u>Themeda intermedia</u>
<u>figiaaru</u>	403	ABCDEF GHIJ	<u>Acalypha sp.</u>
<u>fing'gungga</u>	202	E H	<u>Bulbophyllum sp.</u>
	204	J	<u>Ceratostylis scir-</u> <u>poides</u>
	203	D	<u>Ceratostylis sp.</u>
	224	ABCDEF GHIJ	<u>Dendrobium sp.</u>
	308	ABCDEF GH-J	<u>Dendrobium sp.</u>
	343	E	<u>Dendrobium sp.</u>
	206	A C F GHIJ	<u>Glossorhyncha sp.</u>
	300	E G	<u>Glossorhyncha sp.</u>
	005	D	<u>Liparis sp.</u>
	170	D	<u>Mediocalcar sp.</u>
	286	B E	<u>Oplismenus undulati-</u> <u>folius</u>
	171	A FGH	<u>Phreatia sp.</u>
	210	D F	<u>Phreatia sp.</u>
	353	B F	Unident. Orchidaceae
	060	C	<u>Sida rhombifolia</u>
	253	C	<u>Urena lobata</u>
	074	B	<u>Vernonia cinerea</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>fogini</u>	133	J	<u>Glochidion</u> sp.
<u>fombaa'ririndaara</u>	099	D	<u>Oxalis corniculata</u>
	043	E	<u>Sagina papuana</u>
<u>fong'gora</u>	456	AB D	<u>Dioscorea</u> sp.
<u>fonro</u>	060	A E IJ	<u>Sida rhombifolia</u>
	251	A G	<u>Sida rhombifolia</u>
<u>foringa & foringa_r</u>	195	AB D J	<u>Dicranoloma</u> sp.
	175	ABCDE H	<u>Leucobryum</u> sp.
	199	D I	<u>Spiridens</u> sp.
	096	EF	<u>Usnea</u> sp.
	176	AB DEFG J	Unident. Fungus
	196	A DE	Unident. Fungus
<u>fo'tana</u>	102	H	<u>Commelina diffusa</u>
	249	F HI	<u>Commelina diffusa</u>
	370	I	<u>Lindernia anagallis</u>
	322	E	<u>Ludwigia octovalvis</u>
	365	E	<u>Ludwigia octovalvis</u>
	290	C I	<u>Pollia macrophylla</u>
	233	C EF I	<u>Polygonum barbatum</u>
	094	HIJ	<u>Polygonum minus</u>
	178	I	<u>Viola arcuata</u>
<u>fo'vasara</u>	352	H	<u>Caldcluvia brassii</u>
	093	C	<u>Melastoma polyantha</u>
	483	E J	<u>Olearia monticola</u>
	342	F	<u>Olearia ?platyphylla</u>
	474	F	<u>Olearia spectabilis</u>
	502	ABCDEF HIJ	<u>Saurauia</u> sp.
<u>fu'kaa</u>	268	E J	<u>Nicotiana tabacum</u>
<u>furi</u>	278	ABCDEFGH IJ	<u>Cucurbita pepo</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>furugora</u>	243	B	<u>Oxalis corniculata</u>
<u>gaa'mmanra</u>	401	ABCDEFGH IJ	<u>Omalanthus novogui-</u> <u>neensis</u>
<u>ga'raa'hora</u>	163	E	<u>Cosmos ?bipinnatus</u>
	116	BC H J	<u>Eragrostis tenuifolia</u>
	395	C	<u>Paspalum longifolium</u>
<u>gena'pora</u>	155	ABCD F	<u>Kibara</u> sp.
	158	ABC EF	<u>Kibara</u> sp.
	132	F	<u>Psychotria</u> sp.
<u>gunggu'fora</u>	442	I	<u>Stephania grandiflora</u>
<u>gunri</u>	326	G	<u>Garnotia mezii</u>
	398	G	<u>Sporobolus diander</u>
	184	I	<u>Themeda australis</u>
<u>gwaama'saura</u>	279	A	<u>Symplocos c.f. lutei-</u> <u>folia</u>
	436	A	<u>Symplocos</u> sp.
	445	A E	<u>Symplocos</u> sp.
<u>gwaara</u>	108	ABCDEFGH IJ	<u>Macoutia</u> sp.
<u>haqaariga</u>	195	H	<u>Dicranoloma</u> sp.
<u>haaqaavu'vura</u>	191	F HI	<u>Rubus ledermannii</u> & <u>Rubus moluccanus</u>
	049	HI	<u>Rubus</u> sp.
<u>haaqiora</u>	092	I	<u>Dianella ensifolia</u>
	054	I	<u>Viola arcuata</u>
<u>haa'nraavi</u>	359	G I	<u>Helicia</u> ?sp. nov.
<u>haa'nraqi'vaigu'nera</u>	191	A	<u>Rubus ledermannii</u> & <u>Rubus moluccanus</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>haandan'dara</u>	336	J	<u>Drimys piperita</u> entity <u>heteromera</u>
	337	J	<u>Drimys piperita</u> entity <u>heteromera</u>
	358	J	<u>Elaeocarpus crenulatus</u>
<u>haanda'rana</u>	136	B	<u>Cyrtandra</u> sp.
	153	B	<u>Ophiorrhiza</u> sp.
<u>haan'dararaa'toga</u>	028	F	<u>Ageratum conyzoides</u>
	364	H J	<u>Sigesbeckia orientalis</u>
<u>haan'davi</u>	388	ABCDEFGH IJ	<u>Myristica womersleyi</u>
<u>haan'depi</u>	271	H	<u>Ipomoea batatas</u>
<u>haang'gari</u>	438	B	<u>Astronia</u> c.f. <u>papuana</u>
	169	F H	<u>Conandrium polyanthum</u>
<u>haang'gora</u>	272	ABCDEFGH IJ	<u>Coleus scutellarioides</u>
	276	ABCDEFGH IJ	<u>Coleus scutellarioides</u>
	296	A CDEFGH IJ	<u>Coleus scutellarioides</u>
<u>haa'nroga</u>	342	A	<u>Clearea</u> ? <u>platyphylla</u>
<u>haa'rai</u>	468	AB-D FGHI	<u>Lithocarpus</u> c.f. <u>rufo-villosus</u>
<u>haarigaanrosa</u>	260	H	<u>Anisomeles indica</u>
	416	A DEF H	<u>Dicliptera papuana</u>
	500	C EFG	<u>Dicliptera papuana</u>
	410	A H	<u>Lepidagathis</u> sp.
<u>haari'sora</u>	505	AB DEFGHI	<u>Derris</u> sp.
<u>haaru'aka</u>	336	C	<u>Drimys piperita</u> entity <u>heteromera</u>
	337	C	<u>Drimys piperita</u> entity <u>heteromera</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>haaru've'sora</u>	161	ABCDEFGH-J	<u>Schuurmansia hennings-</u> <u>ii</u>
	187	ABCDEFGH-IJ	<u>Schuurmansia hennings-</u> <u>ii</u>
	299	ABCDEFGH-J	<u>Schuurmansia hennings-</u> <u>ii</u>
<u>haasa'pu</u>	427	ABC EF	<u>Miscanthus floridulus</u>
<u>haasaru'aara</u>	436	D I	<u>Symplocos</u> sp.
<u>haasa'se'rana</u>	395	B	<u>Paspalum longifolium</u>
<u>haataa'vu</u>	445	H	<u>Symplocos</u> sp.
<u>haaquana</u>	483	H	<u>Olearia monticola</u>
	342	CDE G	<u>Olearia ?platyphylla</u>
	474	A CDE G IJ	<u>Olearia spectabilis</u>
<u>haaqu'nraanda</u>	438	A CDE HI	<u>Astronia c.f. papuana</u>
	445	D	<u>Symplocos</u> sp.
<u>haava'risa</u>	425	ABCDEFGH-IJ	<u>Dendrobium</u> sp.
<u>hai_b</u>	357	B F	<u>Diplycosia morobensis</u>
	478	BCDEF HI	<u>Gaultheria mundula</u>
	359	E H	<u>Helicia</u> ?sp. nov.
	351	F	<u>Prunus ?pullei</u>
	473	H	<u>Rapanea</u> sp.
	492	F	<u>Rhododnedron nummatum</u>
	481	DE I	<u>Rhododendron womers-</u> <u>leyi</u>
	472	D	<u>Styphelia suaveolens</u>
	477	H	<u>Symplocos</u> sp.
	476	H	<u>Trochocarpa papuana</u>
<u>haigonrinra</u>	195	I	<u>Dicranoloma</u> sp.
	175	I	<u>Leucobryum</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>hang'gaamung'gora</u>	457	AB-DEFGHIJ	<u>Hornstedtia</u> sp.
<u>hau'tunda</u>	358	H	<u>Elaeocarpus</u> <u>crenulatus</u>
	126	A	<u>Eugenia</u> sp.
	127	D HI	<u>Pullea</u> <u>glabra</u>
	494	H	<u>Vaccinium</u> <u>striicaule</u>
<u>hegara'horavaira</u>	098	I	<u>Cosmos</u> ? <u>bipinnatus</u>
	100	I	<u>Tagetes</u> ? <u>patula</u>
<u>hegara'hotera</u>	097	D I	<u>Tritonia</u> x <u>crocsmi-</u> <u>flora</u>
<u>hengga</u>	036	H	<u>Cardamine</u> <u>africana</u>
	092	H	<u>Dianella</u> <u>ensifolia</u>
	490	H	<u>Geranium</u> <u>potentill-</u> <u>oides</u>
	383	E	<u>Nasturtium</u> sp.
	449	AB-DEFGHIJ	<u>Rorippa</u> sp.
	090	H	<u>Solanum</u> <u>nigrum</u>
<u>hepo</u>	450	AB-DEFGHIJ	<u>Ficus</u> <u>copiosa</u>
<u>heru'kwaari</u>	482	G	<u>Danthonia</u> <u>archboldii</u>
	184	E	<u>Themeda</u> <u>australis</u>
<u>hihima</u>	126	C	<u>Eugenia</u> sp.
	201	CD	<u>Eugenia</u> sp.
<u>himbu'hiri</u>	419	I	<u>Ficus</u> <u>adenosperma</u>
	514	ABCDE IJ	<u>Syzygium</u> sp.
<u>hi'mminri</u>	139	F	<u>Gardenia</u> <u>lamingtonii</u>
	211	ABCD FGHI	<u>Pittosporum</u> <u>pulli-</u> <u>folium</u>
<u>hi'nraana</u>	442	ABCDE H J	<u>Stephania</u> <u>grandiflora</u>
<u>hi'nrainra</u>	124	H	<u>Microglossa</u> <u>pyrifolia</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>hin'deri</u>	067	ABCDEFGH I J	<u>Rhododendron macgregoriae</u>
	475	H	<u>Vaccinium amplifolium</u>
<u>hinga'hinga</u>	149	C	<u>Dianella ensifolia</u>
	338	F	<u>Dianella ensifolia</u>
	300	C	<u>Glossorhyncha</u> sp.
	491	C	<u>Glossorhyncha</u> sp.
	170	C	<u>Mediocalcar</u> sp.
	473	E	<u>Rapanea</u> sp.
<u>hinggi'hora</u>	102	C	<u>Commelina diffusa</u>
	243	I	<u>Oxalis corniculata</u>
<u>hinggira</u>	424	I	<u>Harmsiopanax ingens</u>
<u>hi'nrunru</u>	223	B	<u>Elatostema integrifolium</u>
	458	AB- EFGH I J	<u>Pilea</u> sp.
<u>hipiri</u>	453	AB DE I	<u>Garcinia</u> sp.
<u>hi'rera</u>	096	ABCD GH I J	<u>Usnea</u> sp.
	176	I	Unident. Fungus
	196	BC F I	Unident. Fungus
<u>hi'riri</u>	126	GH J	<u>Eugenia</u> sp.
	201	G	<u>Eugenia</u> sp.
	133	G	<u>Glochidion</u> sp.
<u>hi'ru</u>	419	ABCDEF H J	<u>Ficus adenosperma</u>
	474	H	<u>Olearia spectabilis</u>
<u>hivi'hivi</u>	382	A CDE	<u>Cyclosorus</u> sp.
	343	I	<u>Dendrobium</u> sp.
<u>hoqaarira</u>	475	A E	<u>Vaccinium amplifolium</u>
	345	AB DEF	<u>Vaccinium keysseri</u>
	391	D	<u>Vaccinium</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>hohaa</u> ₂	262	ABCDEFGHIJ	<u>Cucumis sativus</u>
<u>hoha'nrundra</u>	111	H	<u>Lysimachia japonica</u>
	068	HI	<u>Mitrasacme pygmaea</u>
	043	H	<u>Sagina papuana</u>
<u>hohondi</u> ₂	289	D F	<u>Phaseolus vulgaris</u>
<u>hokirira</u>	028	E	<u>Ageratum conyzoides</u>
	302	B E	<u>Crassocephalum crepi-</u> <u>dioides</u>
	124	E	<u>Microglossa pyrifolia</u>
	100	E	<u>Tagetes ?patula</u>
<u>hokwai</u>	071	F	<u>Blumea lacera</u>
	182	ABCDEFGHIJ	<u>Erigeron canadensis</u>
	124	F	<u>Microglossa pyrifolia</u>
	076	F J	<u>Sopubia trifida</u>
	257	B F	<u>Vernonia cinerea</u>
	074	F	<u>Vernonia cinerea</u> var. <u>cinerea</u>
<u>hon'dai</u>	419	G	<u>Ficus adenosperma</u>
	269	ABCDEFGHIJ	<u>Timonius trichanthus</u>
	363	ABCDEFGHIJ	<u>Timonius trichocladus</u>
<u>hon'dau</u>	303	A FG	<u>Ficus wassa</u>
	279	G	<u>Symplocos c.f. lutei-</u> <u>folia</u>
<u>hongga'nrundra</u>	127	C F	<u>Pullea glabra</u>
<u>honri</u> ₂	080	ABCDEFGHIJ	<u>Rungia klossii</u>
	420	B D	<u>Rungia</u> sp.
<u>honrimma</u> ₂	304	ABCDEFGH-J	<u>Castanopsis acumina-</u> <u>tissima</u>
	455	D	<u>Castanopsis acumina-</u> <u>tissima</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>hopiri'pirira</u>	288	E	<u>Mikania cordata</u>
	054	E	<u>Viola arcuata</u>
	178	E	<u>Viola arcuata</u>
<u>hora'vaira</u> & <u>horavaira</u> _r	098	F	<u>Cosmos ?bipinnatus</u>
	162	ABC F H	<u>Cosmos ?bipinnatus</u>
	163	ABC F H	<u>Cosmos ?bipinnatus</u>
	100	B F H J	<u>Tagetes ?patula</u>
	148	AB F	<u>Tagetes</u> sp.
<u>horavaira</u> ₂	027	ABCD FGHIJ	<u>Bidens pilosa</u>
	511	ABCDEFGHIJ	<u>Bidens pilosa</u>
<u>horekakareka'rera</u>	197	F H	<u>Parsonsia curvisepala</u>
	466	G	<u>Parsonsia</u> sp.
<u>horera'nraavura</u>	358	A D	<u>Elaeocarpus crenulatus</u>
<u>hori'ori</u>	294	J	<u>Saurauia c.f. conferta</u>
	125	ABCDEFGHIJ	<u>Saurauia</u> sp.
	439	B E G J	<u>Saurauia</u> sp.
<u>ho'ru</u>	507	G	<u>Poikilogyne</u> sp.
	506	ABCDE H J	<u>Rhus taitensis</u>
<u>hosa</u> ₂	112	ABCDEFGHIJ	<u>Miscanthus floridulus</u>
	181	ABCDEFGHIJ	<u>Miscanthus floridulus</u>
	427	D GH J	<u>Miscanthus floridulus</u>
<u>ho'tera</u> & <u>hotera</u> _r	022	ABCDEFGHIJ	<u>Dendrobium</u> sp.
	122	A GH	<u>Dendrobium</u> sp.
	343	ABC F H J	<u>Dendrobium</u> sp.
	347	A DE H	<u>Dendrobium</u> sp.
	362	G	<u>Dendrobium</u> sp.
	503	AB DE	<u>Dendrobium</u> sp.
	092	G	<u>Dianella ensifolia</u>
	016	ABCDEFGHIJ	<u>Trifonia</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>ho'tera</u> & <u>hotera</u> _r	097	AB FGH	<u>Tritonia</u> x <u>crocsmi-</u> <u>flora</u>
(cont'd)	360	J	Unident. Orchidaceae
<u>hotera</u> ₂	340	A	<u>Dendrobium</u> sp.
<u>ho've</u>	194	C	<u>Claoxylon</u> <u>capillipes</u>
	246	ABCDEFGH IJ	<u>Solanum</u> <u>aviculare</u>
	083	E	<u>Solanum</u> sp. aff. <u>S.</u> <u>belense</u>
<u>hovepu'mmaa</u>	194	E	<u>Claoxylon</u> <u>capillipes</u>
	155	E H	<u>Kibara</u> sp.
	128	E	<u>Lycianthes</u> sp.
	141	EF H	<u>Rhyticarium</u> <u>novogui-</u> <u>neense</u>
<u>hovirira</u>	149	B	<u>Dianella</u> <u>ensifolia</u>
<u>hungga'hungga</u>	202	C	<u>Bulbophyllum</u> sp.
	204	C	<u>Ceratostylis</u> <u>scir-</u> <u>poides</u>
	203	A	<u>Ceratostylis</u> sp.
	409	C	<u>Coelogyne</u> sp.
	503	C	<u>Dendrobium</u> sp.
	380	C	<u>Epiblastus</u> sp.
	300	B	<u>Glossorhyncha</u> sp.
	154	A C	<u>Liparis</u> sp.
	228	C	<u>Liparis</u> sp.
	170	E	<u>Mediocalcar</u> sp.
	140	A C	<u>Phreatia</u> sp.
	171	BC	<u>Phreatia</u> sp.
	210	C	<u>Phreatia</u> sp.
	353	E	Unident. Orchidaceae
<u>hura'ror</u>	496	CD	<u>Schefflera</u> sp.
<u>hure'vu</u>	216	ABCDEFGH IJ	<u>Elaeocarpus</u> <u>nubigenus</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>huru'aari</u>	280	E	<u>Psychotria leucococca</u>
<u>huru'hina</u>	267	ABCDEFGH IJ	<u>Ocimum basilicum</u>
<u>huva'huva</u>	115	CD J	<u>Carex brownii</u>
	121	CD	<u>Carex neoguineensis</u>
	047	E	<u>Carex xestogyne</u>
	366	BCD J	<u>Carex</u> sp.
	086	CD	<u>Cyperus pedunculatus</u>
	321	BC	<u>Cyperus pilosus</u>
	338	DE	<u>Dianella ensifolia</u>
	183	C	<u>Fimbristylis dichotoma</u>
	396	D F I	<u>Leersia hexandra</u>
	516	ABCDE	<u>Scirpus ternatanus</u>
	418	ABC EF H J	<u>Scleria</u> sp.
<u>gia'tai'para</u>	071	C	<u>Blumea lacera</u>
	057	ABCD FGH IJ	<u>Buchnera tomentosa</u>
	235	AB	<u>Crotalaria linifolia</u>
	019	B	<u>Emilia prenanthoidea</u>
	306	C	<u>Haloragis chinensis</u>
	227	C	<u>Hedyotis hispida</u>
	052	C	<u>Hypericum gramineum</u>
	489	C	<u>Hypericum ?macgregorii</u>
	018	F	<u>Osbeckia chinensis</u>
	062	B F	<u>Osbeckia chinensis</u>
	043	C J	<u>Sagina papuana</u>
	251	J	<u>Sida rhombifolia</u>
	257	CD H J	<u>Vernonia cinerea</u>
	074	D	<u>Vernonia cinerea</u> var. <u>cinerea</u>
	144	D	<u>Wahlenbergia marginata</u>
	145	C	<u>Wahlenbergia marginata</u>
	146	CD	<u>Wahlenbergia marginata</u>
	147	C	<u>Wahlenbergia marginata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>qimun'daara</u>	124	IJ	<u>Microglossa pyrifolia</u>
	233	J	<u>Polygonum barbatum</u>
<u>qi'nraangkai'sora</u>	413	B F	<u>Dendrobium</u> sp.
<u>qinring'gairi</u>	309	ABCDEFGH-J	<u>Equisetum</u> sp.
	396	C H J	<u>Leersia hexandra</u>
<u>qi'pura</u>	177	ABCDEFGH-IJ	<u>Cordyline fruticosa</u>
	258	E	<u>Cordyline fruticosa</u>
<u>qi'rera'i'nitara</u>	050	G	<u>Emilia prenanthoidea</u>
	136	J	<u>Cyrtandra</u> sp.
	316	J	<u>Graptophyllum</u> sp.
	002	J	<u>Impatiens hawkeri</u>
	081	GHIJ	<u>Ophiorrhiza ?nervosa</u>
	085	GHIJ	<u>Ophiorrhiza ?nervosa</u>
	153	GH	<u>Ophiorrhiza</u> sp.
	157	J	<u>Psychotria</u> sp.
	129	H	<u>Trigonotis inoblita</u>
	444	GHIJ	Unident. Rubiaceae
<u>gitai'tora</u>	289	C HIJ	<u>Phaseolus vulgaris</u>
<u>kaamma'nru</u>	099	H	<u>Oxalis corniculata</u>
<u>kaam'baa</u>	217	ABCDEFGH-IJ	<u>Maclura cochinchinensis</u>
<u>kaambaara'hotera</u>	122	I	<u>Dendrobium</u> sp.
	340	D	<u>Dendrobium</u> sp.
	362	B IJ	<u>Dendrobium</u> sp.
	413	C	<u>Dendrobium</u> sp.
	503	FGH	<u>Dendrobium</u> sp.
	509	ABCDEFGH-IJ	<u>Dendrobium</u> sp.
	349	F H J	Unident. Orchidaceae
	361	G	Unident. Orchidaceae

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kaam'bi</u> & <u>kaambi_r</u>	069	ABCDEFGF J	<u>Vaccinium striicaule</u>
	494	D G	<u>Vaccinium striicaule</u>
<u>kaambi₂</u>	508	D F H J	<u>Vaccinium albicans</u>
	494	A	<u>Vaccinium striicaule</u>
	391	J	<u>Vaccinium</u> sp.
	307	AB F J	Unident. shrub
<u>kaambira</u>	431	CD G I	<u>Piper</u> sp.
	446	ABCDE GHIJ	<u>Piper</u> sp.
<u>kaambo'ho</u>	352	D	<u>Caldcluvia brassii</u>
<u>kaa'mminra</u>	417	B DE G	<u>Dioscorea</u> sp.
<u>kaa'mo'kura</u>	095	A CDEF HIJ	<u>Gunnera macrophylla</u>
<u>kaa'mmunga</u>	326	E	<u>Garnctia mezii</u>
	311	E	<u>Melinus minutiflora</u>
	331	ABCDEFGH IJ	<u>Setaria palmifolia</u>
	398	E H	<u>Sporobolus diander</u>
<u>kaa'nraamma</u>	323	B	<u>Diplazium</u> sp.
<u>kaan'daara</u>	266	ABCDEFGH IJ	<u>Ricinus communis</u>
<u>kaandiri₂</u>	382	J	<u>Cyclosorus</u> sp.
	323	A CD HIJ	<u>Diplzaium</u> sp.
	379	A CDEFGH IJ	<u>Diplazium</u> sp.
	325	C E H	<u>Hypolepis</u> sp.
<u>kaa'nrembi</u>	426	AB D F	<u>Graptophyllum</u> sp.
	448	CD H	<u>Graptophyllum</u> sp.
<u>kaeng'gaami</u>	463	B	<u>Chloranthus officinalis</u>
	136	C I	<u>Cyrtandra</u> sp.
	223	A CDEFG IJ	<u>Elatostema integrifolium</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kaang'gaami</u>	443	ABCDEFGH IJ	<u>Elatostema</u> sp.
(cont'd)	081	BC	<u>Ophiorrhiza</u> ? <u>nervosa</u>
	085	A C	<u>Ophiorrhiza</u> ? <u>nervosa</u>
	458	D	<u>Pilea</u> sp.
	280	B	<u>Psychotria</u> <u>leucococca</u>
	444	C	Unident. Rubiaceae
<u>kaapi</u> ₂	393	EFG J	<u>Curcuma</u> <u>longa</u>
<u>kaapi'kana</u>	437	ABCDEFGH IJ	<u>Clematis</u> <u>phanero-</u> <u>phlebia</u>
	456	EFGH IJ	<u>Dioscorea</u> sp.
	137	F	<u>Ficus</u> sp.
<u>kaapi'kara</u>	387	A	<u>Asplenium</u> sp.
<u>kaapisi</u> ₂	031	ABCDEFGH IJ	<u>Brassica</u> ? <u>junceae</u>
<u>kaa'rapitau</u>	417	A C F H IJ	<u>Dioscorea</u> sp.
<u>kaa'rera</u>	464	G	<u>Cyrtandra</u> sp.
<u>kaare'vora</u>	315	E	<u>Alpinia</u> sp.
	091	E	<u>Riedelia</u> <u>monticola</u>
	088	I	<u>Riedelia</u> sp.
	284	E	<u>Riedelia</u> sp.
	346	D	<u>Riedelia</u> sp.
<u>kaa'risi</u>	383	ABCD FGH IJ	<u>Nasturtium</u> sp.
<u>kaaro'hera</u>	014	ABCDEFGH IJ	<u>Ipomoea</u> sp.
<u>ka'haara</u>	038	C	<u>Boerlagiodendron</u> <u>micranthum</u>
	156	ABCDEFGH -J	<u>Schefflera</u> sp.
	496	F	<u>Schefflera</u> sp.
<u>ka'saasa</u>	107	ABCDEFGH IJ	<u>Ficus</u> <u>calopilina</u>
	242	ABCDEFGH IJ	<u>Ficus</u> <u>calopilina</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kehura</u>	007	J	<u>Aeschynanthus</u> sp.
	344	ABCDEFGH IJ	<u>Phyllocladus</u> <u>hypo-</u> <u>phyllus</u>
<u>kembora</u> ₂	372	ABCDEFGH IJ	<u>Ficus</u> <u>dammaropsis</u>
<u>kendavara</u> ₂	428	ABCDEFGH IJ	<u>Dimorphanthera</u> <u>elega-</u> <u>tissima</u>
	221	ABCDEFGH IJ	<u>Dimorphanthera</u> <u>robbins-</u> <u>ii</u>
	475	C	<u>Vaccinium</u> <u>amplifolium</u>
	391	F	<u>Vaccinium</u> sp.
<u>kengge'hura</u>	186	B E H	<u>Cordyline</u> <u>fruticosa</u>
	247	ABCDEFGH IJ	<u>Cordyline</u> <u>fruticosa</u>
	258	B F H	<u>Cordyline</u> <u>fruticosa</u>
<u>keng'gepu</u>	366	GH	<u>Carex</u> sp.
	061	E	<u>Curculigo</u> <u>orchioides</u>
	321	I	<u>Cyperus</u> <u>pilosus</u>
	394	A E G IJ	<u>Cyperus</u> <u>sesquiflorus</u>
	183	GH	<u>Fimbristylis</u> <u>dichotoma</u>
	114	FG	<u>Juncus</u> <u>effusus</u>
	369	A FGH	<u>Juncus</u> <u>effusus</u>
	395	H	<u>Paspalum</u> <u>longifolium</u>
	329	G	<u>Scirpus</u> <u>mucronatus</u>
	368	H	<u>Smithia</u> <u>sensitiva</u>
<u>kim'buenranra</u>	015	CDEF HIJ	<u>Begonia</u> sp.
	040	A DEFGH IJ	<u>Begonia</u> sp.
	084	BC F HI	<u>Begonia</u> sp.
	293	I	<u>Begonia</u> sp.
	429	BC H	<u>Begonia</u> sp.
	440	BC	<u>Begonia</u> sp.
	136	D	<u>Cyrtandra</u> sp.
	085	D	<u>Ophiorrhiza</u> <u>?nervosa</u>
	103	J	<u>Spathoglottis</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kim'buenranra</u> (cont'd)	004	B	<u>Symbegonia</u> sp.
<u>king'gora</u>	115	I	<u>Carex brownii</u>
	121	I	<u>Carex neoguineensis</u>
	366	EF I	<u>Carex</u> sp.
	119	I	<u>Cyperus cyperoides</u>
	321	E	<u>Cyperus pilosus</u>
	394	C F	<u>Cyperus sesquiflorus</u>
	183	F	<u>Fimbristylis dichotoma</u>
	114	A I	<u>Juncus effusus</u>
	369	I	<u>Juncus effusus</u>
	329	C EF HIJ	<u>Scirpus mucronatus</u>
	516	I	<u>Scirpus ternatanus</u>
<u>ki'ringga</u>	134	J	<u>Alpinia</u> sp.
	315	J	<u>Alpinia</u> sp.
	341	H	<u>Alpinia</u> sp.
	285	I	<u>Riedelia</u> c.f. <u>geluen-</u> <u>sis</u>
	291	J	<u>Riedelia hollandiae</u>
	091	ABCD FGHI	<u>Riedelia monticola</u>
	088	B	<u>Riedelia</u> sp.
	283	ABCD FG I	<u>Riedelia</u> sp.
	284	A FGHI	<u>Riedelia</u> sp.
	339	A CD FG I	<u>Riedelia</u> sp.
	346	A C FGH	<u>Riedelia</u> sp.
	356	G	<u>Riedelia</u> sp.
<u>ki'saasa</u>	134	I	<u>Alpinia</u> sp.
	154	D	<u>Liparis</u> sp.
	140	J	<u>Phreatia</u> sp.
	285	DE G J	<u>Riedelia</u> c.f. <u>geluen-</u> <u>sis</u>
	023	A E G I	<u>Riedelia</u> sp.
	087	CDE J	<u>Riedelia</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>ki'saasa</u> (cont'd)	088	A CDEFG	<u>Riedelia</u> sp.
	283	E	<u>Riedelia</u> sp.
	284	J	<u>Riedelia</u> sp.
	346	E	<u>Riedelia</u> sp.
	356	B DEF IJ	<u>Riedelia</u> sp.
<u>ko'konda'mmanra</u>	512	ABCDEF HIJ	<u>Helicia saruwagedica</u>
<u>ko'kopin'daara</u>	510	C	<u>Evodiella</u> sp.
	093	AB EFGHIJ	<u>Melastoma polyantha</u>
	018	A	<u>Osbeckia chinensis</u>
	062	C H	<u>Osbeckia chinensis</u>
<u>koko'saasira</u>	071	E	<u>Blumea lacera</u>
	405	G	<u>Triumfetta</u> c.f. <u>nigri-</u> <u>cans</u>
<u>kombaari'hora</u>	438	J	<u>Astronia</u> c.f. <u>papua</u>
<u>ko'mmunra</u>	273	ABCDEFGHIJ	<u>Ipomoea batatas</u>
<u>kori</u>	165	C	<u>Solanum tuberosum</u>
<u>koringga</u>	326	D	<u>Garnotia mezii</u>
	330	D	<u>Ischaemum barbatum</u>
	332	BCD FGHIJ	<u>Ischaemum polystachyum</u>
<u>kotu'vera</u>	390	ABCD FGHI	<u>Piper</u> sp.
<u>ko've</u>	138	H	<u>Bulbophyllum</u> sp.
	056	ABCDEFGHIJ	<u>Peperomia</u> sp.
	501	ABCDEFGHIJ	<u>Peperomia</u> sp.
	129	B	<u>Trigonotis inoblita</u>
<u>ko'vo'vasa</u>	330	ABC EFGHIJ	<u>Ischaemum barbatum</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kovu</u> & <u>kovu_r</u>	263	AB D	<u>Impatiens balsamina</u>
	003	I	<u>Impatiens hawkeri</u>
	011	A DE I	<u>Impatiens hawkeri</u>
	032	A	<u>Impatiens hawkeri</u>
	089	A CDEFGHI	<u>Impatiens hawkeri</u>
	301	AB	<u>Impatiens</u> sp.
	318	ABC E	<u>Impatiens</u> sp.
<u>kovu₂</u>	297	A DEFGHIJ	<u>Impatiens</u> sp.
<u>ku'hinggu'hina</u>	379	B	<u>Diplazium</u> sp.
<u>ku'hora</u>	421	J	<u>Rungia</u> sp.
<u>ku'nraavaga</u>	186	C FG IJ	<u>Cordyline fruticosa</u>
	258	G IJ	<u>Cordyline fruticosa</u>
<u>kun'dimauna</u>	028	BCD HIJ	<u>Ageratum conyzoides</u>
	352	J	<u>Caldcluvia brassii</u>
	302	A CD FGH J	<u>Crassocephalum crepidioides</u>
	407	C	<u>Crotalaria mucronata</u>
	166	C	<u>Crotalaria semperflorens</u>
	060	B	<u>Sida rhombifolia</u>
	148	C	<u>Tagetes</u> sp.
<u>kunggura₂</u>	219	ABCDEFGH IJ	<u>Coix lachryma-jobi</u>
<u>ku'nrunga</u>	496	B E	<u>Schefflera</u> sp.
<u>ku'raara</u>	035	I	<u>Corsia</u> sp.
	001	ABCDEFGH IJ	<u>Dichrotrichum</u> sp.
<u>ku'raasa</u>	396	G	<u>Leersia hexandra</u>
	398	C J	<u>Sporobolus diander</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kusa'nrura</u>	173	DE	<u>Calanthe micrantha</u>
	218	B DE	<u>Calanthe micrantha</u>
	041	CD	<u>Malaxis</u> sp.
	290	DE	<u>Polia macrophylla</u>
	256	E	<u>Spathoglottis grandiflora</u>
	305	E	<u>Thelymitra papuana</u>
	192	C	<u>Zeuxine</u> sp.
<u>kwaa'kesa</u>	392	ABCDEFG J	<u>Ficus xylosyca</u>
<u>kwaam'bimba</u>	393	D I	<u>Curcuma longa</u>
<u>kwaan'dorara</u>	342	H	<u>Olearia ?platyphylla</u>
<u>kwaanrunru'kembora</u>	469	AB-DEFGHIJ	<u>Ficus dammaropsis</u>
<u>kwaari</u>	258	D	<u>Cordyline fruticosa</u>
<u>kwaa'sapara</u>	288	BC	<u>Mikania cordata</u>
<u>kwaa'te</u>	303	CDE J	<u>Ficus wassa</u>
<u>kwaavu</u>	445	B	<u>Symplocos</u> sp.
<u>kwauku</u>	277	A	<u>Impatiens</u> sp.
	297	BC	<u>Impatiens</u> sp.
<u>kwaza'kwaza &</u>	484	E	<u>Astelia papuana</u>
<u>kwazakwaza_r</u>	131	A C E HIJ	<u>Bulbophyllum</u> sp.
	202	A	<u>Bulbophyllum</u> sp.
	173	C J	<u>Calanthe micrantha</u>
	218	J	<u>Calanthe micrantha</u>
	409	B DEFG I	<u>Coelogyne</u> sp.
	092	BC J	<u>Dianella ensifolia</u>
	149	E	<u>Dianella ensifolia</u>
	037	C J	<u>Epiblastus</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>kwaza'kwaza</u> &	380	A E	<u>Epiblastus</u> sp.
<u>kwazakwaza</u> _r	005	ABC E GHIJ	<u>Liparis</u> sp.
(cont'd)	154	B H J	<u>Liparis</u> sp.
	207	ABCDEF J	<u>Liparis</u> sp.
	228	AB DEF H	<u>Liparis</u> sp.
	170	A	<u>Mediocalcar</u> sp.
	198	A C F H	<u>Pedilochilus</u> sp.
	140	B DE I	<u>Phreatia</u> sp.
	171	I	<u>Phreatia</u> sp.
	210	A	<u>Phreatia</u> sp.
	192	D	<u>Zeuxine</u> sp.
<u>kwazakwaza</u> ₂	409	A J	<u>Coelogyne</u> sp.
<u>kwevi</u>	230	BC E	<u>Eugenia</u> sp.
<u>mmaqaa'vora</u>	487	AB EFGHI	<u>Anthoxanthum angustum</u>
	204	I	<u>Ceratostylis scir-</u> <u>poides</u>
	482	ABCD F I	<u>Danthonia archboldii</u>
	326	BC F J	<u>Garnotia mezii</u>
	206	D	<u>Glossorhyncha</u> sp.
	396	B	<u>Leersia hexandra</u>
	175	J	<u>Leucobryum</u> sp.
	210	J	<u>Phreatia</u> sp.
	234	ABCD FG	<u>Poa saruwagedica</u>
<u>mmaqaavu</u>	195	FG	<u>Dicranoloma</u> sp.
	175	FG	<u>Leucobryum</u> sp.
	199	FG	<u>Spiridens</u> sp.
	196	G	Unident. Fungus
<u>mmaahi</u>	402	ABCDEFGH IJ	<u>Pueraria triloba</u>
<u>mmaa'hor</u>	373	I	<u>Euodia</u> sp.
	510	I	<u>Evodiella</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>mmaanranra_p</u>	505	J	<u>Derris</u> sp.
<u>maandundin'dira</u>	071	B	<u>Blumea lacera</u>
<u>mmaa'nriqa_a</u>	385	ABCDEFGHIJ	<u>Marattia</u> sp.
<u>mmaata'kusanranra</u>	028	G	<u>Ageratum conyzoides</u>
	515	ABCDEFGHIJ	<u>Dicrocephala bicolor</u>
	111	C	<u>Lysimachia japonica</u>
	110	E	<u>Mazus pumilus</u>
	051	G	<u>Oxalis corniculata</u>
	094	C	<u>Polygonum minus</u>
	364	G I	<u>Sigesbeckia orientalis</u>
<u>mmaata'rera</u>	062	J	<u>Osbeckia chinensis</u>
	059	F	<u>Polygala japonica</u>
	231	J	<u>Ranunculus basilobatus</u>
	178	F	<u>Viola arcuata</u>
	017	FG	<u>Wahlenbergia marginata</u>
<u>mmaato'nronri</u>	035	C F	<u>Corsia</u> sp.
	190	ABCDEFGHIJ	<u>Dawsonia</u> sp.
	076	E	<u>Sopubia trifida</u>
	367	I	<u>Sphenomeris chinensis</u>
	471	G I	<u>Tetramolopium</u> ?sp. nov.
<u>mmaatun'durura</u>	195	E	<u>Dicranoloma</u> sp.
	471	C E	<u>Tetramolopium</u> ?sp. nov.
<u>mmanra'bau</u>	268	H	<u>Nicotiana tabacum</u>
<u>mmanra'mmaqa</u>	039	E	<u>Elatostema</u> sp.
	081	D	<u>Ophiorrhiza</u> ? <u>nervosa</u>
	430	B D	<u>Pilea</u> sp.
<u>matate₂</u>	165	AB DE GH J	<u>Solanum tuberosum</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>mauna & mauna</u> _r	375	ABCD F HIJ	<u>Adiantum</u> sp.
	010	A EF	<u>Aeschynanthus</u> sp.
	028	A	<u>Ageratum conyzoides</u>
	341	A	<u>Alpinia</u> sp.
	479	B DEF J	<u>Anaphalis mariae</u>
	260	A EFG	<u>Anisomeles indica</u>
	387	B EFGH	<u>Asplenium</u> sp.
	484	ABCD FGHIJ	<u>Astelia papuana</u>
	084	A E	<u>Begonia</u> sp.
	293	A D F	<u>Begonia</u> sp.
	421	A	<u>Belvisia</u> sp.
	071	A GH	<u>Blumea lacera</u>
	057	E	<u>Buchnera tomentosa</u>
	131	D FG	<u>Bulbophyllum</u> sp.
	138	AB D FG IJ	<u>Bulbophyllum</u> sp.
	202	B G J	<u>Bulbophyllum</u> sp.
	173	AB FG	<u>Calanthe micrantha</u>
	218	A F	<u>Calanthe micrantha</u>
	214	DE	<u>Canna indica</u>
	036	ABCDE I	<u>Cardamine africana</u>
	204	AB DEFGH	<u>Ceratostylis scir-</u> <u>poides</u>
	203	B G	<u>Ceratostylis</u> sp.
	335	ABC FGHIJ	<u>Ceratostylis</u> sp.
	102	A D G	<u>Commelina diffusa</u>
	249	D G	<u>Commelina diffusa</u>
	035	AB E GH	<u>Corsia</u> sp.
	098	ABCD G	<u>Cosmos ?bipinnatus</u>
	162	DE G	<u>Cosmos ?bipinnatus</u>
	163	D G	<u>Cosmos ?bipinnatus</u>
	240	E H	<u>Crotalaria ferruginea</u>
	235	EFGH J	<u>Crotalaria linifolia</u>
	407	EF	<u>Crotalaria mucronata</u>
	166	B DEFG -	<u>Crotalaria semper-</u> <u>florens</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>Mauna & Mauna</u> (cont'd)	376	AB EF	<u>Cyclosorus</u> sp.
	377	A FG	<u>Cyclosorus</u> sp.
	382	F	<u>Cyclosorus</u> sp.
	343	G	<u>Dendrobium</u> sp.
	413	G	<u>Dendrobium</u> sp.
	503	J	<u>Dendrobium</u> sp.
	092	A E	<u>Dianella ensifolia</u>
	149	A D H-	<u>Dianella ensifolia</u>
	338	AB	<u>Dianella ensifolia</u>
	323	G	<u>Diplazium</u> sp.
	467	B	<u>Elatostema</u> sp.
	019	A E HI	<u>Emilia prenanthoidea</u>
	050	A H	<u>Emilia prenanthoidea</u>
	255	AB E H	<u>Emilia prenanthoidea</u>
	037	AB HI	<u>Epiblastus</u> sp.
	380	B	<u>Epiblastus</u> sp.
	105	A G	<u>Euphorbia serrulata</u>
	209	B DE HI	<u>Exocarpus erythrocaulis</u>
	488	ABCDEFGHIJ	<u>Gentiana</u> c.f. <u>lorentzii</u>
	490	ABCDEFG	<u>Geranium</u> <u>potentill-</u> <u>oides</u>
	120	B	<u>Gleichenia</u> c.f. <u>erecta</u>
	206	B E	<u>Glossorhyncha</u> sp.
	300	A F -J	<u>Glossorhyncha</u> sp.
	491	AB D FG	<u>Glossorhyncha</u> sp.
	095	G	<u>Gunnera macrophylla</u>
	306	AB DEFGH-J	<u>Haloragis chinensis</u>
	227	AB DEFGHIJ	<u>Hedyotis hispida</u>
	052	A D HI	<u>Hypericum gramineum</u>
	143	A C EFGH-J	<u>Hypericum gramineum</u>
	489	AB DEFGHIJ	<u>Hypericum</u> ? <u>macgregorii</u>
	301	D -	<u>Impatiens</u> sp.
	410	FG	<u>Lepidagathis</u> sp.
	370	ABCDEFGH	<u>Lindernia anagallis</u>
	104	ABCD FGHIJ	<u>Lindernia pusilla</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>mauna & mauna</u> _r (cont'd)	207	G	<u>Liparis</u> sp.
	055	A DEF HI	<u>Ludwigia octovalvis</u>
	322	A CD F I	<u>Ludwigia octovalvis</u>
	365	ABCD F	<u>Ludwigia octovalvis</u>
	063	A DE I	<u>Lupinus</u> sp.
	111	AB D G IJ	<u>Lysimachia japonica</u>
	041	A E GH	<u>Malaxis</u> sp.
	110	A D FGHIJ	<u>Mazus pumilus</u>
	170	B FGH	<u>Mediocalcar</u> sp.
	124	G	<u>Microglossa pyrifolia</u>
	068	AB DEFG	<u>Mitrasacme pygmaea</u>
	081	A F	<u>Ophiorrhiza ?nervosa</u>
	085	F	<u>Ophiorrhiza ?nervosa</u>
	153	A EF	<u>Ophiorrhiza</u> sp.
	018	B DE G IJ	<u>Osbeckia chinensis</u>
	062	A DE G I	<u>Osbeckia chinensis</u>
	045	ABCD FGHIJ	<u>Oxalis corniculata</u>
	051	CDEF HI	<u>Oxalis corniculata</u>
	099	ABC FG I	<u>Oxalis corniculata</u>
	243	A D FGH	<u>Oxalis corniculata</u>
	480	ABCDEFGHI	<u>Parahebe albiflora</u>
	198	B G J	<u>Pedilochilus</u> sp.
	210	GH	<u>Phreatia</u> sp.
	179	A GH	<u>Physalis peruviana</u>
	290	A	<u>Pollia macrophylla</u>
	059	A CDE G I	<u>Polygala japonica</u>
	029	AB DE GHIJ	<u>Polygala paniculata</u>
	065	ABCDEFGH J	<u>Polygala paniculata</u>
	118	BC FGH	<u>Polygala paniculata</u>
	094	B E G	<u>Polygonum minus</u>
	386	B D	<u>Polystichum</u> sp.
	412	B	<u>Pteris</u> sp.
	231	ABCDE GH	<u>Ranunculus basilobatus</u>
	046	G	<u>Rubus rosaefolius</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>mauna & mauna</u> (cont'd)	043	AB D FG I	<u>Sagina papuana</u>
	172	ABCD FGHI	<u>Sciaphila</u> sp.
	378	A EF	<u>Selliguea</u> sp.
	060	D FGH	<u>Sida rhombifolia</u>
	251	DEF HI	<u>Sida rhombifolia</u>
	364	A EF	<u>Sigesbeckia orientalis</u>
	368	A CDEFG I	<u>Smithia sensitiva</u>
	076	A CD GHI	<u>Sopubia trifida</u>
	256	A	<u>Spathoglottis grandiflora</u>
	367	ABCD FGH J	<u>Sphenomeris chinensis</u>
	100	A CD G	<u>Tagetes ?patula</u>
	148	DE G	<u>Tagetes</u> sp.
	066	D	<u>Tephrosia vogelii</u>
	471	AB D F H	<u>Tetramolopium</u> ?sp. nov.
	305	G	<u>Thelymitra papuana</u>
	129	A C EFG I	<u>Trigonotis inoblita</u>
	097	C E	<u>Tritonia x crocosmiflora</u>
	254	A D GH	<u>Triumfetta pilosa</u>
	257	A E G	<u>Vernonia cinerea</u>
	074	A E H	<u>Vernonia cinerea</u> var. <u>cinerea</u>
	054	A D	<u>Viola arcuata</u>
	178	A D G	<u>Viola arcuata</u>
	033	A	<u>Viola betonicifolia</u>
	017	A	<u>Wahlenbergia marginata</u>
	144	G	<u>Wahlenbergia marginata</u>
	145	DE G	<u>Wahlenbergia marginata</u>
	146	G	<u>Wahlenbergia marginata</u>
	147	D G	<u>Wahlenbergia marginata</u>
	070	A E GH	<u>Youngia japonica</u>
	232	AB EFGH J	<u>Youngia japonica</u>
	192	A F	<u>Zeuxine</u> sp.
	349	AB G	Unident. Orchidaceae

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>mauna</u> & <u>mauna</u> _r (cont'd)	360	ABCDE GH	<u>Unident.</u> <u>Orchidaceae</u>
	361	AB F	<u>Unident.</u> <u>Orchidaceae</u>
	444	AB EF	<u>Unident.</u> <u>Rubiaceae</u>
<u>mnenranra</u> ₂	468	E J	<u>Lithocarpus</u> c.f. <u>rufo-villosus</u>
<u>menggi'rerira</u>	268	C FG	<u>Nicotiana</u> <u>tabacum</u>
<u>mmengonga</u>	466	E	<u>Parsonsia</u> sp.
<u>neru</u> ₂	265	ABC EFGH J	<u>Oenanthe</u> <u>javanica</u>
<u>nerura</u>	039	ABCD FGHIJ	<u>Elatostema</u> sp.
<u>mequaara</u>	258	C	<u>Cordyline</u> <u>fruticosa</u>
<u>miang'gaira</u>	275	C	<u>Ipomoea</u> <u>batatas</u>
<u>min'do</u>	384	ABCDEFGH IJ	<u>Asplenium</u> sp.
	421	I	<u>Belvisia</u> sp.
	376	D	<u>Cyclosorus</u> sp.
	378	D HI	<u>Selliguea</u> sp.
<u>mmondira</u>	023	J	<u>Riedelia</u> sp.
	346	I	<u>Riedelia</u> sp.
<u>muavu'rana</u>	183	D	<u>Fimbristylis</u> <u>dichotoma</u>
<u>mmunri</u> _a	225	ABCDEFGH IJ	<u>Dodonaea</u> <u>viscosa</u>
<u>mmunrummu'nrukara</u>	052	F	<u>Hypericum</u> <u>gramineum</u>
	233	A D GH	<u>Polygonum</u> <u>barbatum</u>
	094	A D F	<u>Polygonum</u> <u>minus</u>
<u>muso</u> & <u>muso</u> _r	487	D	<u>Anthoxanthum</u> <u>angustum</u>
	115	A	<u>Carex</u> <u>brownii</u>
	366	A	<u>Carex</u> sp.
	061	A F HI	<u>Curculigo</u> <u>orchiodes</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>muso</u> & <u>muso</u> _r (cont'd)	321	A	<u>Cyperus pilosus</u>
	116	A D G I	<u>Eragrostis tenuifolia</u>
	397	D	<u>Eulalia leptostachys</u>
	183	AB	<u>Fimbristylis dichotoma</u>
	326	A	<u>Garnotia mezii</u>
	332	A	<u>Ischaemum polystachyum</u>
	286	D F H	<u>Oplismenus undulati-</u> <u>folius</u>
	395	D FG J	<u>Paspalum longifolium</u>
	329	A	<u>Scirpus mucronatus</u>
	180	F	<u>Setaria montana</u>
	252	F	<u>Setaria montana</u>
	398	B D F	<u>Sporobolus diander</u>
<u>muso</u> ₂	184	ABCD FGH J	<u>Themeda australis</u>
<u>mmu'tate</u> & <u>mmutate</u> _r	116	E	<u>Eragrostis tenuifolia</u>
	396	A E	<u>Leersia hexandra</u>
	286	A C G IJ	<u>Oplismenus undulati-</u> <u>folius</u>
	395	A	<u>Paspalum longifolium</u>
	234	E	<u>Poa saruwagedica</u>
	075	EF	<u>Sacciolepis indica</u>
	180	B E G	<u>Setaria montana</u>
	252	E G	<u>Setaria montana</u>
	398	A	<u>Sporobolus diander</u>
<u>mmutate</u> ₂	312	ABCDEFGH-J	<u>Arthraxon ciliaris</u>
	180	I	<u>Setaria montana</u>
<u>mwaamun'dera</u>	279	E	<u>Symplocos c.f. lutei-</u> <u>folia</u>
	436	E	<u>Symplocos</u> sp.
<u>mwaapuri</u>	026	ABCDEFGH-IJ	<u>Coleus scutellarioides</u>
	152	ABCDEFGH-J	<u>Coleus scutellarioides</u>
	244	ABCDEFGH-IJ	<u>Coleus scutellarioides</u>
	296	B	<u>Coleus scutellarioides</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>nraagaammu</u>	109	ABCDEFGHIJ	<u>Pipturus argenteus</u>
	319	ABCDEFGHIJ	Unident. tree
<u>nraa'mmaahinra</u>	497	ABCDEFGHIJ	<u>Pueraria triloba</u>
<u>nraamma'nraa'mmanra</u>	461	H	<u>Randia</u> sp.
<u>nraamma'saasira</u>	465	B DE	<u>Bubbia</u> sp.
<u>naam'bufua'raara</u>	015	AB	<u>Begonia</u> sp.
	040	B	<u>Begonia</u> sp.
	084	D G J	<u>Begonia</u> sp.
	293	E G J	<u>Begonia</u> sp.
	334	J	<u>Begonia</u> sp.
	429	A DEFG IJ	<u>Begonia</u> sp.
	440	A DEFGHIJ	<u>Begonia</u> sp.
	036	J	<u>Cardamine africana</u>
	464	J	<u>Cyrtandra</u> sp.
	467	FG	<u>Elatostema</u> sp.
	111	F	<u>Lysimachia japonica</u>
	081	E	<u>Ophiorrhiza ?nervosa</u>
	153	D	<u>Ophiorrhiza</u> sp.
	045	E	<u>Oxalis corniculata</u>
	231	F	<u>Ranunculus basilobatus</u>
	004	A CDE GHIJ	<u>Symbegonia</u> sp.
	129	D	<u>Trigonotis inoblita</u>
	444	D	Unident. Rubiaceae
<u>nraammugapu'nraapu'nri</u>	387	I	<u>Asplenium</u> sp.
	072	A	<u>Scaevola oppositifolia</u>
<u>nraammunra'vokara</u>	197	ABCD	<u>Parsonsia curvisepala</u>
	466	J	<u>Parsonsia</u> sp.
<u>nraa'mmunru</u>	054	F	<u>Viola arcuata</u>
	147	F	<u>Wahlenbergia marginata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>nraan'dai</u>	373	H	<u>Euodia</u> sp.
<u>nraanda'mmanra</u>	008	G	<u>Desmodium repandum</u>
	025	A G	<u>Desmodium repandum</u>
	099	E	<u>Oxalis corniculata</u>
	364	BCD	<u>Sigesbeckia orientalis</u>
	405	F	<u>Triumfetta</u> c.f. <u>nigricans</u>
	254	F	<u>Triumfetta pilosa</u>
<u>naa'rorugauqa</u>	034	E	<u>Aeschynanthus</u> sp.
	131	B	<u>Bulbophyllum</u> sp.
	138	E	<u>Bulbophyllum</u> sp.
	202	I	<u>Bulbophyllum</u> sp.
	218	G	<u>Calanthe micrantha</u>
	413	A J	<u>Dendrobium</u> sp.
	503	I	<u>Dendrobium</u> sp.
	380	I	<u>Epiblastus</u> sp.
	154	E	<u>Liparis</u> sp.
	207	I	<u>Liparis</u> sp.
	228	G IJ	<u>Liparis</u> sp.
	170	I	<u>Mediocalcar</u> sp.
	198	I	<u>Pedilochilus</u> sp.
	210	B I	<u>Phreatia</u> sp.
	361	E I	Unident. Orchidaceae
<u>naasagura</u>	054	H	<u>Viola arcuata</u>
<u>naasi'hotera</u>	413	D	<u>Dendrobium</u> sp.
<u>naavara</u>	289	B	<u>Phaseolus vulgaris</u>
<u>nraavo'nra</u>	143	B	<u>Hypericum gramineum</u>
<u>namin'dura</u>	071	J	<u>Blumea lacera</u>
	404	B D I	<u>Buddleia asiatica</u>
	079	B D	<u>Callicarpa caudata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>namin'dura</u> (cont'd)	104	E	<u>Lindernia pusilla</u>
	322	G	<u>Ludwigia octovalvis</u>
	124	ABCD	<u>Microglossa pyrifolia</u>
	342	I	<u>Olearia ?platyphylla</u>
	074	C J	<u>Vernonia cinerea</u> var. <u>cinerea</u>
<u>nranra</u>	387	D	<u>Asplenium</u> sp.
	376	C G	<u>Cyclosorus</u> sp.
	377	CD HIJ	<u>Cyclosorus</u> sp.
	378	BC	<u>Selliguea</u> sp.
<u>nra'nraa'mmai</u>	430	EFGHI	<u>Pilea</u> sp.
	253	B	<u>Urena lobata</u>
<u>nra'nraang'go'sara</u>	338	H	<u>Dianella ensifolia</u>
	199	H J	<u>Spiridens</u> sp.
<u>nraro'nraa'rora</u>	260	B	<u>Anisomeles indica</u>
	240	ABCD FG IJ	<u>Crotalaria ferruginea</u>
	235	C I	<u>Crotalaria linifolia</u>
	407	I	<u>Crotalaria mucronata</u>
	179	B D	<u>Physalis peruviana</u>
<u>nrausa'sana</u>	205	F	<u>Parsonsia</u> c.f. <u>wollastonii</u>
<u>nremmi</u>	389	ABCDEFGH IJ	<u>Scleropyrum auranti-</u> <u>acum</u>
<u>nerira</u>	406	ABCDEFGH IJ	<u>Phaseolus lunatus</u>
<u>ng'gora'mmaatarera</u>	071	D	<u>Blumea lacera</u>
	235	D	<u>Crotalaria linifolia</u>
	061	D	<u>Curculigo orchiodes</u>
	369	D	<u>Juncus effusus</u>
	059	J	<u>Polygala japonica</u>
	253	D	<u>Urena lobata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>ng'gora'mmaatarera</u>	017	DE H J	<u>Wahlenbergia marginata</u>
(cont'd)	144	AB EF J	<u>Wahlenbergia marginata</u>
	145	AB F J	<u>Wahlenbergia marginata</u>
	146	AB F J	<u>Wahlenbergia marginata</u>
	147	AB J	<u>Wahlenbergia marginata</u>
<u>nriqu</u>	038	F	<u>Boerlagiodendron micranthum</u>
	292	G	<u>Boerlagiodendron micranthum</u>
<u>nroqinrom'be</u>	015	G	<u>Begonia</u> sp.
	293	H	<u>Begonia</u> sp.
<u>nrondaa'pu</u>	013	ABCDEFGH IJ	<u>Oenanthe javanica</u>
	261	ABCDEFGH IJ	<u>Oenanthe javanica</u>
<u>nronggaari'aara</u>	467	A DE HIJ	<u>Elatostema</u> sp.
	430	A J	<u>Pilea</u> sp.
<u>nrongge</u>	150	ABCDEFGH-J	<u>Wendlendia paniculata</u>
<u>nronri'fora</u>	153	J	<u>Ophiorrhiza</u> sp.
	129	J	<u>Trigonotis inoblita</u>
	192	J	<u>Zeuxine</u> sp.
<u>nro'nron'daara</u>	110	C	<u>Mazus pumilus</u>
	243	C	<u>Oxalis corniculata</u>
<u>nro'nrora</u>	006	G	<u>Aeschynanthus</u> sp.
	357	C E	<u>Diplycosia morobensis</u>
	037	E	<u>Epiblastus</u> sp.
	493	D G I	<u>Rhododendron bever-</u> <u>inckianum</u>
	024	ABCDE HIJ	<u>Rhododendron multi-</u> <u>nervium</u>
	208	C E G I	<u>Rhododendron</u> sp.
	350	D G I	<u>Rhododendron</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>nro'nrorā</u> (cont'd)	472	C	<u>Styphelia suaveolens</u>
	475	D I	<u>Vaccinium amplifolium</u>
	391	E	<u>Vaccinium</u> sp.
<u>nonusau'honā</u>	041	F	<u>Malaxis</u> sp.
	256	F	<u>Spathoglottis grandiflora</u>
<u>noraquarara</u>	165	F	<u>Solanum tuberosum</u>
<u>nora'waara</u>	213	E	<u>Iresine herbstii</u>
<u>nrugaahisa</u>	169	G	<u>Conandrium polyanthum</u>
	126	I	<u>Eugenia</u> sp.
	133	ABCDE HI	<u>Glochidion</u> sp.
<u>nruaanrufe'tara</u>	463	A	<u>Chloranthus officinalis</u>
<u>nrugaaqora</u>	251	B	<u>Sida rhombifolia</u>
<u>nrukaangga'vura</u>	260	J	<u>Anisomeles indica</u>
	008	ABCDEF HIJ	<u>Desmodium repandum</u>
	025	BCDEF HIJ	<u>Desmodium repandum</u>
	078	E	<u>Polygonum nepalense</u>
	178	B	<u>Viola arcuata</u>
<u>nrummyqaa'nranra</u>	220	E	<u>Embelia</u> sp.
	288	I	<u>Mikania cordata</u>
<u>nrummyqa'mmaunranra</u>	213	ABCD FG J	<u>Iresine herbstii</u>
<u>nusa'mauna</u>	052	B	<u>Hypericum gramineum</u>
	055	B	<u>Ludwigia octovalvis</u>
	059	B	<u>Polygala japonica</u>
<u>qonggonā₂</u>	470	AB-DEFGHIJ	<u>Homalomena</u> sp.
<u>qogo'mmanra</u>	153	C	<u>Ophiorrhiza</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>qogo'mmunra</u>	414	C E	<u>Solanum verbasci-</u> <u>folium</u>
<u>qopi'aara</u>	288	H	<u>Mikania cordata</u>
<u>qora'hotera</u>	122	J	<u>Dendrobium</u> sp.
	340	BC FGHI	<u>Dendrobium</u> sp.
	343	D	<u>Dendrobium</u> sp.
	347	BC FG IJ	<u>Dendrobium</u> sp.
	362	C	<u>Dendrobium</u> sp.
	491	E H J	<u>Glossorhyncha</u> sp.
	349	D I	Unident. Orchidaceae
<u>qora'kusanranra</u>	036	FG	<u>Cardamine africana</u>
	495	H	<u>Drimys piperita</u> entity <u>coriacea</u>
	263	C	<u>Impatiens balsamina</u>
	430	C	<u>Pilea</u> sp.
<u>qo'taara</u>	496	A	<u>Schefflera</u> sp.
<u>paangki₂</u>	164	ABCD H	<u>Cucurbita moschata</u>
<u>paa'ringga</u>	452	AB-DEFGHIJ	<u>Acalypha</u> sp.
<u>paasa'sora</u>	337	D	<u>Drimys piperita</u> entity <u>heteromera</u>
	160	D	<u>Geniostoma arfakense</u>
	193	E	<u>Psychotria leucococca</u>
	280	D	<u>Psychotria leucococca</u>
	132	DE	<u>Psychotria</u> sp.
	333	ABCDEF HIJ	Unident. Rubiaceae
	433	D	<u>Psychotria</u> sp.
<u>paata'faanresa</u>	285	A C	<u>Riedelia</u> c.f. <u>geluen-</u> <u>sis</u>
	087	A	<u>Riedelia</u> sp.
	356	C	<u>Riedelia</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>paataqunera</u>	191	E	<u>Rubus ledermannii</u> & <u>Rubus moluccanus</u>
	073	A	<u>Rubus rosaefolius</u>
<u>pa'haara</u>	386	A G	<u>Polystichum</u> sp.
<u>pairepai'rera</u>	380	H	<u>Epiblastus</u> sp.
<u>pepin'daara</u>	079	A C F H J	<u>Callicarpa caudata</u>
	160	C	<u>Geniostoma arfakense</u>
	018	C H	<u>Osbeckia chinensis</u>
<u>pera'rosa</u>	415	E G	<u>Alpinia</u> sp.
	214	ABC FGHIJ	<u>Canna indica</u>
<u>pim'baa'sora</u>	173	HI	<u>Calanthe micrantha</u>
	218	I	<u>Calanthe micrantha</u>
	409	H	<u>Coelogyne</u> sp.
	041	I	<u>Malaxis</u> sp.
	140	H	<u>Phreatia</u> sp.
	256	B J	<u>Spathoglottis grandiflora</u>
	058	B G	<u>Spathoglottis</u> sp.
	103	B	<u>Spathoglottis</u> sp.
<u>pi'tu</u>	517	ABCDEFGHJIJ	<u>Imperata conferta</u>
<u>po'hinifu'haa</u>	029	F	<u>Polygala paniculata</u>
	065	I	<u>Polygala paniculata</u>
	118	A DE IJ	<u>Polygala paniculata</u>
	386	F	<u>Polystichum</u> sp.
<u>pom'bomo</u>	416	B IJ	<u>Dicliptera papuana</u>
	500	B D HIJ	<u>Dicliptera papuana</u>
	410	B J	<u>Lepidagathis</u> sp.
<u>po'nraunra</u>	270	ABCDEFGHJIJ	<u>Carpodetus arboreus</u>
	211	E	<u>Pittosporum pullifolium</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>ponda'ro'rira</u>	410	D	<u>Lepidagathis</u> sp.
	420	A C E HI	<u>Rungia</u> sp.
<u>popo_a</u>	454	AB-DEFGHIJ	<u>Macaranga</u> sp.
<u>po'rera</u>	387	C	<u>Asplenium</u> sp.
	203	I	<u>Ceratostylis</u> sp.
	376	H	<u>Cyclosorus</u> sp.
	377	B	<u>Cyclosorus</u> sp.
	360	I	Unident. Orchidaceae
<u>po'ru</u>	352	E	<u>Caldcluvia brassii</u>
	483	C	<u>Olearia monticola</u>
<u>punranra</u>	341	E	<u>Alpinia</u> sp.
	291	CD F	<u>Riedelia hollandiae</u>
<u>punri'haanranra</u>	142	F	<u>Palmeria</u> c.f. <u>fenger-iana</u>
	072	C FGHIJ	<u>Scaevola oppositifolia</u>
<u>pu'nrumma</u>	455	AB- EFGHIJ	<u>Castanopsis acuminatissima</u>
<u>purau_a</u>	212	ABCDEFGH IJ	<u>Euphorbia pulcherrima</u>
<u>pwaadu</u>	424	ABCDEFGH J	<u>Harmsiopanax ingens</u>
<u>raa'haamuhaana</u>	274	H	<u>Ipomoea batatas</u>
<u>raa'kema</u>	139	ABCDE GHIJ	<u>Gardenia lamingtonii</u>
<u>raavua'taara</u>	264	A CDEFGHIJ	<u>Cordyline fruticosa</u>
<u>raukondara</u>	006	C	<u>Aeschynanthus</u> sp.
	007	C	<u>Aeschynanthus</u> sp.
	010	J	<u>Aeschynanthus</u> sp.

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>reka'rau'sara</u>	169	C	<u>Conandrium polyanthum</u>
	336	G	<u>Drimys piperita</u> entity <u>heteromera</u>
	337	HI	<u>Drimys piperita</u> entity <u>heteromera</u>
	128	C	<u>Lycianthes</u> sp.
<u>rira</u>	498	ABCDEFGHILJ	<u>Broussonetia papyrifera</u>
<u>ropa</u>	435	ABCDEFGHILJ	<u>Nastus productus</u>
<u>roro'mmunra</u>	285	H	<u>Riedelia</u> c.f. <u>geluen-</u> <u>sis</u>
	361	H	Unident. Orchidaceae
<u>rotu'muso</u>	116	F	<u>Eragrostis tenuifolia</u>
	311	G	<u>Melinus minutiflora</u>
	234	HI	<u>Poa saruwagedica</u>
	398	I	<u>Sporobolus diander</u>
<u>rcvaqara</u>	460	AB-DEFGHILJ	<u>Calycacanthus magnusi-</u> <u>anus</u>
<u>rugimauna</u>	061	B	<u>Curculigo orchioides</u>
<u>ruku</u>	415	ABCD F H J	<u>Alpinia</u> sp.
<u>saa'koko</u> & <u>saakoko</u> _r	115	B EFGH	<u>Carex brownii</u>
	121	AB EFGH	<u>Carex neoguineensis</u>
	047	B D FGHI	<u>Carex xestogyne</u>
	119	A D FGH	<u>Cyperus cyperoides</u>
	086	A EFGHI	<u>Cyperus pedunculatus</u>
	321	F	<u>Cyperus pilosus</u>
	203	F	<u>Ceratostylis</u> sp.
	482	H	<u>Danthonia archboldii</u>
	092	F	<u>Dianella ensifolia</u>
	149	FG	<u>Dianella ensifolia</u>
	338	G I	<u>Dianella ensifolia</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>saa'koko</u> & <u>saakoko</u> _r	005	F	<u>Liparis</u> sp.
(cont'd)	207	H	<u>Liparis</u> sp.
<u>saakoko</u> ₂	321	D	<u>Cyperus pilosus</u>
	418	D	<u>Scleria</u> sp.
<u>saaku'nra</u>	211	J	<u>Pittosporum pulli-</u> <u>folium</u>
	422	ABCDEFGH IJ	<u>Pittosporum rami-</u> <u>florum</u>
	024	G	<u>Rhododendron multi-</u> <u>nervium</u>
<u>saamma</u>	185	ABCDEFGH IJ	<u>Elaecharis dulcis</u>
<u>saa'mmota</u>	352	B	<u>Caldcluvia brassii</u>
<u>saapavaaqiora</u>	245	H J	<u>Miscanthus floridulus</u>
<u>saapu</u>	127	J	<u>Pullea glabra</u>
<u>saa'puta</u>	487	C	<u>Anthoxanthum angustum</u>
	397	ABC EFGH IJ	<u>Eulalia leptostachys</u>
	332	E	<u>Ischaemum polystachyum</u>
	075	G	<u>Sacciolepis indica</u>
<u>saapwaa'hora</u>	432	J	<u>Medinilla</u> sp.
<u>saara</u> _r	186	A D	<u>Cordyline fruticosa</u>
	258	A	<u>Cordyline fruticosa</u>
<u>saarisa'mmaahu</u>	201	E	<u>Eugenia</u> sp.
	230	D	<u>Eugenia</u> sp.
	453	G	<u>Garcinia</u> sp.
	514	G	<u>Syzygium</u> sp.
<u>saasa</u>	375	E G	<u>Adiantum</u> sp.
	324	ABCDEFGH IJ	<u>Cyclosorus</u> sp.
	382	B GH	<u>Cyclosorus</u> sp.
	367	E	<u>Sphenomeris chinensis</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>saasa'ko</u>	092	D	<u>Dianella ensifolia</u>
	019	F J	<u>Emilia prenanthoidea</u>
	050	BC F I	<u>Emilia prenanthoidea</u>
	255	C F I	<u>Emilia prenanthoidea</u>
	236	ABCDEFGH I J	<u>Lactuca indica</u>
	257	I	<u>Vernonia cinerea</u>
	074	G I	<u>Vernonia cinerea</u> var. <u>cinerea</u>
	017	C	<u>Wahlenbergia marginata</u>
	070	C F I	<u>Youngia japonica</u>
	232	C I	<u>Youngia japonica</u>
<u>saa'sana</u> & <u>saasana</u> _r	098	E	<u>Cosmos ?bipinnatus</u>
	357	H J	<u>Diplycosia morobensis</u>
	220	B	<u>Embelia</u> sp.
	453	J	<u>Garcinia</u> sp.
	478	J	<u>Gaultheria mundula</u>
	359	ABCD J	<u>Helicia</u> ?sp. nov.
	052	E	<u>Hypericum gramineum</u>
	085	E	<u>Ophiorrhiza ?nervosa</u>
	480	J	<u>Parahebe albiflora</u>
	351	J	<u>Prunus ?pullei</u>
	280	C	<u>Psychotria leucococca</u>
	492	E H J	<u>Rhododendron nummatum</u>
	146	E	<u>Wahlenbergia marginata</u>
	147	E	<u>Wahlenbergia marginata</u>
<u>saasana</u> ₂	168	AB DEFGH I J	<u>Amaracarpus clemensae</u>
	135	ABCDEFGH I J	<u>Symplocos</u> sp.
	477	C	<u>Symplocos</u> sp.
<u>saaso'mmaasi</u>	473	C	<u>Rapanea</u> sp.
	141	J	<u>Rhyticarium novo-</u> <u>guineense</u>
<u>saa'va</u>	352	A C	<u>Caldcluvia brassii</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>saa'vara</u>	408	ABCDEFGH IJ	<u>Araucaria cunninghamii</u>
<u>saa'veva</u>	434	F	<u>Ardisia</u> sp.
	445	J	<u>Symplocos</u> sp.
<u>saa'vevana'saara</u>	263	E	<u>Impatiens balsamina</u>
	089	J	<u>Impatiens hawkeri</u>
	277	F	<u>Impatiens</u> sp.
<u>saa'vevatau'taura</u>	434	ABCDE GH IJ	<u>Ardisia</u> sp.
	169	E J	<u>Conandrium polyanthum</u>
	453	H	<u>Garcinia</u> sp.
	160	J	<u>Geniostoma arfakense</u>
	280	J	<u>Psychotria leucococca</u>
<u>saa'vinranra</u>	205	CDE	<u>Parsonsia</u> c.f. <u>wollastonii</u>
<u>saa'vu</u>	447	ABCDEFGH IJ	<u>Hemigraphis</u> sp.
	232	D	<u>Youngia japonica</u>
<u>sa'haa'haa</u>	106	ABCDEFGH IJ	<u>Hornstedtia</u> sp.
<u>sai'sova</u>	167	A CDE IJ	<u>Harpullia</u> c.f. <u>leptococca</u>
	158	J	<u>Kibara</u> sp.
	130	J	<u>Phyllanthus flaviflorus</u>
<u>saivu'kusanranra</u>	290	B H	<u>Pollia macrophylla</u>
<u>sana & sana_r</u>	006	AB DEF HI	<u>Aeschynanthus</u> sp.
	007	AB DEF HI	<u>Aeschynanthus</u> sp.
	034	AB F HI	<u>Aeschynanthus</u> sp.
	220	A D FGH	<u>Embelia</u> sp.
	200	F J	<u>Ficus camptandra</u>
	137	G J	<u>Ficus</u> sp.
	288	A D FG J	<u>Mikania cordata</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>sana & sana</u> _r (cont'd)	189	F	<u>Palmeria fengeriana</u>
	197	G J	<u>Parsonsia curvisepala</u>
	205	J	<u>Parsonsia c.f. wolla-</u> <u>stonii</u>
	466	A -D F	<u>Parsonsia sp.</u>
	442	FG	<u>Stephania grandiflora</u>
	044	ABCDE G	<u>Trigonotis procumbens</u>
<u>sarasaanda'vu</u>	169	I	<u>Conandrium polyanthum</u>
	193	I	<u>Psychotria leucococca</u>
	280	I	<u>Psychotria leucococca</u>
	132	I	<u>Psychotria sp.</u>
	433	I	<u>Psychotria sp.</u>
	461	J	<u>Randia sp.</u>
<u>sa'tari & sa'tari</u> _r	222	FG J	<u>Alyxia lamii</u>
	485	F	<u>Amyema sp.</u>
	438	F	<u>Astronia c.f. papuana</u>
	038	AB DE GHI	<u>Boerlagiodendron</u> <u>micranthum</u>
	292	A CDE H	<u>Boerlagiodendron</u> <u>micranthum</u>
	404	C	<u>Buddleia asiatica</u>
	352	F	<u>Caldcluvia brassii</u>
	079	G I	<u>Callicarpa caudata</u>
	463	F	<u>Chloranthus offici-</u> <u>nalis</u>
	194	AB D FGHIJ	<u>Claoxylon capillipes</u>
	169	AB D	<u>Conandrium polyanthum</u>
	504	DEFG J	<u>Coriaria papuana</u>
	136	A FG	<u>Cyrtandra sp.</u>
	464	AB F	<u>Cyrtandra sp.</u>
	357	A G	<u>Diplycosia morobensis</u>
	495	AB EFG IJ	<u>Drimys piperita</u> entity <u>coriacea</u>
	336	A D	<u>Drimys piperita</u> entity <u>heteromera</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>sa'tari</u> & <u>sa'tari</u> _r (cont'd)	337	A EFG	<u>Drimys piperita</u> entity <u>heteromera</u>
	358	B G	<u>Elaeocarpus crenulatus</u>
	126	E	<u>Eugenia</u> sp.
	201	AB	<u>Eugenia</u> sp.
	373	FG	<u>Euodia</u> sp.
	510	FGH	<u>Evodiella</u> sp.
	453	F	<u>Garcinia</u> sp.
	478	A G	<u>Gaultheria mundula</u>
	160	AB GH-	<u>Geniostoma arfakense</u>
	167	B GH	<u>Harpullia</u> c.f. <u>leptococca</u>
	512	G	<u>Helicia saruwagedica</u>
	359	F	<u>Helicia</u> ?sp. nov.
	155	J	<u>Kibara</u> sp.
	158	D G	<u>Kibara</u> sp.
	128	AB D FGHIJ	<u>Lycianthes</u> sp.
	238	B	<u>Malvaviscus arboreus</u>
	239	B	<u>Malvaviscus arboreus</u>
	093	D	<u>Melastoma polyantha</u>
	159	A FG -J	<u>Melicope</u> sp.
	483	AB D F I	<u>Olearia monticola</u>
	342	B	<u>Olearia</u> ? <u>platyphylla</u>
	474	B	<u>Olearia spectabilis</u>
	082	D	<u>Phaleria</u> sp. nov.
	282	D	<u>Phaleria</u> sp. nov.
	130	G	<u>Phyllanthus flavi- florus</u>
	351	AB D	<u>Prunus</u> ? <u>pullei</u>
	193	A FG	<u>Psychotria leucococca</u>
	280	A FGH	<u>Psychotria leucococca</u>
	132	AB GH	<u>Psychotria</u> sp.
	157	A GH-	<u>Psychotria</u> sp.
	433	FG	<u>Psychotria</u> sp.
	127	AB G	<u>Pullea glabra</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>sa'tari & sa'tari</u> (cont'd)	461	F	<u>Randia</u> sp.
	473	AB D FG I	<u>Rapanea</u> sp.
	492	ABCD G I	<u>Rhododendron nummatum</u>
	481	C F	<u>Rhododendron womersleyi</u>
	506	FG	<u>Rhus taitensis</u>
	141	ABCD G	<u>Rhyticarium novoguineense</u>
	083	ABCD FGH IJ	<u>Solanum</u> sp. aff. <u>S. belense</u>
	414	AB D FGH	<u>Solanum verbascifolium</u>
	472	AB EF HIJ	<u>Styphelia suaveolens</u>
	279	D F HIJ	<u>Symplocos</u> c.f. <u>luteifolia</u>
	436	B FG J	<u>Symplocos</u> sp.
	445	FG	<u>Symplocos</u> sp.
	477	AB DEFG IJ	<u>Symplocos</u> sp.
	514	F	<u>Syzygium</u> sp.
	405	A D	<u>Triumfetta</u> c.f. <u>nigricans</u>
	476	AB DE G J	<u>Trochocarpa papuana</u>
	253	A J	<u>Urena lobata</u>
	475	B FG	<u>Vaccinium amplifolium</u>
	345	G	<u>Vaccinium keysseri</u>
	494	EF	<u>Vaccinium stricaule</u>
	391	A G	<u>Vaccinium</u> sp.
	333	G	Unident. Rubiaceae
<u>sauru</u>	495	D	<u>Drimys piperita</u> entity <u>coriacea</u>
<u>simmaa'uru</u>	004	F	<u>Symbegonia</u> sp.
	054	B	<u>Viola arcuata</u>
<u>si'mmisa</u>	168	C	<u>Amaracarpus clemensae</u>
	357	D	<u>Diplycosia morobensis</u>
	476	C	<u>Trochocarpa papuana</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>si'mmoka</u>	320	ABCDEFGH I J	<u>Maesa</u> sp.
<u>soko'kora</u>	275	B E G J	<u>Ipomoea batatas</u>
	295	ABCD FGHIJ	<u>Ipomoea batatas</u>
<u>som'bura</u> & <u>sombura</u> _r	263	J	<u>Impatiens balsamina</u>
	003	A CD J	<u>Impatiens hawkeri</u>
	188	J	<u>Impatiens</u> sp.
	301	F J	<u>Impatiens</u> sp.
<u>so'mi</u>	027	E	<u>Bidens pilosa</u>
	042	ABCDEFGH I J	<u>Trachymene adenodes</u>
	123	ABCDEFGH I J	<u>Trachymene adenodes</u>
	486	ABCDEFGH I J	<u>Trachymene adenodes</u>
<u>son'daira</u>	459	F HI	<u>Laportea decumana</u>
<u>sondara</u>	238	A CDEFGH I J	<u>Malvaviscus arboreus</u>
	239	A CDEFGH I J	<u>Malvaviscus arboreus</u>
<u>so'para'waara</u>	407	D	<u>Crotalaria mucronata</u>
	213	HI	<u>Iresine herbstii</u>
	063	BC FG	<u>Lupinus</u> sp.
<u>so'rera</u>	048	ABCDEFGH I J	<u>Graptophyllum</u> sp.
	316	ABCDEFGH-	<u>Graptophyllum</u> sp.
<u>so'vati</u>	047	J	<u>Carex xestogyne</u>
	119	C	<u>Cyperus cyperoides</u>
	321	J	<u>Cyperus pilosus</u>
	183	J	<u>Fimbristylis dichotoma</u>
	326	H	<u>Garnotia mezii</u>
	114	C	<u>Juncus effusus</u>
	369	C	<u>Juncus effusus</u>
	412	A CDEFGH I J	<u>Pteris</u> sp.
	516	J	<u>Scirpus ternatanus</u>
	044	F	<u>Trigonotis procumbens</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>so'vovira</u>	032	D	<u>Impatiens hawkeri</u>
	250	D	<u>Impatiens</u> sp.
<u>sunravaa'kura</u>	404	A EF H J	<u>Buddleia asiatica</u>
	505	C	<u>Derris</u> sp.
	220	C	<u>Embelia</u> sp.
	095	B	<u>Gunnera macrophylla</u>
<u>su'raa'rora</u>	275	A D F HI	<u>Ipomoea batatas</u>
	295	E	<u>Ipomoea batatas</u>
<u>switira</u>	274	ABCD FG IJ	<u>Ipomoea batatas</u>
<u>taa'baaki</u>	268	AB D I	<u>Nicotiana tabacum</u>
<u>taa'bana</u>	495	C	<u>Drimys piperita</u> entity <u>coriacea</u>
<u>taambaam'bira</u>	328	A CDEFGHIJ	<u>Mussaenda ferruginea</u>
<u>taam'batl</u>	201	IJ	<u>Eugenia</u> sp.
<u>taam'bira</u>	431	AB EF H J	<u>Piper</u> sp.
	446	F	<u>Piper</u> sp.
<u>taana'nrunra</u>	059	H	<u>Polygala japonica</u>
<u>taana'popi</u>	035	J	<u>Corsia</u> sp.
	061	C	<u>Curculigo orchiodes</u>
	041	B	<u>Malaxis</u> sp.
	305	ABCD F H J	<u>Thelymitra papuana</u>
<u>taa'nrau</u>	381	ABCDEFGH IJ	<u>Asplenium nidus</u>
	421	BCDEFGH	<u>Belvisia</u> sp.
	378	G	<u>Selliguea</u> sp.
<u>taandara'nruqa</u>	102	F	<u>Commelina diffusa</u>
	249	B	<u>Commelina diffusa</u>
	370	J	<u>Lindernia anagallis</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>taandara'nruga</u>	176	H	<u>Unident. Fungus</u>
(cont'd)	196	H J	<u>Unident. Fungus</u>
<u>taan'dauna</u>	387	J	<u>Asplenium sp.</u>
	325	AB D G IJ	<u>Hypolepis sp.</u>
	374	ABCDEFGH IJ	<u>Hypolepis sp.</u>
<u>taagon'de</u>	504	ABC HI	<u>Coriaria papuana</u>
	357	I	<u>Diplycosia morobensis</u>
	179	C	<u>Physalis peruviana</u>
	476	I	<u>Trochocarpa papuana</u>
<u>taapi'pira</u>	203	E H	<u>Ceratostylis sp.</u>
	119	E J	<u>Cyperus cyperoides</u>
	086	J	<u>Cyperus pedunculatus</u>
	321	G	<u>Cyperus pilosus</u>
	394	D	<u>Cyperus sesquiflorus</u>
	183	E	<u>Fimbristylis dichotoma</u>
	114	B DE H J	<u>Juncus effusus</u>
	369	B E	<u>Juncus effusus</u>
	055	G J	<u>Ludwigia octovalvis</u>
	322	B H	<u>Ludwigia octovalvis</u>
	365	GH J	<u>Ludwigia octovalvis</u>
	328	B	<u>Mussaenda ferruginea</u>
	329	D	<u>Scirpus mucronatus</u>
	516	G	<u>Scirpus ternatanus</u>
<u>taa'puqa</u>	354	ABCDEFGH IJ	<u>Cyathea sp.</u>
	355	ABCDEFGH IJ	<u>Cyathea sp.</u>
	382	I	<u>Cyclosorus sp.</u>
	323	E	<u>Diplazium sp.</u>
	386	C E HIJ	<u>Polystichum sp.</u>
<u>taa'rapasarasana</u>	476	F	<u>Trochocarpa papuana</u>
<u>taa'ropasana</u>	205	A GHI	<u>Parsonsia c.f. wollastonii</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>taa'ropasana</u> (cont'd)	466	H	<u>Parsonsia</u> sp.
<u>taa'ropi'nraana</u>	351	E	<u>Prunus</u> ? <u>pullei</u>
<u>taatare'vanranra</u>	222	H	<u>Alyxia</u> <u>lamii</u>
	466	I	<u>Parsonsia</u> sp.
<u>taatavaa'tira</u>	019	G	<u>Emilia</u> <u>prenanthoidea</u>
	050	E	<u>Emilia</u> <u>prenanthoidea</u>
	255	G	<u>Emilia</u> <u>prenanthoidea</u>
	105	BCDEF HIJ	<u>Euphorbia</u> <u>serrulata</u>
	052	G J	<u>Hypericum</u> <u>gramineum</u>
	143	D	<u>Hypericum</u> <u>gramineum</u>
	172	E	<u>Sciaphila</u> sp.
	368	J	<u>Smithia</u> <u>sensitiva</u>
	070	B	<u>Youngia</u> <u>japonica</u>
<u>taaqu</u>	336	B	<u>Drimys</u> <u>piperita</u> entity <u>heteromera</u>
	337	B	<u>Drimys</u> <u>piperita</u> entity <u>heteromera</u>
	445	I	<u>Symplocos</u> sp.
<u>taa'vaaru</u>	167	F	<u>Harpullia</u> c.f. <u>lepto-</u> <u>cocca</u>
	158	H	<u>Kibara</u> sp.
	130	ABCDEF HI	<u>Phyllanthus</u> <u>flavi-</u> <u>florus</u>
<u>taa'vara</u>	314	ABCDEFGH-J	Unident. shrub
<u>taa've</u>	229	ABCDEFGH-IJ	<u>Alphitonia</u> <u>incana</u>
<u>taavu'raa</u>	513	ABCDEFGH-IJ	<u>Macaranga</u> sp.
<u>taaza</u>	259	ABCDEFGH-IJ	<u>Casuarina</u> <u>papuana</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>tain'dega</u>	407	B	<u>Crotalaria mucronata</u>
	021	ABCDEFGH IJ	<u>Salvia splendens</u>
	066	B F I	<u>Tephrosia vogelii</u>
<u>tai'nruku</u>	050	D	<u>Emilia prenanthoidea</u>
	255	D	<u>Emilia prenanthoidea</u>
	110	B	<u>Mazus pumilus</u>
	068	C	<u>Mitrasacme pygmaea</u>
	029	C	<u>Polygala paniculata</u>
	054	C G	<u>Viola arcuata</u>
	178	C H	<u>Viola arcuata</u>
	033	BCDEFGH IJ	<u>Viola betonicifolia</u>
	070	D	<u>Youngia japonica</u>
<u>ta're'rora</u>	159	B	<u>Melicope</u> sp.
<u>taunu'sora</u>	377	E	<u>Cyclosorus</u> sp.
<u>taura₂</u>	317	ABC EF H-J	<u>Themeda intermedia</u>
<u>tembum'bura</u>	241	ABCDEFGH IJ	<u>Piper macropiper</u>
	390	E J	<u>Piper</u> sp.
<u>tepoqara</u>	479	A C GHI	<u>Anaphalis mariae</u>
	071	I	<u>Blumea lacera</u>
	020	ABCDEFGH IJ	<u>Helichrysum bracteatum</u>
	076	B	<u>Sopubia trifida</u>
<u>te'tara</u>	426	C GHIJ	<u>Graptophyllum</u> sp.
	448	AB EFG IJ	<u>Graptophyllum</u> sp.
<u>teti'rerira</u>	341	D	<u>Alpinia</u> sp.
<u>te'vora</u>	348	ABCDEFGH IJ	<u>Dendrobium</u> sp.
	300	D	<u>Glossorhyncha</u> sp.
	491	I	<u>Glossorhyncha</u> sp.
	171	D J	<u>Phreatia</u> sp.
	361	CD	Unident. Orchidaceae

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>ti'saaru</u>	518	ABCDEFGHIJ	<u>Euphorbia buxoides</u>
<u>titi'vona</u>	260	I	<u>Anisomeles indica</u>
	102	B IJ	<u>Commelina diffusa</u>
	249	A C E J	<u>Commelina diffusa</u>
	499	C	<u>Cyanotis</u> sp.
	290	FG	<u>Pollia macrophylla</u>
	368	B	<u>Smithia sensitiva</u>
<u>to'hongginranra</u>	264	B	<u>Cordyline fruticosa</u>
<u>tombinranra</u>	459	AB-DE G J	<u>Laportea decumana</u>
<u>tombirira</u>	030	ABCDEFGHIJ	<u>Desmodium gyroides</u>
	053	ABCDEFGHIJ	<u>Desmodium gyroides</u>
	077	ABCDEFGHIJ	<u>Desmodium sequax</u>
	226	ABCDEFGHIJ	<u>Desmodium sequax</u>
	365	I	<u>Ludwigia octovalvis</u>
	253	E	<u>Urena lobata</u>
<u>tondaam'bu</u>	294	ABCDEFGHI	<u>Saurauia c.f. conferta</u>
	313	D	<u>Saurauia</u> sp.
	439	CD F I	<u>Saurauia</u> sp.
<u>tonre'rera</u>	281	ABCDEFGHIJ	<u>Amyema</u> sp.
	485	ABCDE GHIJ	<u>Amyema</u> sp.
	475	J	<u>Vaccinium amplifolium</u>
	345	C HIJ	<u>Vaccinium keysseri</u>
	391	HI	<u>Vaccinium</u> sp.
<u>tonggaqa</u>	174	ABCDEFGHIJ	<u>Alpinia floccosa</u>
	134	ABCDEFGH	<u>Alpinia</u> sp.
	315	D FGH	<u>Alpinia</u> sp.
	341	G J	<u>Alpinia</u> sp.
	291	E GHI	<u>Riedelia hollandiae</u>
	091	J	<u>Riedelia monticola</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>to'ru</u>	164	EFG J	<u>Cucurbita moschata</u>
<u>to'sosa</u>	441	ABCDEFGH IJ	<u>Pandanus julianettii</u>
<u>to'taga</u>	209	G	<u>Exocarpus erythro-</u> <u>caulis</u>
	508	ABC E G I	<u>Vaccinium albicans</u>
	069	HI	<u>Vaccinium stricaule</u>
	494	BC	<u>Vaccinium stricaule</u>
	391	BC	<u>Vaccinium</u> sp.
	307	CDE GH	Unident. shrub
<u>to'teza</u>	034	G	<u>Aeschynanthus</u> sp.
	465	A - FGHIJ	<u>Bubbia</u> sp.
	336	F HI	<u>Drimys piperita</u> entity <u>heteromera</u>
<u>toti'nron'daara</u>	202	D	<u>Bulbophyllum</u> sp.
	335	DE	<u>Ceratostylis</u> sp.
	300	H	<u>Glossorhyncha</u> sp.
	198	DE	<u>Pedilochilus</u> sp.
	171	E	<u>Phreatia</u> sp.
	210	E	<u>Phreatia</u> sp.
<u>tove'nra</u>	371	ABCDEF HI	<u>Cyathea</u> sp.
	323	F	<u>Diplazium</u> sp.
	325	F	<u>Hypolepis</u> sp.
<u>to'zanggi'taira</u>	321	H	<u>Cyperus pilosus</u>
	394	B H	<u>Cyperus sesquiflorus</u>
	329	B	<u>Scirpus mucronatus</u>
<u>tua'nrausa</u>	201	H	<u>Eugenia</u> sp.
	514	H	<u>Syzygium</u> sp.
<u>tunaa'porana</u>	072	B	<u>Scaevola oppositifolia</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>tu'raatura</u>	404	G	<u>Buddleia asiatica</u>
	160	F	<u>Geniostoma arfakense</u>
	483	G	<u>Olearia monticola</u>
	313	ABC EFGH-J	<u>Saurauia sp.</u>
	439	A H	<u>Saurauia sp.</u>
	502	G	<u>Saurauia sp.</u>
<u>tu'runduwana</u>	155	G	<u>Kibara sp.</u>
	432	B	<u>Medinilla sp.</u>
	082	ABC EFGHIJ	<u>Phaleria sp. nov.</u>
	282	ABC EFGHIJ	<u>Phaleria sp. nov.</u>
<u>turu'rora</u>	010	C	<u>Aeschynanthus sp.</u>
<u>tusa'tara</u>	436	C	<u>Symplocos sp.</u>
<u>quara'maanu'vora</u>	010	D	<u>Aeschynanthus sp.</u>
<u>quara'nraa'tora</u>	490	I	<u>Geranium potentilloides</u>
	111	E	<u>Lysimachia japonica</u>
	051	A	<u>Oxalis corniculata</u>
	231	I	<u>Ranunculus basilobatus</u>
	054	J	<u>Viola arcuata</u>
	178	J	<u>Viola arcuata</u>
<u>quaran'doga</u>	499	G	<u>Cyanotis sp.</u>
	050	J	<u>Emilia prenanthoidea</u>
	070	J	<u>Youngia japonica</u>
	192	E	<u>Zeuxine sp.</u>
<u>quara'raukondara</u>	010	B GHI	<u>Aeschynanthus sp.</u>
	292	I	<u>Boerlagiodendron micranthum</u>
	126	D	<u>Eugenia sp.</u>
	481	H	<u>Rhododendron womersleyi</u>
	141	I	<u>Rhyticarium novoguineense</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>quara'rankondara</u> (cont'd)	436	H	<u>Symplocos</u> sp.
<u>guna</u> ₂	237	ABCDEFGH I J	<u>Lablab</u> <u>purpureus</u>
<u>qu'nera</u>	012	ABCDEFGH I J	<u>Rubus</u> <u>rosaefolius</u>
	046	ABCDEF H I J	<u>Rubus</u> <u>rosaefolius</u>
	073	BCDEFGH I J	<u>Rubus</u> <u>rosaefolius</u>
	049	ABCDEFG H J	<u>Rubus</u> sp.
	064	ABCDEFGH I J	<u>Rubus</u> sp.
<u>gunera</u> ₂	191	BCD G J	<u>Rubus</u> <u>ledermannii</u> & <u>Rubus</u> <u>moluccanus</u>
<u>gunro</u> ₂	245	ABCDEFG I	<u>Miscanthus</u> <u>floridulus</u>
<u>qu'rauga</u>	006	J	<u>Aeschynanthus</u> sp.
	007	G	<u>Aeschynanthus</u> sp.
	034	CD J	<u>Aeschynanthus</u> sp.
	493	ABC EF H J	<u>Rhododendron</u> <u>beyer-</u> <u>inckianum</u>
	024	F	<u>Rhododendron</u> <u>multi-</u> <u>nervium</u>
	481	AB J	<u>Rhododendron</u> <u>womers-</u> <u>leyi</u>
	208	AB D F H J	<u>Rhododendron</u> sp.
	350	ABC EF H J	<u>Rhododendron</u> sp.
<u>vaa'teqatan'daara</u>	463	DE GH I J	<u>Chloranthus</u> <u>offici-</u> <u>nalis</u>
	193	H	<u>Psychotria</u> <u>leucococca</u>
<u>vaateza'hukwanranra</u>	358	C	<u>Elaeocarpus</u> <u>crenulatus</u>
	445	C	<u>Symplocos</u> sp.
<u>vindivindi'nraana</u>	376	I	<u>Cyclosorus</u> sp.
	481	G	<u>Rhododendron</u> <u>womers-</u> <u>leyi</u>
	472	G	<u>Styphelia</u> <u>suaveolens</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>waaki'kora</u>	011	B J	<u>Impatiens hawkeri</u>
	089	B	<u>Impatiens hawkeri</u>
	250	C	<u>Impatiens sp.</u>
	277	BC E GHIJ	<u>Impatiens sp.</u>
	301	C	<u>Impatiens sp.</u>
<u>waam'buri</u>	218	C H	<u>Calanthe micrantha</u>
	035	D	<u>Corsia sp.</u>
	338	C	<u>Dianella ensifolia</u>
	256	CD GHI	<u>Spathoglottis grandiflora</u>
	058	A CDEF HIJ	<u>Spathoglottis sp.</u>
	103	A CDEFGHI	<u>Spathoglottis sp.</u>
<u>waangga</u>	078	ABCD FGHIJ	<u>Polygonum nepalense</u>
<u>waagoga</u>	101	ABCDEFGHJIJ	<u>Cassia floribunda</u>
	407	A	<u>Crotalaria mucronata</u>
<u>waagora₂</u>	117	ABCDEFGHJIJ	<u>Ficus augusta</u>
	392	HI	<u>Ficus xylosyia</u>
<u>waa'vaari</u>	126	B	<u>Eugenia sp.</u>
	127	E	<u>Pullea glabra</u>
	506	I	<u>Rhus taitensis</u>
<u>waavara</u>	423	ABCDEFGHJIJ	<u>Schefflera sp.</u>
	496	GHIJ	<u>Schefflera sp.</u>
<u>waihara</u>	121	J	<u>Carex neoguineensis</u>
	047	A C	<u>Carex xestogyne</u>
	119	B	<u>Cyperus cyperoides</u>
	086	B	<u>Cyperus pedunculatus</u>
	482	E	<u>Danthonia archboldii</u>
	234	J	<u>Poa saruwagedica</u>
	516	F H	<u>Scirpus ternatanus</u>
	418	G I	<u>Scleria sp.</u>

<u>Plant Name</u>	<u>Coll.</u>	<u>Informants</u>	<u>Determination</u>
<u>wasai'honri</u>	416	G	<u>Dicliptera papuana</u>
	420	FG	<u>Rungia</u> sp.
<u>wasai'kovu</u>	318	D FGH	<u>Impatiens</u> sp.
<u>waundaa'vura</u>	265	D I	<u>Oenanthe javanica</u>
<u>qaati'nenta</u> (lit., 'nothing,' i.e., NO NAME)	209	A	<u>Exocarpus erythro-</u> <u>caulis</u>

Totals:

Number of Plant Collections	517
Number of Genera Represented	261+
Number of Species Represented	346+
Number of Distinct Responses	652
Number of Synonyms	98
Number of Descriptive Phrases	50
Number of Polysemous Expressions	16
Number of Conceptually Distinct Responses	488

APPENDIX 6 DISCOVERED "USES" OF PLANTS IN NDUMBA

Listed below are 269 distinct ways in which plants are variably utilized, or otherwise differentially responded to, in Ndumba. Together with each listed "use" is recorded the number of terminal, or lowest-level, folk plant taxa which are associated with the use in question. Sources for the data, as described in Chapter III, include both direct observations by the author and informants' statements in response to direct queries about each plant name. While the list below is doubtless not exhaustive, it is believed to be nearly so.

For economy in presentation, and to lend some organization to the listing, the data are presented in several groups, roughly corresponding to "classes" of uses which, to some extent, are validated by Tairora expressions which may be used to label all of the plants included in the groups, e.g., fu'haa ('medicine'), fusara ('food'), funruqaa ('ornamentation'). Other groupings have no basis other than ethnographic convention.

Food Plants (fusara)

Bulb eaten	3
Tuber eaten	85
Fruit, nut or kernel eaten	82
Stem eaten	21
Seeds eaten	6
Root eaten	2
Inflorescence eaten	16
Shoots eaten	1
Pith eaten	22
Leaf or frond eaten	64
Leaf wrapped around roasted banana, eaten	1
Leaf burned and ashes eaten as salt	1
Wrap pork and marsupial meat; good smell	
said to flavor meat	2
Source of <u>gwaza</u> {tree grubs}	114
Source of water {from stalk}	23
Good place to find edible mushrooms	2

Clothing (bruga) and Ornamentation (funruqaa)

Reed skirt (<u>pu'nraana</u>)	1
Pounded bark skirt (<u>pa'haara</u>)	1
Child's play skirt (<u>qeta'saamma</u>)	11
Pounded bark cape (<u>faapa</u>)	1
Men's undergarment (<u>dai'mora</u>)	1
Men's orchid fiber waistbands (<u>hogusa</u>)	4
Legbands (<u>hinranra</u>)	1
Armbands (<u>humba</u>)	6
Wristlets (<u>haasa'sura</u>)	1
Orchid fiber bandolier (<u>noqu</u>)	1
Orchid fiber necklace (<u>te'vora</u>)	1
Seed case necklace (<u>nra'nraa'mmai</u>)	3
"False fruits" necklace (<u>kung'gura</u>)	3
Decorative chains (<u>nraaganra'faarembaa'rera</u>)	11
"Belt" for reed skirts (<u>qaa'mmanri</u>)	1
Chin strap for headdress	1
Frame for headdress	1
Thistle headdress	1
Center peg for pig tusks (in nasal septum)	1
String base for feather headband	1
String base for marsupial fur headband	1
String for seed case necklace	2
String for orchid fiber bandolier	1
Temporary rain hat (leaf)	31
Juice rubbed on hair	2
Paint face with fruit juice	2
Nose decoration (<u>mmaato'nronri</u>)	1
Flowers or fruits worn as ornament	95
Leaf or frond worn as ornament	94
Planted to decorate garden or hamlet	39
Orchid fiber streamers for arrows	2
Leaf decorations for food bundles	23
Ornament on men's house	2
String for orchid fiber necklace	1

Medicine (fu'haa)

Inhale smoke of leaf	89
Rub skin with leaf	15
Hit skin with leaf	8
Rub skin with wet, mashed root	1
Put milky sap on sores	1
Wrap leaf around sores	1
Spit bark on skin	1
Spit leaf or bark on food	4
Eat leaf and spit on sores	2
Eat leaf	4
Eat bark	5
Purgative (smell)	1
Wear leaf and sing	1
Feed bark to sick pigs	2

Construction Materials

Lumber:

Hunting blind	16
Bridge	148
Cane fence	3
Fence for men's house	2
Bark fence	1
Fence posts	149
Fence middle (cross-saplings)	15
House posts	143
House walls and floor	14
House floor pole	2
House center post	1
House roof	25
House door	5
Men's house center post	2
Temporary bush shelter	23
Pig house	1
Bed	5
Prop sticks (for yams, beans and sugar cane)	153
Trap	155
Planks for bridge	2
Water diverter	10
Pole for ceremonial dancing	3

Lashing Materials:

Fasten bridge	35
Fasten fence	41
Fasten house walls	37
Fasten house roof	1
Fasten trap	17
Fasten firewood bundles	17
Fasten bananas	6
Fasten yams, beans and sugar to props	39
Fasten food bundles	1
Fasten tubes of cooked meat	4
Pull trees for bridge	2
Arrow bindings (tomma)	1
Arrow bindings (hi' nraana)	1
Arrow bindings (mmaqaavu)	1
Fasten bamboo sheaths on cooked meat tubes	2
Leaf fastening for arrows	1
Brace for banana plant against wind	1
Fasten bowstring	3
Fasten stone adze blade	4
Glue in arrow bindings	2
Tie up corpse in bark cape	1

Containers

Gourd for cooked ferns	1
Water tubes	11
Cooking tubes	8
Tubes placed around reeds while growing	1

Implements

Digging stick	13
Walking stick	2
Fire saw	11
Adult's bow	3
Child's bow	4
Bowstring	5
Arrow shafts	1
Arrow heads	23
Child's arrows	1
Adze handle	3
Axe handle	7
Knife	11
Comb	7
Hair brush	1
Bark beater	1
Taro scraper	1
Rope tree-climbing aid	4

Musical Instruments

Drum	2
Pounding tubes	1
Jew's harp	10
Body of trumpet	1
Horn of trumpet	1
Panpipes	1
Child's seed whistle	1

Toys

Child's marbles	2
Child's ball	1
Child's hoop	1

Wrapping Materials

Dry leaf -- wrap arrows	11
Wrap arrow bundles	11
Wrap and cook marsupial meat	1
Wrap rats in leaves and cook at funeral	4

Wrapping Materials (cont'd)

Wrap and cook mushrooms	15
Wrap food for earth oven	3
Wrap sweet potato in leaves if no bag	1
Wrap newborn infant	1
Wrap and cook brains of first marsupial killed by young boy	1
Cover earth oven with leaf and frond	25

Hunting and Trapping Aids

Eel bait	1
Bird bait	1
Rub fruit juice on trap as lure	1
Rub bark juice on trap as lure	1
Birds drink water from flowering parts	3
Birds eat fruit	205
Birds eat leaf or frond	2
Birds eat flower	4
Cassowary eats fruit	11
Flying fox eats fruit	15
Birds make nests	183
Marsupials eat fruit	169
Marsupials eat leaf or frond	20
Marsupials eat flower	3
Marsupials eat bark	2
Tree kangaroo eats fruit	1
Marsupials live in hole	162
Marsupials live in leaf clusters	10
Tree kangaroo sits on branches	1
Wild pigs eat fruit	1
Wild pigs make houses	3
Rats strip fronds (thus, evidence that rats are near)	1
Rats build houses	4
Construct hunting sign to indicate plentiful game to other hunters	1

"Ritual"

Planted to enrich soil	1
Garden magic (planted with crops)	34
Bind sugar to stick to make grow tall	1

Childbirth:

New father cooks ferns, stuffs ashes
with water into marsupial meat, then
distributes to kinsmen to eat

1

"Ritual" (cont'd)**Childbirth (cont'd):**

While wife in childbirth house, if
man wants to eat squash, must eat
mixture of banana, salt and pork fat 11

Woman, after childbirth, washes hands
with mashed banana before cooking food 11

New father must rub hands with burned
leaves before eating food 3

Leaf eaten after childbirth 1

Women decorate ground at childbirth
house 1

Strike new mother with leaves 1

gummaanra initiation:

Leaves eaten with ginger and salt 1

Mark nose 1

Juice rubbed on torso of initiate 2

Juice rubbed on arrows 2

Eaten by new initiates 2

Initiates decorated with leaf and
stems 1

Decorate cassowary bone 1

All eat leaf and shoots 2

Decorate initiate 1

Men eat bark 1

Men eat leaf 2

Leaves worn by men 1

Initiates lick leaves until tongues
bleed 2

Stiff edge inserted into nostrils to
bleed initiates 2

New leaf worn as belt by initiates 1

Decorate sugar cane 1

Hit skin to raise welts (on initiates) 7

Rub cheeks to raise welts (on men) 1

kwaasi initiation:

Women eat bark 3

Women eat leaf 1

Hit skin to raise welts (on initiates) 7

Stiff sedge inserted into nostrils to
bleed initiates 2

"Ritual" (cont'd)

gia'vaati initiation:

Leaf belt worn by men	3
Leaf cut up and eaten by men	1

Marriage:

Juice rubbed on torso of bride	2
Burn leaves	1
Couple eat bark with taro	1
Used in sex instruction	6

Funeral:

Leaves and saplings placed inside shrine	12
Small twist worn in hair, then placed in house wall to show mourning	1
Rub food and skin with leaves at feast	1
Leaf cooked in clay pot with pork, presented to spirit of corpse, later eaten	5
Sugar placed in shrine	18
Planted at gravesite	1
Brush flies away from corpse	1

Love Magic:

Give leaf to object of affection: when eaten, will requite	5
Revenge when love magic fails; place leaf in split cane grass and leave on doorstep; will cause crippling	1

Sorcery:

1

Counter-Sorcery:

Cook and eat leaf	12
Culm shot at suspected village of sorcerer like arrow	1
Feed leaf to pig to increase fat	20
Flowers and leaves used in curing ceremony for sick child	9

Hunting luck:

Men eat stem and leaf	3
Men eat bark	2

"Ritual" (cont'd)**Hunting luck (cont'd):**

Men rub leaf on eyes and hands	1
Men rub bark on forehead	1
Men feed leaf and stem to dog	9
Men feed bark to dog	2
When man kills marsupial or woman kills rats, put flower in hair or ear as sign to others	1

Miscellaneous

Strengthen reed pond walls	1
Strengthen garden ground	1
Smoking pipe	9
Smoke leaf	3
Wrap tobacco	1
Pipe filter	1
Start fire	16
Firewood	242
Sleeping mat	5
Torch	18
Bull-roarer	4
Headrest	1
Shield	1
"Pulley" in hunting blind	1
"Cowbell" for dog	1
Sandpaper	1
Baby sling	1
String for string bag	5
Vegetable dyes	6
Vine "time marker"	4
Cash crop (coffee)	1
Shade for coffee trees	1
Hit skin in play	7
Juice thrown in play-fighting	2
Mark garden boundary	21
Mark bird hunting blind	2
Mark marsupial hunting blind	3
Mark future marriage	13
Menstrual pad	1
Catch blood at childbirth	1
Clean up blood after childbirth	1
To eat would cause vomiting	1
Hallucinogenic bark	4
To brush against would result in "teleportation"	1
To touch would be fatal poison to women	1
If cut vine, will sicken and die	1

Miscellaneous (cont'd)

If felled, women's breasts will dry up
Spirits' food

1
3

A total of 57 plant names were said to refer to plants which were totally "useless," even within the broad scope illustrated above.

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