

## THE HIGH ALTITUDE ETHNOBOTANY OF THE ROLWALING SHERPAS

Janice Sacherer\*

Ethnobotany is a subject of more than scholarly or historical interest in Nepal. In the five years 1970-1975, the export earnings from the sale of Nepalese medicinal plants rose from one and a half to nearly ten million rupees (Malla 1977:194), a trend which held in the subsequent years (HMG Trade Promotion Center 1978:6), and which represents approximately 3% of the total exports of Nepal (Dobremez 1977:9). Potential uses of medicinal plants from the higher altitude regions remain under-developed compared to those from the temperate middle ranges and tropical zones (Malla 1977:198), but the possibilities of exploitation are attractive when one considers the ease of transportation and the high profits involved in medicinal plants as compared to the heavier, bulkier, and less valuable agricultural products of these remote regions.

Numerous problems arise in any discussion of the uses of wild plants in Nepal because the flora of the Himalayan regions is so often valley specific. While interesting to the botanist, the endogamous nature of many of these plants is not very useful to the commercial entrepreneur. Even in the case of closely related plants, it is difficult to know if the different species and subspecies contain the same properties, much less how they compare to related species in the far more geographically remote Tibetan, Chinese, and Indian Ayurvedic systems. Another difficulty is the tendency for all plants with special characteristics to be used in some capacity but often in a very different one, depending on the region and the ethnic group. Thus we find the aromatic root, nardostachys jatamansi, being used either as incense (Sacherer 1977:131) or as medicine (Dobremez 1977:104), while rheum emodi, a type of rhubarb is used as food (Jest 1974), as medicine (Dobremez 1977:103), and as a catalyst in setting both natural and chemical dyes (Sacherer 1977:134) depending on the community. Still another problem is that of maintaining uniformity of collection and preservation, a task made particularly difficult in Nepal by the occurrence of the monsoon at the height of the wild plant and mushroom season.

Despite all of these problems however, research and cultivation of wild plants, particularly medicinal ones, continues to be an active concern of His Majesty's Government, particularly the long established Department of Medicinal Plants. This institution

---

\*Dr. Janice Sacherer is a Research Scholar affiliated with CNAS.

has published numerous books, as for example, Medicinal Plants of Nepal, (Dept. of Medicinal Plants 1970), and has sent a number of its members abroad to study and publish, particularly at French institutions (Shrestha 1974; Dobremez et al 1974). It also maintains a large experimental botanical garden at Godavari, and similarly, a large herbarium in Kathmandu, as well as eight botanical farms located in the Nepalese country side. In addition, there is a pharmacognostical division of the Royal Drug Co. which does chemical analyses of herbal medicines.

Because of this long standing interest on the part of local researchers and also because of the potential economic significance, it was thought important to investigate and report on the ethnobotany, but particularly the medicinal plants, of the high altitude, remote, and impoverished Sherpa community of Rolwaling.<sup>1</sup>

Rolwaling is an east-west valley running parallel with the Chinese border (North 27°85', West 86°20'-86°30'). The northern mountain range forms the frontier and contains Gauri Shanker, an unclimbed peak of 7,100 m. The valley itself is 30 km. long and never more than one km. wide. The human habitations in Rolwaling range from the winter villages at 3,600 m. to the temporary summer yak camps at 5,000, and are encircled on three sides by 6,000 m. mountains. There are passes to the north, south, and east, but the lowest of these is 5,300 m. and it is only via the western end of the valley that there is easy access to the outside world through Simigaon and the Tamba Kosi river valley. It was in the 3,600 m. to 5,000 m. range of human habitation that the following botanical collection and observations were made.

Altogether some 297 different species of plants were identified from this altitude zone while the local Sherpas had names for about 150 or half, of these (Sacherer 1977b:191-199). If one separates the medium altitude plants (those growing from 3,600 m. up to 4,100, from those growing at extreme altitudes, one finds that nearly all of them have Sherpa names. This knowledge of plant life and the pride taken in it by all adult Sherpas stands in marked contrast to the ignorance and apathy displayed toward the wildlife of the area, a phenomenon related to the fact that many wild plants are utilized by the Sherpas for food, medicine, and religious purposes while hunting in the valley is forbidden by their religion.

In searching for the meanings of the various Sherpa names, one finds that about one third are still remembered and that most of these relate either to characteristic descriptions or to the potential use. Typical examples of descriptive names include chu tsa (water grass), a type of grass found only in marshes or within the reach of the spray of the valley's many waterfalls, mendo serma

(flower yellow), kali tsermang (blackbird thorn), and shamu (hat) for mushrooms. Examples of names indicating the potential use of the plant are tsa men (grass medicine), re pedzu (goats' spinach) and dangin dra (pheasant rice) as well as the category of plants known as sra jung or sra jungma (hair young), which are small fuzzy leafed plants that are particularly useful when dried and used as kindling for fires.

The Sherpa sense of aesthetics include an appreciation of the numerous flowers dotting the monsoon landscape and several songs celebrating their beauty including one dedicated to the primula, Pangi mendo (first flower) which is the first bloom to appear in the spring and the red rhododendron known as kalma, also an early spring flower. A number of juniper trees have been planted in front of the gomba (Buddhist temple) and the village council has passed a ruling that no trees could be cut in the forest opposite the village of Beding and the gompa so as not to spoil the serenity of the view.

The idea that plants are living creatures that ought not to be harmed if possible finds expression in the belief that no plants should be picked or cut on the various religious holidays and the idea that certain plants have unique characteristics relating to religious history. Thus, one is told, the shukpa, Juniperus recurva and the pamu, Juniperus indica, are bent and crooked because they were alive when Buddha walked the earth and were so sad at his death that they became permanently bent over with grief. Yet another interesting story, secular in nature, involves the bamboo which is said to have grown very straight and tall in the beginning thinking itself better than other plants only to realize that such lofty heights were lonely, and eventually bending over in order to be with its shorter friends. Still another relates that the rhododendron and oak had a debate during winter as to which tree was the best but when spring came and the rhododendron burst forth with beautiful flowers, the oak became so ashamed that it began to grow crooked and cracked.

In addition to these morality stories about plants, the Sherpas have some folk beliefs regarding the sexuality of certain plants which appear to have both flowered and flowerless varieties growing at the same time in the same vicinity as for example the umbellifereae, gumdang, Archangelica officinalis Hoffin, and shin nakpa, Pterocyclus angelicoides Benth. According to the Sherpas, the flowered plant is the male and the flowerless the female, since the flowers eventually produce seeds, sen, and it is a rule of nature that it is the males of every species (including human beings) who furnish the creative seed. It is further believed that plants such as shin nakpa, gyashur, Meconopsis paniculata, and sengrun, Swertia multicaulis D. Don, not only have male and female

varieties, but that the male counterparts die after only one blooming season. Scientifically, it would appear that these particular plants are biennials or perennials which continue to live but do not bloom every year.

A final way in which the plant life of Rolwaling significantly influences the outlook and way of life of the people is the phenomenon of the monsoon growth period which not only transforms over grazed brown stubble into luxuriant grass, flowers, and hanging moss, but also over grows the trail separating upper Rolwaling from Simigaon at the western end, making it impassable for two months of the year. While it is always possible to exit the upper valley by using a high ridge route which requires twice the physical effort of the normal trail, this route is impractical for all but emergencies and the prevailing impression created by the combination of over grown path and ever present low hanging clouds during this period is one of total isolation and solitude. Certainly during the monsoon more than any other time of year, one is aware of the recurring folk theme of Rolwaling being a sacred hidden valley, beyul, created by Padmasambhava, the yogin who brought Buddhism from India to Tibet (Sacherer 1977b, 1977c).

#### Edible Plants

All available evidence indicates that wild plants were much more important to the Sherpa diet before the introduction of the potato provided a more stable food supply, an event which seems to have occurred in Khumbu around 1850 (Haimendorf 1972), and in Rolwaling around 1870 (Sacherer 1977a, 1977b). Thus, there are thirty one commonly known edible plants (See Table 1) yet in the summer of 1974, actual use of these plants was confined to only twelve, three of which were subspecies of a particular wild garlic plant. In addition, there were sixteen types of edible mushrooms (See Table 2) of which eleven were actually consumed during 1974.

One clue to the Sherpa's rapid adoption of the potato once it was introduced from Darjeeling (Hooker 1905; Haimendorf 1972), is the fact that they have long harvested and eaten a potato-like root of the wild plant, Arisaema intermedium Bl. (Haluk, or To). Varieties of this plant are known across the Himalaya although they are usually reserved for consumption by animals (Dutta 1909) at lower, more hospitable altitudes, due to their extremely acidic nature which requires beating, blanching, and boiling to be rendered harmless enough for human consumption. It is interesting to note however, that the Sherpa word for the whole plant is haluk, a Tibetanized form of the Nepali word for potato which is alu, and which may have indicated all edible, starchy roots in the past. If so this would indicate a much larger consumption of wild roots by the middle hills people in the past and also the fact, as seems

likely, that the Sherpas did not know this plant before entering Nepal in the 1500's (Oppitz 1968; 1974) and therefore borrowed a Nepali term for it.<sup>2</sup> Nowadays, among the Rolwaling Sherpas, one finds the idea that this wild root is a form of living food surplus to be used as a condiment in normal times, and as an emergency food ration in times of harvest failure and food scarcity. Normally, it is dug for only one or two days of the year and is used as a condiment to add acidity and thus flavor, to the bland starchy mixtures of wheat, maize, or millet porridge which are often eaten. In times of crop failure however, such as the autumn of 1972, when there were bad grain harvests all over Nepal, Rolwaling people dug the root for fifteen days and used it as a real caloric supplement. The year of 1973 by contrast, was a good harvest year, and fearing the extinction of the root, the village headman did not allow any digging at all that year. In 1974, one day of digging was allowed, and in the years since then, two each.

The next most popular wild vegetable and most important in terms of amounts consumed, is the long hollow stem of the umbelliferae, Archangelica officinalis Hoffin, (gumdang). The peeled stocks of this plant are edible during the months of May and June (See Table 1), and are consumed in both raw and cooked form nearly every day for the two months. Resembling both celery and fennel in flavor, this vegetable is said to grow in greater abundance in Rolwaling than in any of the neighbouring Sherpa areas, including Khumbu.

Two other plants which are consumed during this same time of year are a fern, Denustaetia appendiculata (budjalu), whose entire upper stem and foliage may be eaten before it uncurls into its flat leaf form, and the plant Meconopsis paniculata (D. Don) Prain (gyashur), the thick peeled stem of which is eaten raw and resembles very sweet asparagus in flavor

Another edible wild plant of long tradition in Tibetan and Sherpa regions is a species of edible nettle, Urtica hypeborea, Jacq. (So tukpa; Sauor). It is even said that the most famous of ascetic Tibetan saints, Malavepa existed in nearby Lapchi or nothing but nettles for so long that his skin, eventually turned green. It is harvested by plucking with iron tongs and is often eaten as a thick soup to accompany boiled potatoes or tsamba. Edible from May to the middle of September, the leaves lose their stinging properties after only a few minutes of submersion in boiling water.

A condiment which is eaten in fairly large quantities just because of the frequency with which it is consumed, are the three subspecies of the Allium wild garlic plant. The most commonly eaten form is known as gokpa. During the months of May, June,

and early July, the leaves of the plant are eaten, and during the second half of July and the months of August and September, the flowers and seeds are eaten. Most commonly it is mixed together with salt and chili to form a spice for the ever present potatoes. A slightly different variety of this wild garlic plant is known as zingbu, and is consumed in the same fashion as gokpa, but the roots can be dug and dried during the winter months, a practice which is not possible with gokpa because of its bitterness upon drying. A third type of wild garlic called zingri, has about the same uses as zingbu and is almost identical in appearance, but is said not to grow in neighbouring Khumbu but only in Rolwaling and Tibet. In addition to food, all of these varieties of wild garlic have a certain sentimental value as the flowers, which bloom late in the summer, are often used to decorate the huts of the semi-nomadic high altitude yak herders.

Finally, two high altitude roots which were consumed as snacks during the short summer stays in the high yak camps were the two subspecies of polygonum, Macrophyllum D. Don and Spheerocephalum Wall., monzo and tai monzo, respectively. These small starchy roots grow at altitudes of 4,800 m. and above and can be eaten raw or roasted.

In regard to the eleven varieties of mushrooms which are commonly consumed, little is known yet of their scientific identifications (See Table 2).<sup>3</sup> In respect to ethnobotany it is interesting to note however, that both ground and tree mushrooms are eaten although those varieties such as okpi sham, which grow on several trees, are not eaten if they are found on rhododendrons as the rhododendron is known as a "poison tree." Nevertheless, Rolwaling Sherpas do eat a mushroom known as che sham, yak dung mushroom, (because it grows only from piles of yak dung, particularly at altitudes above 4,000 m.), a practice which the Tibetans of nearby Dingri scorn as being unclean (Amjila Kunsang 1977.) Meanwhile, if an efficient means of drying could be developed, the commercial properties of these edible mushrooms would appear considerable.

In conclusion, one of the ways in which knowledge of edible plants is dispersed, can be illustrated by the example of a plant called pema koko, Epilobium conspernum. In 1974, this plant was known by name to all Rolwaling adults but had no known use. Upon a return visit in 1977 however, it was discovered that almost everyone in the valley was using the dried leaves of this plant as tea or at least to supplement the expensive Nepali commercial tea which must be carried for eight days by human porters. The knowledge of such use had spread from nearby Khumbu via an important religious figure who had just come to reside in Rolwaling as the new head lama.

### Medicinal Plants and Poisons

Medicinal plants and poisons have been grouped together in this classification since they are grouped together by the Sherpas as well. (See Table 3).

"The difference between strong medicine and poisons is very small," say the Sherpas, and "the best medicines belong to the same families of plants as the poisons." Scientific examples for this belief are found especially in the *Aconitum* family where closely related Nepalese species contain alkaloids either in therapeutic quantities or in poisonous dosages, depending on the plant (Faugeras et al 1973: 160) and in the danur plant, *Scropolia tangutica* Max., which can be eaten by domestic animals but which causes bloating and death in men when eaten as a vegetable, although the seeds of the plant are sometimes used as a type of mild narcotic by Sherpas in east Nepal.

Another interesting way in which Sherpas correlated medicines and poisons is in the use of the same word, men, for both in those situations in which they routinely kill something, with a separate word for poison, duk, for those poisons which are known but not normally used. Thus we find that *Delphinium brunonianum* Royle is called shik men (lice medicine), when in fact it is a poison which very effectively kills fleas and lice. Because such killing is a sin for orthodox Buddhists however, it is psychologically easier to label it as a medicine than as a poison, particularly since there is frequent need to use it.

In terms of actual daily use, however, one member of the *Aconitum* family, a type of caterpillar with attached fungus, and an umbellifereae, were the three most widely used of the medicinal plants.

*Aconitum gammiei*, pongar, is a root collected every year as it is believed to be very effective against stomach pains. Another member of the same family, *Aconitum orochryseum* Stapf., pomar, is said to be even more effective for the same purpose but has become virtually extinct due to over zealous digging in former time. The one specimen gathered by myself in 1974 was the first one seen in several years and certainly illustrates the ecological problems of intensive and unsupervised gatherings of irreplaceable medicinal roots.

Another very popular and interesting medicine/vitamin/aphrodisiac, is one whose Sherpa name, yer tsa gun bu, literally means summer grass winter worm. The Sherpas explain that this creature is in fact a worm in winter whose head "becomes" grass in summer, at which time the worm half dies and can be gathered and can be gathered and utilized without sin! Scientifically, this unusual

biological specimen turns out to be the caterpillar of an as yet unidentified insect which hatches in spring, is then attacked in large numbers at the onset of the monsoon by a head fungus, Cordyceps sinensis, (which indeed resembles long strands of grass growing out of the head) causing death by late summer. By early fall when the Rolwaling people collect the "worm", both it and the fungus have been mummified by the cold dry air. Not peculiar to Rolwaling, the yer tsa gun bu is known and used widely across the Himalayas by all peoples of Tibetan culture (Dobremez 1974; Bhatt 1977: 96a) and is eaten in its entirety, caterpillar and fungus, mostly by middle aged men.

Additionally, there is widespread use of the root of an umbellifereae, Pterocyclus angelicoides Benth., (shin nakpa). The roots of this plant are dug during the months of February and March and fed to the livestock, particularly sheep and goats. The root has a cat nip like effect on these animals and is believed to be especially healthy for them while the degree to which they are sensitive to it is extraordinary. Both sheep and goats will come running for distances of half a kilometer to obtain pieces of it placed on open ground or on top of houses to dry in the sun, being able evidently, to smell it from that far away. Upon locating a supply which is hidden away, they will spend an hour or more trying to push down doors, dig under rocks, or make holes in roofs to obtain bits of it. Strangely enough, they give no special attention to the stalks and flowers of this plant during the summer monsoon season when they are found in abundance.

The scientific efficacy of these various medicinal plants is only now beginning to be established. All of them were known to and used by the classical Tibetan doctor trained at one of the national schools of traditional Tibetan medicine in Lhasa and now resident in Kathmandu (Amjila Kunsang 1976) and five of them, Swertia multicaulis, Fritillaria cirrhosa D. Don, Aconitum gammiei, Aconitum ochryseum Stapf., and Aconitum lacinatedum, were the same as or subspecies of plants listed as part of the official pharmacology of the People's Republic of China (National Academy of Sciences 1975: 83-92).

Nearly fifty common Nepalese medicinal plants have been analysed chemically so far in the Laboratoire de Pharmacognosie at the Universite de Grenoble in France, with the result that many of them have been found to contain alkaloides, steroides, and quinones which were hitherto unsuspected (Debalmas 1975: 1). So far the most promising among them which is at all related to the medicinal plants from Rolwaling are the swertias, gentians whose proven characteristics in the laboratory include anti-inflammatory action and a lowering of blood pressure (Debalmas 1975: 6-7). Their related subspecies in Rolwaling, Sertia multicaulis D. Don, sengrun, and Swertia racemosa Wall., titak, are reknowned there

for being useful when applied to open wounds, in the prevention of infections.

Likewise, initial tests of the various Aconitums (Faugeras et al 1972: 160) verify that A. gammiea pongar contains therapeutic alkaloides which cause stupor and eventual death in laboratory mice depending on the dose, while A. orochryseum, pomar, never caused death even at the same dosages. It will be remembered that both of these roots were used in Rolwaling for stomach pain with the latter said to be more effective although in recent years it had become nearly extinct. Both of them are of course, closely related to a third Aconitum, duk zendu, A. lacinatum which is known to the Sherpas and to western scientists, as a powerful poison (Dobremez 1975), and to the delphinium, shik men, which is used as a tea bath for the killing of body lice.

In terms of commercial potential for the Rolwaling medicinal plants, it should be noted that in addition to the ones listed by the Sherpas as useful, there are at least seven other plants or trees which are either used for other purposes such as incense, or not used at all, which are already recognized for their medicinal properties and are frequently exported, including Abies spectabilis, Betula utilis, Ephedra gerardiana, Nardostachys grandiflora, Podophyllum hexandrum, Rheum emodi, and Valeriana wallichii (Malla 1977: 5-7). Furthermore, there is still the possibility for wide scale exploitation of those they are already familiar with but have never bothered to market themselves. Such is the case with the flowers and leaves of Picrorhiza scrofulariaefolia. While the Sherpas know the root as hogling, they were not accustomed to use the top part of the plant. In 1979 for the first time however, a non-Sherpa lowlander appeared in the valley to buy the tops of the plant (Nepali kutki) in exchange for maize and rice, and succeeded in gathering dozens of large bags of the substance which he was intending to sell in Kathmandu at a considerable profit.

### Incense Plants

Because of their role as incense in the numerous religious ceremonies, both in the homes and in the gomba, those plants which have aromatic properties are highly valued among the Sherpas. The ones most commonly used are those of the juniper family, Juniperus recurva, shukpa, and Juniperus indica, pamu (See Table 4). The branches of these two plants are burned over fires either green or in dried form, being valued for the aroma which their thick smoke yields. Since Sherpa houses have no chimneys, such smoke lingers within the interior for a considerable length of time and saturates the hair and clothing of the people as well. It is placed on fires at any event at which a benediction is performed; the arrival or departure of special guests, the occupation of a family dwelling

after one of the cyclic absences, and at all formal religious ceremonies which are performed in the household. In addition, it is frequently placed on a smoldering outdoor campfire just as people are preparing to leave the site, in the belief that the various mountain gods will be pleased with the aroma and lend their blessing to the intended activities or travel.

A high altitude rhododendron (4,000-5,500 m.), R. anthopogon, he masur, is the second most frequently used type of incense, being burned as dried branches or as the main ingredient in a composite incense mixture, tsang. Because it grows at higher altitudes than the junipers, its use is generally confined to the five warmer months when the Sherpas are living above the areas which are the natural habitat of the junipers.

Another plant whose highly aromatic root is used for incense in Rolwaling is Nardostachys jatamansi, pangbu. The root of this plant is dried and later burned for its fragrance and because of its popularity, is in danger of becoming extinct in the valley. The Rolwaling people do not recognize it as having any medicinal properties as do other ethnic groups in Nepal (Malla 1977:6; Debalmas 1975:2).

Another plant of very interesting properties which is used for incense in Rolwaling is Artemisia vulgaris, kemba girbu. This plant is used for moxibustion in China (National Academy of Sciences 1975:84), a process whereby a small amount of burning herb is applied directly to the skin. While moxibustion is practiced also by Tibetan doctors (Amjila Kunsang 1975) and therefore known also to Rolwaling residents, there is no one in the valley at present who is proficient in such remedies and no one could say if this artemisia would be used by a Tibetan practitioner although it seems likely. Another use it has in Rolwaling in addition to incense however, is in the manufacture of the yeast used in the brewing of chang. So far, the chemical composition of this plant remains unknown but must in some way be unusual to account for the versatility of its usage.

As for the commercial possibilities of these various incense plants, another researcher exploring the perfumery possibilities of Sikkim (Bole 1977:209) listed four species as definitely promising and two others with seeming potential, which are included in the Rolwaling inventory. These include ordinary oakmoss, Usnea longissima, which is used in Rolwaling as a special green treat for the livestock in winter, a rhododendron, R. Lepidotum, which is not even considered an incense plant in Rolwaling, the ubiquitous Artemisia vulgaris, another rhododendron already recognized for its incense properties, R. anthopogon, and a species of Abies and another of a mint plant, Elsholzia, which have corresponding

species in Rolwaling, Elsholtzia eriostachya Benth., lenza, an edible mint, and Abies spectabilis, a tree which is used for its medicinal properties in other parts of Nepal (Malla 1977:191).

### Natural Dyes

Only two natural dyes are known in Rolwaling and only one of these, Rumex nepalensis, dampshima, is a true dye. The root of this plant is utilized for its yellow colour and because of its acid content, is not mixed with sour juices as are the others (See Table 4).

The other plant, Rheum emodi, atchowa, a type of rhubarb, is used to set and make fast the other dyes used on clothing. The stems are gathered in large numbers during the month of August when they are peeled and hung above the family fires to dry. After the drying is finished, they are stored until the winter months of December, January, and February, when they are soaked in cold water for reconstitution, and then boiled. After this process, the stalks are removed and Indian commercial dyes are added to this acidic water in the belief that wool dyed in this manner will not lose its colours after washing. In a few of the wealthier houses, this process has been replaced by the use of concentrated lemon juice which is manufactured in the lower villages and carried up by lowland porters. Neither the stalks nor their juice are eaten or used for medicinal purposes in Rolwaling.

### Special Use Plants

Some of the special use plants in Rolwaling include several large middle altitude (3,000-4,000 m.) rhodendrons which are utilized both as firewood and as fertilizer (See Table 5). After the leaves are used to carpet the floors of animal stalls and barns, they become mixed with dung which is then strewn about on the potato fields each spring. Another plant, Silene nigrescens, sukpa, is utilized for its root which has soap like properties when minced with water, and especially the natural alkali which is found on the dried salt beds of Tibet and known as puldak. Several types of wild grass are used to line the traditional Tibetan boots of the Rolwaling people which are said to be not as secure but much warmer than modern mountaineering boots. A local variety of bamboo which grows as high as 3,800 m., has a number of uses. In its green state, the stalks are split and woven into baskets, straps, and cords while the dried form burns very easily and is often used as kindling or in a bunch together, as a torch for walking about at night. The hollow stems are also used as straws for the sipping of a particular kind of chang known as tonba. Meanwhile, the leaves of the rhubarb, Rheum emodi, are so large that they are often used as rain hats during the monsoon months, in addition to being handy

for packaging such commodities as butter and as light weight lids to aluminum cooking pots, the latter, a valuable asset to those who have to pack and carry household goods from one high yak camp to another all during the monsoon.

Finally, we find two species of compositeae, Artemisia vulgaris, kemba girbu, and Waldheimia glabra, kemba tikpe, being used to make the yeast which is necessary for the fermentation of the grains making the alcoholic drink of chang. The leaves of these plants are wrapped around small balls of millet flour which causes the normally dark, brown flour to "turn white" over a period of days. In fact, the change of colour is the signal to remove the leaves and place the small balls of dough called pap, on a basket to be smoked dry over the household fire. Recipes for this natural yeast are found in slight variations all across the Himalaya (Dobremez 1975; Amjila Kunsang 1977). In the most classical of the Tibetan court recipes (Kunsang 1977), special ingredients such as bear and fox innards are included, while other observers note the addition of wild berries, roots, and leaves (Batra & Millner 1974:946) and certain types of insects (Bernot 1975) depending on the region of the Himalayas. So far, only the rice flour yeasts of the Darjeeling area of the eastern Himalayas have been the subject of intensive study, and they have been discovered to contain and be activated by a synergistic relationship between phycomycetous fungi and several different kinds of yeasts (Batra & Millner 1974:947).

### Conclusions

As the forgoing material indicates, the ethnobotany of the Rolwaling Sherpas is a rich one, perhaps surprisingly so in view of the altitude and the limitation of species. Classified botanically as a "dry inner valley" (Stainton 1972), Rolwaling is richer than some other high altitude areas further to the west such as Dolpo (Jest 1975:89-91) but has relatively few useful species compared to nearby regions of lower altitude (Yon 1976; Alirol 1975). Compared to Langtang, another east-west valley of similar altitude approximately 80 km. to the west, one finds that only 38% of the species are the same and perhaps another 10-15% are closely related while only 40% of the medicinal plants are found in common (HMG, Dept. of Medicinal Plants, 1976).<sup>4</sup> Given this lack of similarity between two such geographically close and similar valleys, it would seem that each Himalayan valley must be explored individually for its potential ethnobotanical resources. As one Nepali writer has put it (Malla 1976), "Economic development through the utilization of natural resources and their management demand a sound knowledge of nature itself."

|                       |                                                                                                                                                              |                                                                                     |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <u>Aceraceae:</u>     | <u>Acer pectinatum</u> Wall.*                                                                                                                                | <u>Cha simba</u>                                                                    |
| <u>Araceae:</u>       | <u>Arisaema flavescens</u> (Forsk) Schott<br><u>Arisaema intermedium</u> Bl.                                                                                 | <u>Chukalak</u><br><u>Haluk/To</u>                                                  |
| <u>Berberidaceae:</u> | <u>Podophyllum hexandrum</u> Royle*                                                                                                                          | <u>Amu</u>                                                                          |
| <u>Boraginaceae:</u>  | <u>Microula sikkimensis</u> *                                                                                                                                | <u>Aliba</u>                                                                        |
| <u>Cruciferae:</u>    | <u>Capsella bursa pastoris</u> L.*<br><u>Erysimum</u> sp.*                                                                                                   | <u>Chanmin</u><br><u>Chamin</u>                                                     |
| <u>Geraniaceae:</u>   | <u>Geranium refractum</u> Edgw.*<br><u>Impatiens sulcata</u> Wall.                                                                                           | <u>Pem Chundi Cha</u><br><u>Dokshar</u>                                             |
| <u>Labiatae:</u>      | <u>Elsholtzia eriostachya</u> Benth.*                                                                                                                        | <u>Lenza</u>                                                                        |
| <u>Leguminosae:</u>   | <u>Calophaca crassicaulis</u> (Benth) Korn                                                                                                                   | <u>Gorim</u>                                                                        |
| <u>Liliaceae:</u>     | <u>Allium</u> sp.*<br><u>Allium</u> sp.*<br><u>Allium</u> sp.<br><u>Polygonatum verticillatum</u> (L.)<br><u>Allioni</u> *<br><u>Smilacina fusca</u> . Wall. | <u>Gokpa</u><br><u>Zingbu</u><br><u>Zingri</u><br><u>Ramashak</u><br><u>Gundare</u> |
| <u>Onagraceae:</u>    | <u>Epilobium conspermum</u>                                                                                                                                  | <u>Pema koko</u>                                                                    |
| <u>Papaveraceae:</u>  | <u>Meconopsis horridula</u> Hook. f.<br>& Thoms.*<br><u>Meconopsis pamiculata</u> (D. Don)<br><u>Prain</u> *                                                 | <u>Dangin dra</u><br><u>Gyashur</u>                                                 |
| <u>Polygonaceae:</u>  | <u>Polygonum macrophyllum</u> D. Don<br><u>Polygonum sphearocephalum</u> Wall.<br><u>Polygonum viviparum</u> L.*                                             | <u>Monza/Monzo</u><br><u>Tai Monzo</u><br><u>Rombu</u>                              |
| <u>Pteridaceae:</u>   | <u>Denustaedtia appendiculata</u> *                                                                                                                          | <u>Budjalu</u>                                                                      |
| <u>Rosaceae:</u>      | <u>Cotoneaster baccularis</u> Wall.<br><u>Fragaria nubicola</u> Lindl.*<br><u>Potentilla fruticosa</u> L.*<br><u>Rubus niveus</u> Thunb.*                    | <u>La mi cha</u><br><u>Pamlammu</u><br><u>Shoshumba</u><br><u>Nyangyung</u>         |
| <u>Saxifragaceae:</u> | <u>Ribes luridum</u> Hook. & Thoms.                                                                                                                          | <u>Gyakshin</u>                                                                     |
| <u>Umbelliferae:</u>  | <u>Archangelica officinalis</u> Hoffn.<br><u>Selinum tenuifolium</u> Wall.                                                                                   | <u>Gumdang</u><br><u>Komak</u>                                                      |
| <u>Urticaceae:</u>    | <u>Urtica hyperborea</u> Jacqu.*                                                                                                                             | <u>So tukpa/Saur.</u>                                                               |

Table 2. Edible Mushrooms

|                        |                                         |
|------------------------|-----------------------------------------|
| <u>Changon Shamu</u>   | <u>Boletus</u> sp. ( <u>Leccinum</u> ?) |
| <u>Che Shamu</u>       | <u>Coprinus</u> or <u>Drosophila</u>    |
| <u>Dar Shamu</u>       | ?                                       |
| <u>Dokar Katsikpa</u>  | <u>Russula</u> ?                        |
| <u>Laa Shamu</u>       | ?                                       |
| <u>Okpi Amja Shamu</u> | <u>Fistulina</u> ?                      |
| <u>Omi Shamu</u>       | <u>Russula</u> sp. or <u>Lactarius</u>  |
| <u>Pemar Shamu</u>     | <u>Tricholoma</u> ?                     |
| <u>Quzir Shamu</u>     | ?                                       |
| <u>Ser Shamu</u>       | ?                                       |
| <u>Sil Tukpa Shamu</u> | ?                                       |
| <u>Taa Shamu</u>       | <u>Hypholoma</u> ?                      |
| <u>Tokar Shamu</u>     | <u>Russula</u> sp.                      |
| <u>Trakpi Shamu</u>    | <u>Clitocybe</u> ?                      |

Table 3. Medicinal Plants and Poisons

|                         |                                                                                                                                     |                       |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <u>Caryophyllaceae:</u> | <u>Stellaria sp.*</u><br>(Reduction of fever when taken as a tea)                                                                   | <u>Cha Men</u>        |
| <u>Fungus:</u>          | <u>Cordyceps sinensis*</u><br>(Snrengthening and aphrodisiacal properties)                                                          | <u>Yer tsa gun bu</u> |
| <u>Gentianaceae:</u>    | <u>Swertia multicaulis D. Don*</u><br>(The juice prevents infections & clots blood in wounds)                                       | <u>Sengrun</u>        |
|                         | <u>Swertia racemosa Wall.*</u><br>(Prevents infections; lowers fevers)                                                              | <u>Titak</u>          |
| <u>Liliaceae:</u>       | <u>Fritillaria cirrhosa D. Don*</u><br>(Prevents infections of open wound when applied externally; reduces stomach pain when eaten) | <u>Pango</u>          |
| <u>Orchidaceae:</u>     | <u>Orchis stracheyi Hook. f.</u><br>(Prevents infections of open wounds)                                                            | <u>Ongbi Lakbaa</u>   |
| <u>Ranunculaceae:</u>   | <u>Aconitum gammiei</u><br>(Eaten to reduce stomach pain)                                                                           | <u>Pongar</u>         |
|                         | <u>Aconitum lacinatedum</u><br>(Poisonous to the skin and deadly if eaten)                                                          | <u>Duk Zendu</u>      |
|                         | <u>Aconitum orochryseum Stapf.</u><br>(Eaten to reduce stomach pain)                                                                | <u>Pomar</u>          |
|                         | <u>Delphinium brunonianum Royle</u><br>(Prepared as a tea and then applied to the kill fleas and lice)                              | <u>Shik Men</u>       |
| <u>Scrofulariaceae:</u> | <u>Picrorhiza scrofulariaefolia Penne*</u><br>(Root used as a cough & cold medicine; strengthening properties)                      | <u>Hogling</u>        |
| <u>Solonaceae:</u>      | <u>Scropolia tangutica Maxim.</u><br>(Seeds used as a pain killer and tranquilizer)                                                 | <u>Danur</u>          |
| <u>Tamaricaceae:</u>    | <u>Myricaria rosea WW. Sm.*</u><br>(Prepared as a tea to prevent coughing)                                                          | <u>Chishambu</u>      |
| <u>Umbelliferae:</u>    | <u>Bupleurum candollii Wall.</u><br>(Grass which is poisonous to animals)                                                           | <u>Tsa Duk</u>        |
|                         | <u>Pterocyclus angelicoides Benth.</u>                                                                                              | <u>Shin nakpa</u>     |

Table 4. Incense Plants and Natural Dyes

Incense Plants

|                       |                                                                          |                                          |
|-----------------------|--------------------------------------------------------------------------|------------------------------------------|
| <u>Compositae:</u>    | <u>Artemisia vulgaris L.*</u><br><u>Waldheimia glabra</u>                | <u>Kemba Girbu</u><br><u>Kemba Tikpe</u> |
| <u>Conifereae:</u>    | <u>Juniperus indica Bertol.*</u><br><u>Juniperus recurva B.ch.-Ham.*</u> | <u>Pamu</u><br><u>Shukpa</u>             |
| <u>Ericaceae:</u>     | <u>Rhododendron anthopogon D. Don*</u>                                   | <u>Hemasur</u>                           |
| <u>Lichen:</u>        | <u>Thamnia vermicularis</u>                                              | <u>Kanjin Sheru</u>                      |
| <u>Valerianaceae:</u> | <u>Nardostachys jatamansi D.C.*</u>                                      | <u>Pangbu</u>                            |

(The ingredients in a special composite incense mixture called tsang include Kemba girbu, kemba tikpe, Pamu, Shukpa, Hemasur, and Pangbu).

Natural Dyes

|                      |                                                                |                                   |
|----------------------|----------------------------------------------------------------|-----------------------------------|
| <u>Polygonaceae:</u> | <u>Rheum emodi Wall.*</u><br><u>Rumex nepalensis Sprengel.</u> | <u>Atchowa</u><br><u>Dapshuma</u> |
|----------------------|----------------------------------------------------------------|-----------------------------------|

Table 5. Special Use Plants

|                         |                                                    |                        |
|-------------------------|----------------------------------------------------|------------------------|
| <u>Caryophyllaceae:</u> | <u>Silene nigrescens</u> (Edgew) <u>Majundar</u> * | <u>Sukpa</u>           |
| <u>Cimpositae:</u>      | <u>Artemisia vulgaris</u> L.*                      | <u>Kemba Girbu</u>     |
| <u>Coniferae:</u>       | <u>Abies spectabilis</u> (D. Don) <u>Mirb.</u> *   | <u>Tashing</u>         |
| <u>Ericaeae:</u>        | <u>Rhododendron arboreum</u> Sm.*                  | <u>Kalma</u>           |
|                         | <u>Rhododendron campanulatum</u> D. Don*           | <u>Kalma</u>           |
|                         | <u>Rhododendron cinnabarinum</u> Hook. f.          | <u>Kalma</u>           |
| <u>Gramineae:</u>       | <u>Arundaria maing</u> Gamble                      | <u>Nungma/Ba Shing</u> |
|                         | <u>Junicaeae</u> sp.                               | <u>Tsa</u>             |
| <u>Leguminosae:</u>     | <u>Parocherus communis</u> Buch.-Ham.              | <u>Sra jungma</u>      |
| <u>Lichen:</u>          | <u>Usnea longissima</u>                            | <u>Mengmak</u>         |
| <u>Polygonaceae:</u>    | <u>Rheum emodi</u> Wall.*                          | <u>Atchowa</u>         |

Footnotes

1. The botanical collection made by the author in Rolwaling during the summer of 1974, was done with the advice and material assistance of Dr. Corneille Jest, Maitre de Recherche, R.C.P. 253, C.N.R.S., France, and Dr. Jean Francois Dobremez of the Laboratoire de Biologie et Botanique Vegetable, Universite de Grenoble, France. The latter very kindly identified all of the specimens gathered and contributed most generously of his wide knowledge of Himalayan flora. The initial publication of these results appeared in the author's Ph.D. dissertation, "The Sherpas of Rolwaling north Nepal, a Study in Cultural Ecology," which was accepted by the Ecole Pratique des Hautes Etudes in Paris, June 1977. Short follow up studies were then done in the fall of 1977 and again in 1978. The complete botanical collection rests in the herbarium of the Laboratoire Botanique at Grenoble, while examples of all the edible, medicinal, and other wise useful plants are on deposit with the herbarium of HMG, Department of Medicinal Plants under the direction of Dr. S.B. Malla. Dr. Malla extended professional aid to me and my collection during 1974 when I was still in Nepal. To all of these individuals and institutions, I therefore owe my thanks.
2. I am indebted to my thesis director, Dr. Lucien Bernot of the Ecole Pratique des Hautes Etudes for pointing this interesting linguistic phenomenon out to me.
3. For the existing mushroom identifications, I must thank Dr. G. Durrieu of the Laboratoire de Botanique, Universite de Toulouse I, France, who was able to do this difficult work only on the basis of coloured field drawings and ethnobotanical data which I gathered in 1974.
4. For a complete breakdown of the similarities between the ethnobotany of Langtang and that of Rolwaling as (listed by HMG, Dept. of Med. Plants 1976), 57% of the edible Rolwaling plants were also found in Langtang, 40% of the medicinal plants, 78% of the natural dyes and incense plants, and 64% of the special use plants. To know which species these included specifically, note the asterisk beside certain of the species listed in the Tables 1-5).

References

- Alirol, P. 1975. "Esquisses pour une etude ethnobotanique,"  
Universite de Grenoble, Laboratoire Botanique et Biologie  
Vegetable. MS.

- Batra, L., and P. Millner. 1974. "Some Asian Fermented Foods and Beverages and Associated Fungi," *Mycologia*, Vol. 66, No. 6, pp. 942-950.
- Bernot, L. 1975. Personal Communication, Paris.
- Bhatt, D. 1977. Natural History and Economic Botany of Nepal, Orient Longman Ltd., New Delhi.
- Bole, P. 1977. "Aromatic Plants of Sikkim - A Preliminary Study in Utilization," in Himalaya, Ecologie, Ethnologie, C.N.R.S., Paris.
- Debalmas, A. 1975. "Rapport des Travaux Effectués sur les Plantes Medicinales du Nepal," Laboratoire de Pharmacognosie, Grenoble, MS.
- Dobremez, J.F. 1975. Personal Communication, Grenoble.
- \_\_\_\_\_. 1977. "Exploitation and Prospects of Medicinal Plants in Eastern Nepal," in Mountain Environment and Development, University Press, Tribhuvan University, Kathmandu, pp. 97-107.
- Dobremez, J.F., B.K., Shrestha, S. Vernian, and F. Vigny. 1974. "Carte Ecologique du Nepal: Terai Central 1/250,000, C.N.R.S. Paris.
- Dutton, B. 1909. "The Constitutents of the Roots of Arisaema concinnum, Schott., and A. speciosum, Mart.," *Journal of the Royle Asiatic Society of Bengal*, July, pp. 198-199.
- Faugeras, G., J.F. Dobremez and J. Bourgeois. 1973. "Sur les Aconits du Nepal: Etude Preliminaire de Six Especies Recoltees en 1972," *Plantes Medicinales et Phytotherapie*, Tome VII, No. 2, pp. 151-162.
- Haimendorf, C. von Furer. 1972. The Sherpas of Nepal: Buddhist Highlanders, John Murray, London (2nd Ed.).
- HMG. Dept. of Medicinal Plants. 1970. Medicinal Plants of Nepal, Jore Ganesh Press, Kathmandu.
- \_\_\_\_\_. 1976. Flora of Langtang, Jore Ganesh Press, Kathmandu.
- Hooker, J.D. 1905. Himalayan Journals, Ward, Lock & Co., London.
- Jest, C. 1974. Personal Communication.

64 CNAS Journal, Vol. VI, No. 2 (June 1979)

Jest, C. 1975. Dolpo: Communautés de Langue Tibétaine du Népal, C.N.R.S., Paris, pp. 89-91; 179.

Kunsang, A. 1977. Personal Communication, Kathmandu.

Malla, S.B. 1976. Seminar on Medicinal Plants, International Colloquium on the Ecology and Ecology of the Central Himalaya, Paris.

\_\_\_\_\_. 1977. "Potentialities of Medicinal Herbs in Nepal," in Himalaya, Ecologie, Ethnologie, C.N.R.S., Paris, pp. 187-194.

National Academy of Sciences Herbal Pharmacology Delegation. 1975. Herbal Pharmacology in the People's Republic of China, U.S. Govt. Printing and Publishing Office, Washington D.C.

Oppitz, M. 1968. Geschichte und Sozialordnung der Sherpa, Khumbu Himal, Vol. 8, Universitätsverlag Wagner, Ges. M.B.H., Innsbruck-Munich.

\_\_\_\_\_. 1974. "Myths and Facts: Reconsidering Some Data on the Clan History of the Sherpas," in Haimendorf, C. von Furer ed., Contributions to the Anthropology of Nepal, Aris and Phillips, London.

Sacherer, J. 1977a. "The Sherpas of Rolwaling: 100 Years of Change," in Himalaya, Ecologie, Ethnologie, C.N.R.S., Paris, pp. 289-293.

\_\_\_\_\_. 1977b. "The Sherpas of Rolwaling, North Nepal: A Study in Cultural Ecology," Unpublished Ph.D. dissertation, Ecole Pratique des Hautes Etudes, Paris (Xerox University Microfilms, Ann Arbor, Michigan).

\_\_\_\_\_. 1977c. "Man in the Himalayas: The Sherpas of Rolwaling, Nepal Nature Annual, Kathmandu.

Shrestha, T.B. 1974. Gymnosperms of Nepal: Les Gymnospermes du Népal, C.N.R.S., Paris.

Stainton, J.D.A. 1972. Forests of Nepal, John Murray & Co., London.

Yon, B. 1976. "Le Népal Central; Contribution à l'Etude Ecologique de l'Etage Alpin," Unpublished Ph.D. dissertation, Université de Grenoble, France.