

# TIBETAN MEDICINE PLURALITY<sup>1</sup>

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**Key Words:** Tibetan medicine, markets, cultural variation, medicinal plants.

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Recent literature extols Tibetan medicine and its plants (Kletter and Kriechbaum 2001; Dash 1994), often giving the impression that there is one centralized practice. Like Chinese and Ayurvedic medical systems, Tibetan medicine has a central core of historic literary reference works, called “the four Tantras” (*rgyud bzhi*) which define and describe the Tibetan medical system. This core of literary texts (written in their present form in the 12th century) together with later commentaries (such as the 17th century “Blue Beryl treatise”) are still commonly accepted as the scholarly foundation of Tibetan medicine. However, the existence of such a commonly accepted literary basis does not imply a static or uniform system of knowledge and practice. Ghimire, McKey, and Aumeeruddy-Thomas

(2005) have broken ground in appreciating variation within Tibetan medical traditions in Nepal. The fact that similar variation has existed for many centuries is evidenced by Tibetan texts from the 16th century that bear witness to conflicting views of the “proper” way of learning and practicing Tibetan medicine (Schaeffer 2003). The origin of Tibetan medicine is in itself diverse and from the beginning has been characterized by the existence of different lineages or schools. Not only have there been strong influences from Indian and Chinese medical systems, but also from pre-Buddhist Bön, Middle Eastern, and Greek medical systems, and from local herbal practices (Beckwith 1979).

Through the first half of the 20th century, Tibetan medicine retained a diversity of schools and practitioners, including not only Buddhist monks, but also professional secular medical practitioners (with their own schools) and local healers, who often incorporated pre-Buddhist

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shamanistic practices in their treatments (Cantwell 1995; Janes 1995). During the Cultural Revolution, Tibetan medicine was stigmatized as feudalistic and superstitious. Many monasteries and medical institutions were closed, medical texts destroyed, and medical practitioners sent to labor camps and prevented from practicing (Janes 1995; Cantwell 1995). Reforms in the 1980s rehabilitated Tibetan medicine, which is now seen as a cheap and efficient way to provide health care in rural areas.

This development is similar to what has happened in other Asian countries where traditional medical systems have been incorporated into national health care systems (Holliday 2003). The incorporation of traditional medicinal systems has been recommended by the World Health Organization (WHO 2002) as a means to improve health care access for the rural poor. Along with governmental recognition of traditional medicine, WHO promotes national and international regulation and control of treatment and practitioners. This route has been followed in Tibet, where increasing official acceptance of Tibetan medicine has entailed increasing state control. The teaching of Tibetan medicine has been centralized and secularized around the Mentsikhang school of medicine in Lhasa (Janes 1995). Only graduates of the Mentsikhang school are officially allowed to practice in state supported Tibetan clinics and hospitals. As a result, much of the variation in Tibetan medicine in the form of different medical lines or schools has been lost (Janes 1995).

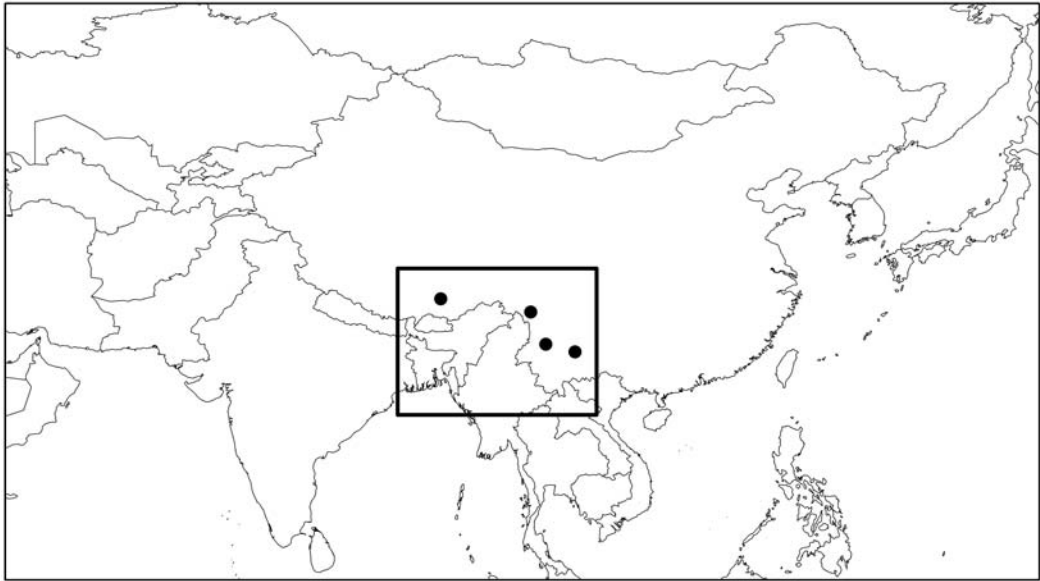
In addition to increasing state regulation, Tibetan medicine has, like many other traditional medical systems, experienced an increasing commoditization beginning in the 1990s (Janes 1999; Fischer 2005). The reasons are twofold (Janes 1999; Fischer 2005). First, reforms in the health care system required hospitals and clinics to finance a larger share of their budget themselves, introducing consultation fees and higher prices for medicines. Second, external demand (from non-Tibetan China, as well as India, Nepal, and western countries) for Tibetan medicine has been skyrocketing. The health care sector was thus one of the few areas in Tibet experiencing inflation at the end of the 1990s, while all other sectors experienced stagnating prices. Since Tibetan areas are among the most impoverished in China, this medicinal economic sector was promoted to alleviate poverty.

The number of people participating in Tibetan medicinal markets has escalated dramatically, from the herbal collectors to investors in medicinal production plants. Unfortunately, aside from the field collectors and factory laborers, the Tibetan medicinal industry tends to be controlled by non-Tibetans (Fischer 2005). The commoditization has led to increasing demands for standardized products and services, which can be subjected to quality control, adding further impetus to the state's efforts at formalizing Tibetan medicine. Commoditization has therefore contributed further to the homogenization of Tibetan medicine. Both commoditization and state policies have had their strongest impacts in Lhasa and other urban centers (Cantwell 1995; Janes 1995, 1999). Meanwhile, rural areas mainly have been affected by a general decrease in the availability of health care from the end of the 1990s (Janes 1999; Fischer 2005).

Here we investigate how state interjection, commoditization, and local traditions affect Tibetan medicine in Lhasa and a distant eastern Tibetan realm, known traditionally as the *Menri* or Medicine Mountains. To this end we compare the medicinal plant species used by different sectors of the medical system—formal Tibetan hospitals and clinics, Tibetan medicinal markets, and local herbalist healers—in these two localities. In addition, we compare these elements with nearby eastern outgroups—medicinal markets in Dali (ethnically Bai) and Kunming (ethnically Han), Yunnan, China—which gives a sense of where Tibetan medicine fits within a larger context.

## STUDY SITES

Mount Khawa Karpo, (Fig. 1; 6,740m, 28°26'20"N latitude, 98°41'05"E longitude) is situated on the border in the extreme northwest of Yunnan and southeast of Tibet. It is the highest peak of the Menri ("Medicine Mountains" in Tibetan, transliterated to *Meili* in Chinese), which are part of the Hengduan Mountains of the eastern Himalayas, the most biologically diverse temperate ecosystems on earth (Mittermeier et al. 1998). Mount Khawa Karpo is one of the eight sacred mountains in Tibetan Buddhism and is circumambulated by thousands of pilgrims from all over Tibet each year. Locally, the area is predominantly Kham Tibetan, with traditional village livelihoods based on agricul-



**Fig. 1.** In Lhasa, Dechen, Dali, and Kunming, medicinal plants were censused in Tibetan medical institutions, markets, and with Tibetan doctors of Tibet and northwest Yunnan.

ture, herding, forestry, and gathering (Salick, Yang, and Amend 2005). In the Menri there is a rich tradition of herbalism, with doctors trained locally (Law and Salick n.d.), and thriving medicinal markets, as well as a state-supported Tibetan clinic in the town of Dechen (pinyin: Deqin, formerly Atunze). The Medicine Mountains, as their name implies, are a traditional area for collecting Tibetan medicinal plants.

Lhasa (3,650m, 29°41.76'N 91°9.54'E) is located on the southern edge of the Tibetan plateau. Nearby mountains reach altitudes of up to 5,500m. Ethnically, Lhasa is originally central Tibetan. Nowadays, migrants from other regions of Tibet, as well as Han Chinese, make up a large proportion of the city's population of around 200,000.

## METHODS

Tibetan medicinal plants used near Khawa Karpo by local doctors of various training, by the formal clinic, and in markets are compared to those used in Lhasa, Tibet, and in Dali and Kunming, Yunnan. In Lhasa we inventoried medicinal plants at the Mentsikhang (Tibetan Hospital), the main Tibetan Medicine Factory, the Tibetan Pharmacy in the Barkhor market (near central Lhasa monastery, Jokhang), and the official, government licensed Tibetan Medicine Market. Near Dali, Yunnan, we sampled the central warehouse of Bai medicinal plant merchants. In Kunming, Yunnan, we sampled the central Han Chinese medicinal market.

## SAMPLING

Sampling varied by necessity; however, prior informed consent was uniformly received with stipulations observed as follows. Optimally, for the Kunming, Dali, Dechen, Sinong (near Khawa Karpo), and Lhasa markets, as well as the Barkhor Pharmacy in Lhasa and Tibetan Medical Clinic in Dechen, vouchered plant samples with scientific names are deposited at the Missouri Botanical Garden. Less ideally, where we were not allowed to take samples, highly trained Tibetan doctors identified Tibetan medicinal plants used at the Mentsikhang and the Tibetan Medicine Factory. With these doctors, we double-checked scientific names against two standard Tibetan medicine manuals (Gawai Dorje 1995; Chinese Academy of Science 1996). Local herbalists near Khawa Karpo were interviewed (see Law and Salick n.d.), and

for each, a list of their 20 most useful medicinal plants was recorded for which we ascribed scientific names with reference to a Tibetan medicine guide specific to Dechen (Yang 1987–89). Finally, to provide the most recent nomenclature, all these scientific names are referenced against the International Plant Names Index (IPNI, [www.ipni.org](http://www.ipni.org)) and the Flora of China ([mobot.mobot.org/W3T/Search/foc.html](http://mobot.mobot.org/W3T/Search/foc.html)). See Appendix.

## ANALYSES

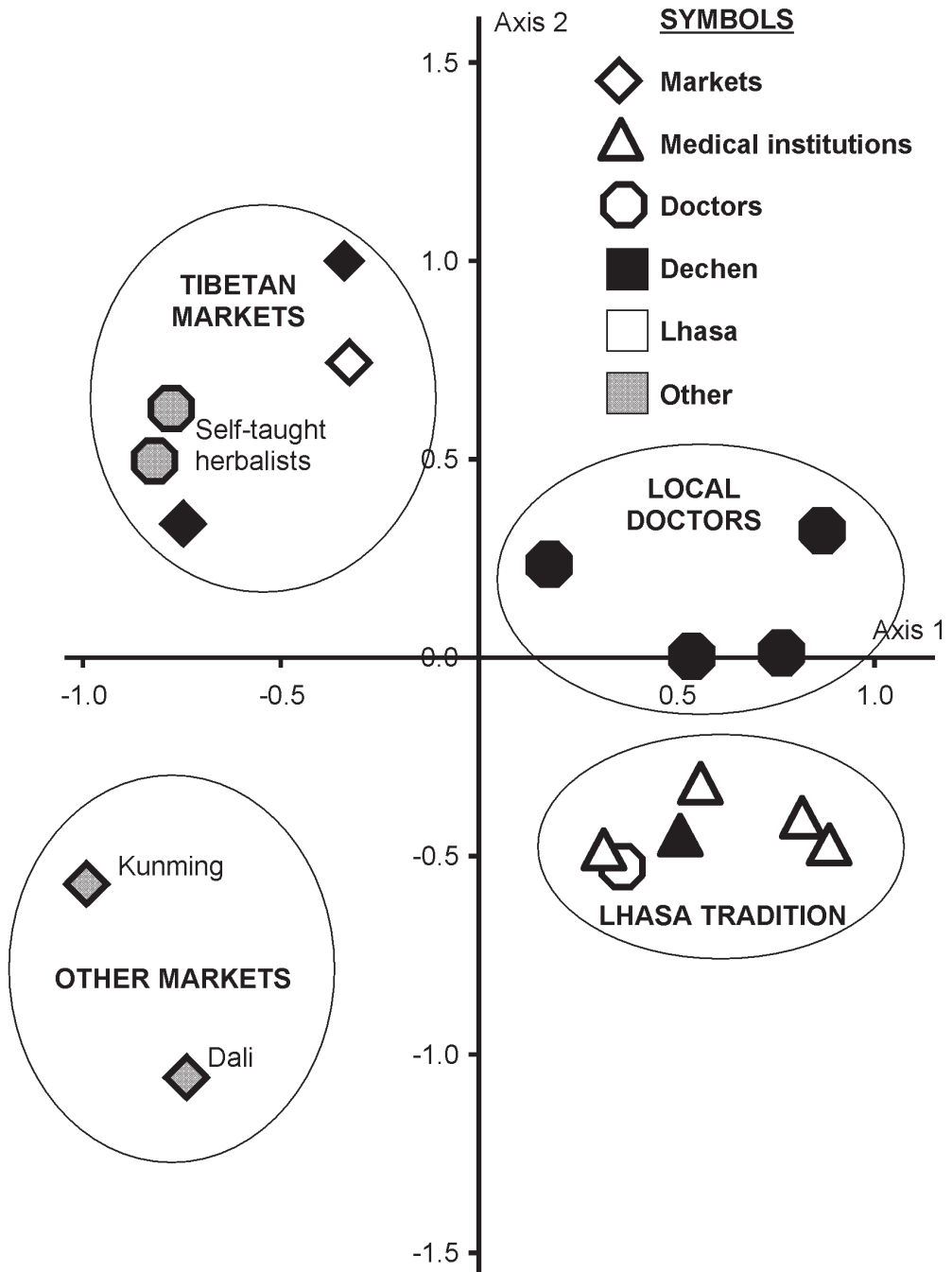
Since there are many congeneric species differences over the geographic range of our study, since specific epithets are not uniformly attributed and vouchers were not always available, and since many congeneric species are used for the same general purposes in Tibetan medicine, we chose to analyze the data at the generic level.

To differentiate and group Tibetan medical traditions, Non-metric Multidimensional Scaling with the Jaccard Distance Measure is performed with PC-Ord 4 (McCune and Mefford 1999). The binary presence-absence matrix is appended including both genus and species.

## RESULTS

Tibetan medical institutions and doctors clearly group by the plants that are used (Fig. 2). The tightest group is the formal Tibetan medicine establishment of Lhasa including the Mentsikhang Tibetan Hospital, the Barkhor pharmacy, the Tibetan Medicine Factory, as well as the Dechen Tibetan Medical Clinic (sanctioned and supplied by Lhasa) and the one monk practicing in the Khawa Karpo area who has Lhasa training in Tibetan medicine. These institutions/people represent the official Tibetan medicinal system, as it is taught and practiced in state-approved institutions.

Similar but distinct are the local doctors who practice herbal medicine near Khawa Karpo and were mostly trained by a local medicinal “grand master.” As a group, these doctors are more dispersed in the ordination than the Lhasa group, indicating that their local uses of medicinal plants are less uniform and more individualistic. A third group, more distant and more dispersed, includes the markets in Lhasa, Dechen, and Sinong and two self-taught local herbalists who began their career by collecting for the market. Finally, the two out-groups—the



**Fig. 2.** Pluralism in Tibetan medicine, grouped by similarity of plant genera used, include the well-established Lhasa tradition (bottom right), local Tibetan doctors practicing near Mt. Khawa Karpo (center right), and markets selling Tibetan plants (upper left). Medicinal markets outside of Tibetan cultural influence (lower left) are clearly distinct. Exceptions to these groups prove their integrity: for example, the one Dechen institution falling within the Lhasa tradition is the state-run Tibetan Medicine Clinic that receives its stores from Lhasa; and two self-taught herbalists south of Dechen who used medicinal plants similar to those in markets learned medicine by collecting plants for such markets. This ordination is Non-metric Multidimensional Scaling with the Jaccard Distance Measure, performed with PC-Ord 4; the binary presence-absence matrix is appended.

Kunming Medicinal Market and the Dali central warehouse of Bai medicinal plant merchants—are ordered separately and not particularly close to each other, but clearly distinct from the Tibetan medical traditions.

### DISCUSSION

Despite the ancient, shared literary canons and recent government centralization and marketing, Tibetan medicine is still by no means a single entity (see also Ghimire, McKey, and Aumeeruddy-Thomas 2005). Plants used in *government-sponsored* Tibetan medicine—as taught and manufactured in Lhasa and practiced throughout Tibet and China—are distinct from those used in Tibetan medicine as practiced by *herbalists* near sacred Mt Khawa Karpo, which is again distinct from those which appear in *Tibetan medicinal markets*, be they in Lhasa or Khawa Karpo or elsewhere. The government-sponsored medical institutions are the most homogeneous in their plant use. In Lhasa, the influence of state policies has been strongest: it is there that the main state-approved medical institutions (school, clinics, hospitals, and factories) are located, but approved state institutions outside of Lhasa are also comparable. This homogeneity seems to have arisen after the Cultural Revolution with the state centralization and increasing commoditization of Tibetan medicine. Although little documentation remains today, there were reportedly several distinct medical lineages in Lhasa until the middle of the 20th century (Janes 1995).

In more rural areas, homogenizing forces have been less influential and local Tibetan medical traditions coexist (although without state support or subsidy) with the officially state-sanctioned version of Tibetan medicine as taught in the Mentsikhang school. Consequently, more variation in the plant use of medical practitioners remains in rural areas. Nonetheless, the plants used by local medical practitioners of the Khawa Karpo region are clearly distinct from those used in Lhasa, those in the government Tibetan medical clinic near Khawa Karpo, and those of the one Lhasa-trained doctor in the Khawa Karpo area. These differences can be ascribed partly to locally differentiated traditions (with different medical lineages dominating in different parts of Tibet), partly to environmental variation of locally available plant species, and potentially to varia-

tion in the most prevalent types of afflictions in different areas. There is ample evidence that local flora shapes local medicine; for example, the species of *Lagotis* that is used medicinally very much depends on location with *L. alutacea* dominating in Dechen, while in Lhasa several other species of *Lagotis* are used.

As shown elsewhere (Olsen 2005), commoditization of Tibetan medicine has reduced the *materia medica* and made it relatively uniform between both Lhasa and Khawa Karpo. Interestingly, two self-trained herbalists who started as commercial medicinal collectors clearly show evidence of their shared background in the medicinal plants they use—typical market fare.

Lhasa Tibetan medicine and commoditized Tibetan medicine support an extensive international trade with Persian (e.g., saffron), Indian (e.g., *Terminalia bellerica* and *T. chebula*), and other tropical medicinal plants (e.g., *Cinnamomum* spp., *Elettaria* sp. (actually imported from cultivated stock in Guatemala!), and *Zingiber* spp. Local doctors in the Khawa Karpo area rely more on local plants that they collect themselves, many of which are threatened (Law and Salick n.d.). However, local Tibetan doctors pose little apparent threat to medicinal plants because they use very little of any one plant species, carefully guarding the plant populations that they do use. Tibetan medicine markets in Lhasa as well as Dechen also support an extensive trade in several threatened medicinals (e.g., *Fritillaria* spp., *Panax* spp., *Saussurea* spp.). In contrast to local doctors, market collectors often do not comply with traditional customs or constraints (e.g., sacred sites; see Anderson et al. 2005 and Salick et al. 2006), especially where global demand has led to increase in prices and required quantities (Olsen and Larsen 2003; Xu and Wilkes 2004; Olsen and Bhattarai 2005).

This commercial collection is of great concern because rampant collectors harvest and export already limited and stressed populations of valuable medicinal herbs (Xu and Wilkes 2004; Kala 2005). There are no exact figures for the harvest and trade of medicinal plants available from Tibet. In the Tibetan Autonomous Prefecture in NW Yunnan, estimates of income from non-timber forest products ranges between 25% and 80% of earned income (Xu and Wilkes 2004; Zhang, Wang, and Geng 2000) with the most lu-

crative being Matsutake, a medicinal/culinary mushroom (He 2003; Yeh 2000; Yun, Hall, and Evans 1997). In Nepal an estimated 7,000–27,000 tons of medicinal plants are harvested per year involving around 323,000 households or 10% of rural households (Olsen 2005). Most of the harvest in Nepal is concentrated on a small number of high value species, which make up ca. 50 % of the total value and ca. 40% of the total amounts collected. Many programs are being developed around the world to cultivate medicinal herbs both for their conservation in natural habitats and for sustainable development (e.g., Long et al. 2003 in the eastern Himalayas; Silori and Badola 2000 in the western Himalayas). However, many of these threatened Tibetan medicinal species are very difficult if not impossible to cultivate, while others take many years to mature and so are not profitable. In situ conservation and management of these threatened species is of highest priority.

Tibetan medicine, in all its plurality, is distinct from Bai traditional medicine in Dali and from Han (Chinese) traditional medicine in Kunming. Although trade and exchange of specific medicinal plants are both historic and current between Tibetan and other areas (Li et al. 2000), medical traditions remain distinct. Analogous to biodiversity, diversity of traditional medicine obviously exists at many levels: within traditions, among traditions, and on larger scales.

Unfortunately, the Chinese government only recognizes and allows Tibetan clinics to be established by practitioners of Tibetan medicine formally trained in Lhasa. Local doctors in the Khawa Karpo and other areas are not recognized. Variation in cultural traditions is a sign of adaptation and change (Pelto and Pelto 1975). A strength of traditional medicinal systems is their ability to attend to the physical and psychological needs of people in ways that are culturally meaningful (Janes 1995, 1999). While incorporation into national health care may afford traditional medical systems greater recognition, it will also tend to increase regulation, standardization, and the demand for testing according to biomedical standards. This may lead to the discarding of more spiritual and local elements of traditional medical systems (Janes 1995; Holliday 2003). Rigid institutionalization may inhibit the ability of traditional institutions to meet the changing and locally differing needs of people (Janes 1995, 1999). Even though incorporation

of traditional medical systems into national health care has been promoted by the World Health Organization as a means of ensuring greater access to health care for all, this may not necessarily be the result, especially when it is coupled with greater commoditization.

This is the case in Tibet, where increased national as well as foreign demand for Tibetan medical treatment and medicines has resulted in increasing prices (Janes 1999; Fischer 2005). Consequently, the inequity in health care access has increased during the last decade, both because of government control and because of markets. The most impoverished Tibetans, who have no access to government-supported Tibetan clinics and/or who cannot afford the increasing costs of treatment and manufactured Tibetan medicines, are served only by traditional Tibetan herbal doctors who collect their own medicines in places like the Medicine Mountains. However, these highly knowledgeable and respected professionals are not recognized by the government and so receive no support or recompense for their knowledge, dedication, or labor. Nonetheless, they carry on their ancient tradition with *boddhieitta*.

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Aristolochiaceae	<i>Aristolochia macrocarpa</i> C. Y. Wu & S. K. Wu ex D. D. Tao	1	1	1
Aristolochiaceae	<i>Aristolochia moupinensis</i> Franch.	1	1	2
Asclepiadaceae	<i>Cynanchum vincetoxicum</i> (L.) Pers.	1	1	1
Asclepiadaceae	<i>Vincetoxicum komarovii</i> Ijinsk.	1	1	1
Asparagaceae	<i>Asparagus filicinus</i> Buch.-Ham. ex D. Don	1	1	4
Asparagaceae	<i>Asparagus longiflorus</i> Franch.	1	1	1
Asparagaceae	<i>Asparagus myriacanthus</i> F. T. Wang & S. C. Chen	1	1	1
Asteraceae	<i>Ainsliaea pertyoides</i> Franch.	1	1	1
Asteraceae	<i>Ajania khartensis</i> (Dunn) Shih	1	1	1
Asteraceae	<i>Ajania tenuifolia</i> (J. Jacq.) Tzvelev	1	1	1
Asteraceae	<i>Arctium lappa</i> L.	1	1	1
Asteraceae	<i>Artemisia annua</i> L.	1	1	2
Asteraceae	<i>Artemisia desertorum</i> Spreng.	1	1	1
Asteraceae	<i>Artemisia hedinii</i> Ostenf. & Paulson	1	1	1
Asteraceae	<i>Artemisia parviflora</i> Buch.-Ham. ex Roxb.	1	1	1
Asteraceae	<i>Artemisia sibiriana</i> Willd.	1	1	1
Asteraceae	<i>Artemisia</i> sp. L.	1	1	1
Asteraceae	<i>Artemisia vestita</i> Wall. ex Besser	1	1	1
Asteraceae	<i>Aster batangensis</i> Bureau et Franch.	1	1	1
Asteraceae	<i>Aster himalaicus</i> C. B. Clarke	1	1	1
Asteraceae	<i>Aster megalanthus</i> Y. Ling	1	1	1
Asteraceae	<i>Aster yunnanensis</i> Franch.	1	1	1
Asteraceae	<i>Calendula officinalis</i> L.	1	1	1
Asteraceae	<i>Carduus acanthoides</i> L.	1	1	1
Asteraceae	<i>Carthamus tinctorius</i> L.	1	1	2
Asteraceae	<i>Cirsium soubiei</i> (Franch.) Mattf. ex Rehder & Kobuski	1	1	1
Asteraceae	<i>Cosmos bipinnatus</i> Cav.	1	1	1
Asteraceae	<i>Cremanthodium decaisnei</i> C. B. Clarke	1	1	1
Asteraceae	<i>Cremanthodium lineare</i> Maxim.	1	1	1
Asteraceae	<i>Cremanthodium lingulatum</i> S. W. Liu	1	1	1
Asteraceae	<i>Cremanthodium</i> sp. Benth.	1	1	1
Asteraceae	<i>Dolomiaea souliei</i> (Franch.) C. Shih	1	1	3
Asteraceae	<i>Erigeron breviscapus</i> (Vaniot) Hand.-Mazz.	1	1	1
Asteraceae	<i>Erigeron flaccidus</i> (Bunge) Botsch.	1	1	2
Asteraceae	<i>Gerbera anandria</i> (L.) Sch. Bip.	1	1	1
Asteraceae	<i>Gnaphalium affine</i> D. Don	1	1	1



Asteraceae	<i>Sorozeris hookeriana</i> (C. B. Clarke) Stebbins	1	1	1	1
Asteraceae	<i>Syncalathium kawaguchii</i> (Kitam.) Ling	1	1	1	1
Asteraceae	<i>Synotis erythropappa</i> (Bureau & Franch.) C. Jeffrey & Y. L. Chen	1	1	1	1
Asteraceae	<i>Tagetes erecta</i> L.	1	1	1	1
Asteraceae	<i>Taraxacum sikkimense</i> Hand.-Mazz.	1	1	1	1
Asteraceae	<i>Taraxacum tibetanum</i> Hand.-Mazz.	1	1	1	3
Asteraceae	<i>Tephrosia flammea</i> (Turcz. ex DC.) Holub	1	1	1	1
Asteraceae	<i>Xanthium sibiricum</i> Patr. ex Widder	1	1	1	1
Berberidaceae	<i>Berberis dasystachya</i> Maxim.	1	1	1	1
Berberidaceae	<i>Epimedium</i> sp. L.	1	1	1	1
Berberidaceae	<i>Mahonia duclouxiana</i> Gagnep.	1	1	1	1
Berberidaceae	<i>Sinopodophyllum hexandrium</i> (Royle) T. S. Ying	1	1	1	3
Bignoniaceae	<i>Incarvillea arguta</i> (Royle) Royle	1	1	1	1
Bignoniaceae	<i>Incarvillea compacta</i> Maxim.	1	1	1	3
Bignoniaceae	<i>Oroxylum indicum</i> (L.) Kurz	1	1	1	1
Bombacaceae	<i>Bombax ceiba</i> L.	1	1	1	2
Boraginaceae	<i>Microala tibetica</i> Benth.	1	1	1	1
Boraginaceae	<i>Onosma hookeri</i> C. B. Clarke	1	1	1	3
Boraginaceae	<i>Onosma multiramiosum</i> Hand.-Mazz.	1	1	1	1
Boraginaceae	<i>Asperugo procumbens</i> L.	1	1	1	1
Boraginaceae	<i>Cynoglossum wallichii</i> G. Don	1	1	1	1
Boraginaceae	<i>Eritrichium sinomicrocarpum</i> W. T. Wang	1	1	1	1
Brassicaceae	<i>Neotorularia humilis</i> (C. A. Mey.) Hedge & J. Léonard	1	1	1	1
Brassicaceae	<i>Pegaeophyton scapiflorum</i> (Hook. f. & Thomson) C. Marquand & Airy Shaw	1	1	1	6
Brassicaceae	<i>Raphanus sativus</i> L.	1	1	1	1
Brassicaceae	<i>Sinapis alba</i> L.	1	1	1	3
Brassicaceae	<i>Sisymbrium heteromallum</i> C. A. Mey.	1	1	1	2
Brassicaceae	<i>Sisymbrium indicum</i> L.	1	1	1	1
Brassicaceae	<i>Solms-Laubachia eurycarpa</i> (Maxim.) Botsch.	1	1	1	1
Brassicaceae	<i>Thlaspi arvense</i> L.	1	1	1	3
Brassicaceae	<i>Brassica campestris</i> L.	1	1	1	1
Brassicaceae	<i>Brassica juncea</i> (L.) Czern.	1	1	1	1
Brassicaceae	<i>Brassica rapa</i> L.	1	1	1	2
Brassicaceae	<i>Capsella bursa</i> (L.) Medik.	1	1	1	1



Caryophyllaceae	<i>Arenaria festuoides</i> Benth.	1	1	1	1	1
Caryophyllaceae	<i>Arenaria kansuensis</i> Maxim.	1	1	1	1	3
Caryophyllaceae	<i>Arenaria lancangensis</i> L. H. Zhou	1	1	1	1	1
Cephalotaxaceae	<i>Cephalotaxus sinensis</i> (Rehder & E. H. Wilson) H. L. Li	1	1	1	1	1
Chenopodiaceae	<i>Chenopodium album</i> L.	1	1	1	1	1
Clavicipitaceae	<i>Cordyceps sinensis</i> (Berk.) Sacc.	1	1	1	1	5
Combrataceae	<i>Quisqualis indica</i> L.	1	1	1	1	1
Combrataceae	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	1	1	1	1	4
Combrataceae	<i>Terminalia chebula</i> (Gaertn.) Retz.	1	1	1	1	5
Coniferae	<i>Juniperus recurva</i> Buch.-Ham. ex D. Don	1	1	1	1	1
Convalliariaceae	<i>Ophitopogon bodinieri</i> H.Lév.	1	1	1	1	1
Convalliariaceae	<i>Polygonatum cirrhifolium</i> (Wall.) Royle	1	1	1	1	5
Convalliariaceae	<i>Polygonatum verticillatum</i> (L.) All.	1	1	1	1	2
Convolvulaceae	<i>Cuscuta europaea</i> L.	1	1	1	1	1
Crassulaceae	<i>Rhodiola crenulata</i> (Hook.f. & Thomson) H. Ohba	1	1	1	1	4
Crassulaceae	<i>Rhodiola dumulosa</i> (Franch.) S. H. Fu	1	1	1	1	1
Crassulaceae	<i>Rhodiola kirilowii</i> (Regel) Maxim.	1	1	1	1	2
Crassulaceae	<i>Sedum bulbiferum</i> Makino	1	1	1	1	1
Crassulaceae	<i>Sedum tatarinowii</i> Maxim.	1	1	1	1	1
Cucurbitaceae	<i>Herpetospermum pedunculatum</i> (Ser.) C. B. Clarke	1	1	1	1	3
Cucurbitaceae	<i>Lagenaria siceraria</i> (Molina) Standl.	1	1	1	1	1
Cucurbitaceae	<i>Luffa cylindrica</i> (L.) M. Roem.	1	1	1	1	1
Cucurbitaceae	<i>Momordica cochinchinensis</i> (Lour.) Spreng.	1	1	1	1	1
Cucurbitaceae	<i>Siraitia grosvenorii</i> (Swingle) C. Jeffrey ex A. M. Lu & Zhi Y. Zhang	1	1	1	1	1
Cucurbitaceae	<i>Benincasa hispida</i> (Thunb.) Cogn.	1	1	1	1	1
Cyperaceae	<i>Cyperus rotundus</i> L.	1	1	1	1	1
Dicksoniaceae	<i>Cibotium barometz</i> (L.) J. Sm.	1	1	1	1	1
Dioscoreaceae	<i>Dioscorea cirrhosa</i> Lour.	1	1	1	1	1
Dipsacaceae	<i>Dipsacus asper</i> Wall.	1	1	1	1	1
Dipsacaceae	<i>Pteroccephalus hookeri</i> (C. B. Clarke) L. Diels	1	1	1	1	4
Dipsacaceae	<i>Triplostegia glandulifera</i> Wall. ex DC.	1	1	1	1	1
Elaeagnaceae	<i>Elaeagnus viridis</i> Servettaz	1	1	1	1	1
Ephedraceae	<i>Ephedra equisetina</i> Bunge	1	1	1	1	1
Ephedraceae	<i>Ephedra Gerardiana</i> Wall. ex C. A. Mey.	1	1	1	1	1

















Polygonaceae	<i>Rumex nepalensis</i> Spreng.	1	1	2
Polygonaceae	<i>Fagopyrum dibotrys</i> (D. Don) H. Hara	1		1
Polygonaceae	<i>Fagopyrum esculentum</i> Moench	1		1
Primulaceae	<i>Androsace maxima</i> L.	1		1
Primulaceae	<i>Androsace tapete</i> Maxim.	1		1
Primulaceae	<i>Primula bryophila</i> Balf.f. & Farrer	1		1
Primulaceae	<i>Primula fasciculata</i> Balf.f. & Kingdon-Ward	1		1
Primulaceae	<i>Primula russeola</i> Balf.f. & Forrest	1		1
Primulaceae	<i>Primula secundiflora</i> Franch.	1		2
Primulaceae	<i>Primula sikkimensis</i> Hook.	1		1
Primulaceae	<i>Primula</i> sp. L.	1		1
Pteridophyta	<i>Drynaria sinica</i> Diels	1	1	2
Pteridophyta	<i>Lepisorus soulieanus</i> (Christ) Ching & S.K. Wu	1		1
Pteridophyta	<i>Polypodium propinquum</i> Wall. ex Mett.	1	1	2
Pteridophyta	<i>Polystichum squarrosus</i> (D. Don) Fee.	1		1
Ranunculaceae	<i>Aconitum flavum</i> Hand.-Mazz.	1		1
Ranunculaceae	<i>Aconitum gymmandrum</i> Maxim.	1		1
Ranunculaceae	<i>Aconitum polyanthum</i> (Finet & Gagnep.) Hand.-Mazz.	1		1
Ranunculaceae	<i>Aconitum richardsonianum</i> Lauener	1	1	3
Ranunculaceae	<i>Aconitum</i> sp. L.	1	1	2
Ranunculaceae	<i>Aconitum tanguticum</i> (Maxim.) Stapf	1	1	6
Ranunculaceae	<i>Aconitum vilmorinianum</i> Kom.	1		1
Ranunculaceae	<i>Adonis coerulea</i> W. T. Wang	1	1	1
Ranunculaceae	<i>Anemone demissa</i> Hook.f. & Thomson	1		1
Ranunculaceae	<i>Anemone rivularis</i> Buch.-Ham. ex DC.	1		1
Ranunculaceae	<i>Caltha scapoza</i> Hook.f. & Thomson	1		1
Ranunculaceae	<i>Cimicifuga foetida</i> L.	1		1
Ranunculaceae	<i>Cimicifuga simplex</i> (DC.) Wormsk. ex Turcz.	1		1
Ranunculaceae	<i>Clematis rehderiana</i> Craib	1		2
Ranunculaceae	<i>Clematis tangutica</i> (Maxim.) Korsh.	1		1
Ranunculaceae	<i>Coptis teeta</i> Wall.	1	1	4
Ranunculaceae	<i>Delphinium albocoeruleum</i> Maxim.	1		1
Ranunculaceae	<i>Delphinium caeruleum</i> Jacquem. ex Cambess.	1		1
Ranunculaceae	<i>Delphinium chryso-trichum</i> Finet & Gagnep.	1		1
Ranunculaceae	<i>Delphinium</i> sp. L.	1		1
Ranunculaceae	<i>Delphinium trichophorum</i> Franch.	1		1
Ranunculaceae	<i>Ranunculus cymbalaria</i> Pursh	1		1







## APPENDIX. CONTINUED

Family	Species	Lhasa trained doctor	Dechen doctor	Dechen doctor	Dechen doctor	Dechen doctor	Dechen medical institution	Lhasa medical institution	Lhasa market	Lhasa medical institution	Dechen market	Dechen market	Other market	Other market	Totals
Scrophulariaceae	<i>Pedicularis przewalskii</i> Maxim.			1				1							3
Scrophulariaceae	<i>Pedicularis trichoglossa</i> Hook.f.	1								1					3
Scrophulariaceae	<i>Scrophularia buergeriana</i> Miq.			1				1							1
Scrophulariaceae	<i>Scrophularia dentata</i> Royle ex Benth.											1	1		3
Scrophulariaceae	<i>Veronica ciliata</i> Fisch.			1				1							1
Selaginellaceae	<i>Sellaginella pulvinata</i> (Hook. & Grev.) Maxim.			1				1							1
Solanaceae	<i>Anisodus tanguticus</i> (Maxim.) Pascher			1				1							1
Solanaceae	<i>Capsicum annuum</i> L.			1				1							1
Solanaceae	<i>Datura stramonium</i> L.			1				1							1
Solanaceae	<i>Hyoscyamus niger</i> L.			1				1							2
Solanaceae	<i>Lycium chinense</i> Mill.			1				1					1		1
Solanaceae	<i>Mandragora caulescens</i> C. B. Clarke			1				1							1
Solanaceae	<i>Przewalskia tangutica</i> Maxim.			1				1				1			2
Sterculiaceae	<i>Sterculia</i> sp. L.			1				1							1
Symplocaceae	<i>Symplocos paniculata</i> (Thunb.) Miq.			1				1							3
Tamaricaceae	<i>Myricaria germanica</i> (L.) Desv.			1				1							3
Tamaricaceae	<i>Myricaria squamosa</i> Desv.			1				1							1
Thymelaeaceae	<i>Stellera chamaejasme</i> L.			1				1							1
Thymelaeaceae	<i>Aquilaria agallocha</i> Roxb.			1				1							4
Thymelaeaceae	<i>Aquilaria sinensis</i> (Lour.) Spreng.			1				1							2
Trilliaceae	<i>Paris polyphylla</i> Sm.			1				1				1			1
Typhaceae	<i>Typha angustifolia</i> L.			1				1					1		1
Ulmaceae	<i>Ulmus pumila</i> L.			1				1							1
Urticaceae	<i>Urtica dioica</i> L.			1				1							1
Urticaceae	<i>Urtica triangularis</i> Hand.-Mazz.			1				1							1
Valerianaceae	<i>Nardostachys jatamansi</i> DC.			1				1							3
Valerianaceae	<i>Valeriana jatamansi</i> Jones			1				1					1		1
Valerianaceae	<i>Valeriana officinalis</i> L. & Maillefer			1				1							1

