

## **ETHNOPHARMACOLOGIC ANALYSIS OF MEDICINAL PLANTS USED BY LAOTIAN HMONG REFUGEES IN MINNESOTA**

MARLINE A. SPRING

*University of Minnesota, Department of Anthropology, 215 Ford Hall, 224 Church Street S.E.,  
Minneapolis, MN 55455 (U.S.A.)*

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### **Summary**

Laotian Hmong refugees in the Twin Cities of Minneapolis and St. Paul, Minnesota, cultivate many plants and employ them as a first line of defense against illness and disease. Thirty-seven medicinal plants have been identified, phytochemical components catalogued through literature research, and potential pharmacological activities correlated with Hmong medicinal uses. Using western biomedical criteria of efficacy, 92% of the medicinal plants being cultivated were found to be potentially efficacious. The frequent use of these plants in diet (81%) suggests that they have served to mediate against illness and disease states in the cultural and natural environment in which the practices evolved. A listing of 37 plants with Hmong names, uses and potentially active constituents is provided.

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### **Introduction**

All known human populations have developed views toward disease that are consistent with their perceptions of the processes of the universe. Like many other peoples, Laotian Hmong believe that disorders of the human body are manifestations of disorders in the processes of the universe; illness occurs when people do not live in harmony with the natural environment. Hmong have an understanding that people cannot live without plants and have developed a medical system which, in part, employs cultivated and wild plants.

Until recently the efficacy of this plant use has been largely unquestioned by others due to the relative isolation of Hmong from other groups of people. Researchers have discussed Hmong traditional medicine and culture in the Laotian context (LeMoine, 1972; Bliatout, 1984, 1986; Thao, 1986; Westermeyer, unpublished data) and have emphasized supernatural healing practices. Pake (1986) has addressed herbal medicines in Thailand's refugee camps but has not questioned botanical efficacy.

Today, the Hmong compose a large ethnic refugee population of approximately 13,050 (Haga, 1988) in the Twin Cities of Minneapolis and St. Paul, Minnesota. Although many have access to western health care, most Hmong still utilize some aspects of traditional health care either exclusively or in conjunction with western medical care. Virtually all members of the community have access to plant medicines either through kinship networks or via household cultivation of plants brought from Thailand or acquired in the United States. Traditional medicines are little understood by the medical establishment due to educational background and poor access to relevant scientific information about the medicines. The occurrence of Sudden Unexplained Death Syndrome (SUDS) among healthy young Hmong male refugees in the Twin Cities and elsewhere (Centers for Disease Control, 1984) and the high incidence of lead absorption in Hmong children in the Twin Cities (Centers for Disease Control, 1983; Chun and Deinard, 1986) have, however, heightened western physicians' interests in traditional medicines used by Hmong refugees.

Hmong often seek traditional health care before turning to western physicians. Usually they are reluctant to tell physicians that they have taken traditional medicines because they fear that the doctor will be angry, will refuse to treat them, or that their plants will be taken away from them by authorities. Western physicians, on the other hand, may feel they do not have enough information about medicinals that Hmong may have ingested, to diagnose and effectively treat these patients.

This paper identifies 37 of the Hmong medicinal plants most commonly used in the Twin Cities. It attempts to correlate their potential efficacy using western biomedical criteria by examining their known chemical components.

### *From South China to Minnesota*

The origin of the more than five million Hmong people living throughout the world today cannot be established either archaeologically or historically. Hmong tradition holds that they originally came from provinces north and east of the area where the majority of Hmong live today: the southern provinces of Yunan, Guangxi and Guangdong in the People's Republic of China (Li, 1928). There have been four major Han migrations southward in China occurring during the Third, Fifth, Twelfth, and Twentieth centuries of the Christian era, the last of which was the result of Japanese invasions during World War II. With each Han migration, Hmong moved either southward or vertically into the mountains (Wiens, 1954). Several groups have migrated into Vietnam, Laos and Thailand.

During the first half of the Twentieth Century, Laotian Hmong began participating in a cash economy through the cultivation and selling of opium poppies to outside groups. This new economic strength led the local Laotian-

French government to give some government positions to Hmong family leaders as a means of gaining information about and a degree of control over Hmong. In turn, Hmong leaders were able to secure certain advantages for their people. When the Royal Laotian government was formed in 1946, many Hmong continued to be involved in that government. However, many desired a total independence from France and aligned themselves with a group that was to later become known as the Pathet Lao. Even after independence in 1954 and throughout the civil war in Laos, there were Hmong leaders and people fighting on both sides (Yang See, n.d.).

In 1975 the Royal Laotian government fell with the takeover by the Pathet Lao. Similar military and political activities occurred in Cambodia and Vietnam at that time. Hmong leaders within the government resigned and fled to Thailand. Only about 1000 Hmong could be airlifted from Laos. Approximately 44,000 Hmong fled by other means in 1975 (Yang See, n.d.).

In the decade following the political and military takeover of Laos by the Pathet Lao, approximately 126,000 Hmong have crossed the Mekong River and entered refugee camps inside Thailand; thousands more have died trying to reach the camps. Survivors have settled in other countries: 63,000 in the United States, 7000 in France, 1500 in French Guiana, 800 in Canada, 350 in Australia, 225 in Argentina, and approximately 300 in other countries. An unknown number have migrated back into China and approximately 55,000 remain in camps in Thailand (Yang Dao, 1984; Olney, 1986). In the United States, the city of Fresno, California, is the home of approximately half of the state's 30,000 Hmong refugees (Beghtol, 1988). The second largest community of Hmong outside of Asia, some 13,050, live in the Minneapolis and St. Paul, Minnesota, area.

### *Hmong medical concepts and practices*

Hmong believe that illness may be caused by natural or supernatural phenomena and that therapeutic practices and prevention may require either natural or supernatural measures. Appropriate treatment of illness is determined according to etiology of the condition.

The primary supernatural cause of illness is soul loss. This may be the result of an emotional experience such as fright, depression or loneliness (Thao, 1986) or the soul may be enticed away or lost while traveling. Symptoms range from changes of behavior to acute physical illness, the severity of which depends upon the duration of soul absence (Bliatout, 1984). Rituals to call souls back into the body may be performed by heads of households or a shaman (*txiv neeb*) may be hired to perform the ceremony.

Humans must maintain the naturally existing harmony between the environment and themselves or risk illness caused by spirits who inhabit places in the natural world such as bodies of water, hills, minerals or vegetation. Ancestral spirits may cause illness in order to communicate their needs

to the living or evil spirits may attack people without reason. Spirit-caused illnesses produce symptoms such as trembling, convulsions, behavior changes or physical illness. A shaman must travel to the spirit world and either reason, bargain or fight with the spirit to convince it to remove the illness. A person possessed by an undesirable spirit may be washed with an infusion of leaves which will force the spirit to leave.

Diseases of organic or natural etiology often display discrete symptoms such as bleeding, rash, stomachache and weight loss (Thao, 1986). They are described according to sign or anatomical location (Westermeyer, unpublished data), such as cough or dropped stomach, and are not attributed to an underlying western physiological cause such as cancer or hepatitis. Pake (1986) contradicts this perspective by reporting biomedical concepts of disease, such as otitis media, anemia and kidney stones, to be Hmong indications for herbal treatment in a refugee camp in Thailand. However, the present paper documents that Hmong informants in the Twin Cities do not use these sorts of western disease terms or concepts, despite the fact that they have experienced more direct and often longer contact with western health care systems than Hmong in refugee camps.

Treatments for illnesses of organic etiology include ingestion or application of herbal preparations, abdominal massage, herbal body massage, rubbing a silver bar and egg on the body, rituals and incantations. Herbal specialists (*kws tshuaj*) are able to treat a wide variety of illness symptoms. These specialists are almost always women and have learned their skills by paying to study with more skilled herbalists.

## Methodology

This research was conducted during the 1985, 1986 and 1988 growing seasons in Minneapolis and St. Paul, Minnesota. The study population was chosen from among the Hmong residing in and around the Twin City area. Twenty-two informants were selected randomly either by introduction by Hmong or non-Hmong friends, or were approached in their gardens or at a farmers' market. All informants are women, most are older women, and most live in public housing located throughout St. Paul. They gained their knowledge of plant use from their parents or paid others to teach them individual plant uses. They cultivate plants for use as a first line of defense against sickness.

Historically, Hmong transported their medicinal plants when they moved to new locations. Similarly, many Hmong brought important plants with them from Thailand. When the plants are big enough, they are shared with others in their kingroup. Many Hmong cultivate these and locally acquired plants in small sections of community vegetable gardens, in small plots located next to their homes, or in pots, pails, pans or other large containers that can be moved indoors during the winter months.

Interviews were conducted in homes, gardens, classrooms and a farmers' market. One informant was able to speak in detail in English about her medicinal plant uses. Other interviews were interpreted by bilingual English as a second language (ESL) instructors, bilingual health care paraprofessionals, teenage and adult children or neighbors of informants.

Women were asked about the plants that they were growing at the time. Information about Hmong plant name, symptomatic use, category of person appropriate for this use, preparation, mode of administration, and frequency of use were ascertained during discussion and observation of their own plants. Informants were then shown pictures taken of plants in other gardens. As an informant recognized a plant, the above information was noted. Most women provided names and information for many plants pictured, even though they did not possess the plants at the time. They frequently reported that they previously cultivated a plant in Minnesota, but that it had died during the winter.

As a means of cross-checking information, the questions were reversed to ask what plant or plants could be used for certain symptoms or disorders. Answers often included plants found in Laos and that they were unable to bring with them or were unable to find here. Return interviews to recheck information were conducted in four homes containing the largest botanical collections.

Voucher specimens of 52 plants were pressed, dried and sent for taxonomic identification to P.F. Stephens, Director, Harvard University Herbaria. Identification to genus and species was obtained for 20 specimens; 14 plants were identified as comparable to a species (noted with "cf" in plant table). Identification was impossible for incomplete voucher specimens which lacked flower or fruit. Accordingly, genus only was determined for five plants, family only for seven specimens and two plants remain unidentified. Informants reported that they have begun to use some plants found in Minnesota that are similar to those found and employed in Laos. Three voucher specimens of these plants were identified by Dr. Thomas Morley, Professor, Department of Botany, University of Minnesota.

Literature research was conducted for the 23 identified species and the 14 species that were identified with qualification. Ethnobotanical compendia were consulted and a national computer search of the current literature was conducted on both Medline and Biosis. Ethnographic data, phytochemicals and pharmacological actions of each plant were catalogued. Plants about which little is known phytochemically, could be analyzed only to the extent that information was available.

Given the limitations of data in the literature, efficacy of Hmong medicinal plant use can be determined to be: potentially biomedically efficacious because it is known to contain phytochemicals capable of the pharmacologic action for which Hmong use the plant; biomedical efficacy of the plant is unknown because it has not been laboratory tested for the pharmacologic

action for which it is used; or it is biomedically ineffective because the plant is known to not produce the pharmacologic action for which it is used. Although this paper does not address other criteria of efficacy, it should be noted that Hmong medicinal plants are perceived as effective because Hmong observe them to affect undesirable biological states in expected and intended ways or they are symbolically efficacious because the use of the plants gives meaning and order to the disruption and stress of sickness experienced by Hmong in Minnesota. Therefore, failure to cure may serve to reinforce their medical belief system and world view (Ortiz de Montellano, 1986b).

## **Discussion**

Informants provided 106 different plant and use combinations for plants grown in their own gardens. Based upon scientific laboratory experiments, 88 of these plant and use combinations (83%) are potentially pharmacologically capable of effecting the indicated outcome. Moerman (1979) suggests that if medicinal plant use is based on symbolic meaning and a placebo effect, then plants should be randomly represented in a population's pharmacopeia. This data suggests that Hmong medicinal plants are not randomly selected nor are they valued primarily for symbolic reasons, but that their use is based upon empirical observations of efficacy.

An additional 36 plant and use combinations were indicated by informants from photographs of plants. Only ten (28%) are known to contain phytochemicals capable of effecting the indicated response. The lower potential efficacy found among plants identified in photographs may be the result of:

- (1) A woman now cultivating a plant has current knowledge of its use, whereas a woman who does not currently grow a plant may have forgotten specific information about its use.
- (2) A woman currently cultivating a plant may have a keener interest in the plant medicine and its healing properties and therefore possess more accurate knowledge of its uses.
- (3) Poor eyesight resulted in some older women becoming confused while identifying plants with similar images in photographs. Women cultivators with poor vision either knew the location of their own specific plants or they felt the leaves and stems of their plants before making identifications and stating medicinal or dietary uses.

These data call into question the rigorousness of research methods which use photographs to elicit ethnobotanical information. The traditional anthropological method of participant observation as used in this research, e.g. discussions in gardens with the women cultivating their own plants, is likely to reap the most accurate information.

## Dietary considerations

Thirty of the 37 plants researched (81%) are used both in medicinal preparations and as seasonings or additives to diet. Informants indicated they incorporate these plants in the general diet of all individuals to increase appetite, weight, strength and energy, and to promote good health. Cross-cultural data (Etkin and Ross, 1982; Koo, 1984; Hammerschmidt, 1986), indicates that it may be that medicinal plants used in Hmong diets serve to mediate against diseases possible in those natural environments and social settings in which the practices evolved.

## Conclusion

Despite the fact that new and different ideas as to the causes of illness and disease are imposed upon individuals from Hmong culture, they adhere to their traditional medicine. To the extent that these medicinal and dietary plants remain available and are observed to affect health in expected and meaningful ways, plant medicines will continue to be important components in the Hmong health care system in Minnesota.

TABLE 1

### POTENTIAL BIOMEDICAL EFFICACY OF PLANT USES ACCORDING TO PHYSIOLOGIC SYSTEM

Physiologic system	No. of plants and use indications	No. potentially efficacious
Gastrointestinal	29	22
Epidermal	29	26
Urinary	2	2
Reproductive	29	12
Musculoskeletal	18	12
Respiratory	6	4
Ophthalmic	2	2
Other: Fever	9	8
Pain	18	10

TABLE 2

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Acorus cf. gramineus</i> Ait. (small variety) ARACEAE Aquatic sword grass, Chinese sweet grass	<i>pa:wj qai:b</i> - (W,G)	Prevent miscarriage Cough with sore throat Chicken pox Heartburn, dry mouth, pain, increase energy, postpartum diet	Eugenol: sedative Pinene: expectorant Volatile oil: antiviral	Röst 1979, p. 350 Elvin-Lewis 1986, p. 62 Natl. Acad. Sci. 1975, p. 100
<i>Acorus cf. gramineus</i> Ait. (large variety) ARACEAE Aquatic sword grass, Chinese sweet grass	<i>pa:wj ia loj</i> - (W) <i>pa:wj deg</i> - (W) <i>pa:wj taab</i> - (G)	Headache, pain, earache	Asarone: central nervous system depressant <i>trans</i> -4-propenyl-vera- trole: central nervous system depressant Eugenol: sedative and analgesic	Chopra 1965, p. 902 Xiao 1980, p. 374 Röst 1979, p. 350
		Rash Infant fever Cough Children's diarrhea with mucus and blood Chicken pox Alleviates water retention during pregnancy, dry mouth, heartburn, stomachache, increases appetite, seasoning	Eugenol: antiseptic Eugenol: antipyretic Pinene: expectorant Eugenol: larvicide Tannin: antidiarrheal Volatile oil: antiviral	Röst 1979, p. 350 Röst 1979, p. 350 Elvin-Lewis 1986, p. 62 Elvin-Lewis 1986, p. 62 Elvin-Lewis 1986, p. 62 Natl. Acad. Sci. 1975, p. 100
<i>Agopodium podagraria</i> L. UMBELLIFERAE	<i>nkaj ntsuab</i> - (W) <i>taab ki:b Amesitkas</i> - (G)	Heals and relieves pain of surgical incision, infant fever, food, removes dis- colored skin, increase strength and energy	No constituents found	

<i>Anredera cordifolia</i> (Tenore) Steen.	<i>maab, maab caj ntsuab,</i> <i>Amab sab tzhim,</i> <i>sab tzhim ntsuab</i> — (W) "green vine"	Heartburn, indigestion, red skin, yellow skin, children's diarrhea or diarrhea with mucus, wounds, increase brain function, increase fetal vitality, arthritis, back pain, muscle stiffness, seasoning	Plant: causes livestock diarrhea Water extracts: toxic to rabbits	Everist 1974, p. 87 Everist 1974, p. 87
Madeira vine	<i>saab tzhim maab</i> — (G)			
<i>Artemisia</i> cf. <i>vulgaris</i> L. COMPOSITAE	<i>ntiv soob</i> — (W,G) "small fingers"	Infant and child fever	Leucomycin: antibiotic Tannin: viricide, bactericide	Duke 1985, p. 549 Duke 1985, p. 549
Mugwort, fleabane Caroline thistle, Indian wormwood	<i>knaj ntsuab</i> — (W,G) "green boat" <i>nhab koob</i> — (W,G) "prickly burr"		Phenol: antimicrobial Camphor: antimicrobial Terpineol: antimicrobial Adenine: antiviral Linalool: antiviral Phenol: antimicrobial Camphor: antimicrobial Terpineol: antimicrobial Linalool: antimicrobial Camphor: cardiac stimulant	Duke 1985, p. 549 Duke 1985, p. 549 Duke 1985, p. 549 Keys 1978, p. 220 Duke 1985, p. 549 Duke 1985, p. 549
		Bad breath		
		Increase energy, strength		
		Headache Sore breasts in pregnancy	Camphor: analgesic Camphor: anesthetic Phenol: antiseptic Rutin: antiedemic and anti- inflammatory	Duke 1985, p. 549 Duke 1985, p. 549 Duke 1985, p. 549 Duke 1985, p. 549
		Virility, impotence, increase appetite, post-partum diet, seasoning		

TABLE 2 (continued)

Scientific name* Family Common English name	Hmong name (White Hmong — W) (Green Hmong — G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Basella alba</i> L. BABELLACEAE Ceylon spinach	<i>maab ntshaa</i> — (G) "purple vine"	Bruise Food, promotes good health	Saponin: skin irritant, improves circulation	de Padua 1977b, p. 9
<i>Colocasia esculenta</i> (L.) Schott. ARACEAE Taro, dasheen, eddoes, Elephant ears, coco yam	<i>kav yum</i> — (W,G) "soft spongy stem" <i>kaav yuwj</i> — (G)	Food Hard lump with swelling, infected wound, blister, sore breast lump, stomachache	Good source of: protein, carbohydrates, vitamin C	Iwu 1986, p. 138
<i>Commelina cf. communis</i> L. COMMELINACEAE Common day flower	<i>raus ntsuab</i> — (W,G) "green trailing plant" <i>zaub tsauv</i> — (G)	Wounds, cuts, fever cough Pain and curling of hands, wrists, feet and knees, weakness, for good health	Tannin: styptic, hemostatic, bactericide, viricide	Ortiz de Montellano 1986a, p. 16
<i>Coriandrum sativum</i> L. UMBELLIFERAE Coriander, cilantro	<i>zaub tsuab qaib</i> — (W) "lacy leaf to cook with chicken"	Fever, rash  Chicken pox, food	Vitamin A: vitamin deficiency dermatitis Tannin: antibacterial  Coriandrol: anticonvulsant <i>p</i> -Cymene: antibacterial Tannin: antiviral	Perry 1980, p. 415 Perry 1980, p. 415 Xiao 1980, p. 379 Keys 1976, p. 198 Morton 1977, p. 380 Duke and Ayensu 1985, p. 82 Lueng 1984, p. 44

TABLE 2 (continued)

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong — W) (Green Hmong — G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Dioscorea alata</i> L. DIOSCOREACEAE White yam, water yam, Winged-stalked yam	<i>qos iab</i> — (W)	Food	Carbohydrates, vitamin C protein, sterol	Iwu 1986, p. 140
<i>Gaiasoga citata</i> COMPOSITAE	unknown	Mouth sore	Caffeic acid: antiseptic antifungal, vulnerary	Szepeczynska and Woldis 1984, p. 121
<i>Glechoma hederacea</i> LABIATAE Creeping Charlie, Ground ivy, ale hoof, Cat's foot, Run-away-robin	<i>kuas luag</i> — (G)	Diarrhea	Tannin: astringent, viricidal, antidiarrhetic, bactericidal Asparagic acid: nematocide Linalool: spasmolytic	Kimura 1982, p. 93 Perry 1980, p. 186 Duke 1985, p. 210 Duke 1985, p. 210
		Stomachache	Methyl salicylate: carminative	Kingsbury 1964, p. 30
		Headache	Methyl salicylate: anal- gesic, counter-irritant, anodyne	Kingsbury 1964, p. 30 Perry 1980, p. 186
		Itch	Menthol: antipruritic, anesthetic	Duke 1985, p. 210
		Cough	Tannin: bactericide, viricide Marrubium: expectorant Extract: cough sedative	Duke 1985, p. 210 Kurup 1977, pp. 204—5
		Postpartum diet, food	Pinene: expectorant Amino acids: choline, proline, tryosine, glutamic acid, valine	Duke 1985, p. 210 Perry 1980, p. 186 Duke 1985, p. 210 Duke 1985, p. 210
		Fetal quickening, morning sickness		

<i>Houttuynia cordata</i> Thunb. SAURACEAE Stinky peony, stink grass, Pepper grass, nipple grass, New Zealand spinach	<i>kab raus</i> "smelly insect" <i>zauß tsos neeg</i> — (G)	Dysentery, diarrhea, bloody diarrhea, stomachache  Fever, wound, cough, breast pain and swelling	Quercitrin: antispasmodic vasopressor, viricide  Houttuynin (decanoyl acetaldehyde): anti- microbial, antibacterial Volatile oil: antimicrobial  Oxalate: antiseptic	Kimura 1962, p. 25 Perry 1980, pp. 377 — 8 Keys 1976, p. 184  Xiao 1980, p. 378 Natl. Acad. Sci. 1975, p. 213 Natl. Acad. Sci. 1975, p. 213 Matsushita and Sanada 1978, p. 365 Xiao 1983, p. 102
<i>Hydrocotyle</i> cf. <i>stbthor-</i> <i>ptoides</i> Lam. UMBELLIFERAE Lawnwater pennywort	<i>laj vag</i> — (W) "goes around"	Headache, weight gain, enlarged spleen	Pinene: expectorant	Kawa et al. 1982, p. 2590
<i>Impatiens balsamina</i> L. BALSAMINACEAE Garden balsam, Touch-me-not	<i>paj co nitiv</i> — (W,G) "Co people's flower" "moving flower scatters seeds when touched" <i>paj nitir ntuvav</i> — (G) "vomiting flower"	Eye wash, infant stomachache, pregnancy dietary, morning sick- ness, fetal quickening  Hasten childbirth, relieves menstrual cramps, stops spotting  Increases strength	Extracts: tocolytic	Lueng 1984, pp. 62 — 63
<i>Iresine herbstii</i> Hook. f. AMARANTHACEAE	<i>nkaj ikab</i> — (W) <i>nkaj laab</i> — (G)	Rash, itch, burns, stomachache, body pain  Irregular menses, post- partum bleeding, energy, appetite	Extract: anti-gram positive bacteria Extract: antispasmodic	Ayensu 1981, p. 35  Mokkhasmit et al. 1971, p. 490

TABLE 2 (continued)

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Iris germanica</i> hybrid IRIDACEAE Iris	<i>uab noog ntsuam</i> - (W, G) "bird flapping wings" <i>ob noog ntsuam</i> - (G)	Stomachache, diarrhea  Weak kidney, pain, tired, amenorrhea	Iridenin: cholinergic Iridin: cholinergic cathartic	Ali et al. 1983, p. 2061 Ali et al. 1983, p. 2061
<i>Kalanchoe</i> cf. <i>pinnata</i> (Lam.) Pers. CRASSULACEAE Air plant	<i>nplooj twaj dau</i> - (W) "stem comes out from leaf on ground" <i>nplooj twaj kwag</i> - (G) "leaf that grows shoots"	Wound, chicken pox, fever, stomachache, sores	Eryophylline: antibacterial antiseptic Tannin: bactericide, viricidal, astringent, styptic, antidiarrhetic	Perry 1980, p. 216 de Padua 1978, p. 13
<i>Mentha</i> cf. <i>piperita</i> L. LABIATAE Peppermint, balm mint, Brandy mint, lamb mint, Curled mint	<i>pum hub</i> - (W, G)	Mouth sores  Fever	Tannin fraction: active against herpes simplex virus Menthol: anesthetic, anti- septic, antipruritic Tannin: bactericide Carvacrol: antiseptic, dis- infectant Thymol: bactericide, anti- septic Cineol: bactericide Menthol: antipruritic Linalool: antimicrobial	Herrmann and Kucera 1967, p. 876 Morton 1977, p. 381 Morton 1977, p. 381 Morton 1977, p. 381 Morton 1977, p. 381
		Itch, rash  Food Bruise	Thymol: bactericide, anti- septic Cineol: bactericide Menthol: antipruritic Linalool: antimicrobial Thymol: larvicide	Morton 1977, p. 381 Morton 1977, p. 381 Nichiforescu et al. 1970, p. 159 Nichiforescu et al. 1970, p. 159

<i>Mirabilis jalapa</i> L. NYCTAGINACEAE False jalap, four-o'clock, Morning rose marvel of Peru	<i>paş kaub tub saab</i> — (W) "sour flower" <i>kuab tub saab</i> — (G)	Mumps  Bloody stools  Bone fracture  Body aches Abortifacient, hasten childbirth	Formic acid: counter irritant  Saponin: counter irritant Pectins: hemostatic, antidiarrheal Formic acid: counter- irritant Extracts: antispasmodic	de Padua 1978, p. 36  de Padua 1978, p. 36 de Padua 1978, p. 36  de Padua 1978, p. 36  Dhar 1968, p. 232
<i>Ocimum cf. americanum</i> very close to <i>O. basilicum</i> LABIATAE Sweet basil, garden basil	<i>zaub trig theem</i> — (W) "vegetable that grows in level steps" <i>zaub trig nises</i> — (W) "vegetable that grows in level steps to eat with fish" <i>zaub trug theem</i> — (G)	Remove foreign eye object  Lip blister or sore	Oleic acid: mucous membrane irritant Pinene: mucous membrane irritant Camphor: anesthetic, antipruritic, anti- bacterial Eugenol: anesthetic, fungicide Safrrole: anesthetic, antibacterial Phenol: anesthetic, antibacterial <i>p</i> -Cymene: antibacterial Tannin: antibacterial, antiviral <i>p</i> -Methyl benzoic acid: antibacterial Eucalyptol: antibacterial Cineole: antibacterial Linalool: antibacterial, antiviral Thymol: antibacterial, fungicide Anethole: gastric stimulant Geraniol: used in perfumery	Duke 1985, p. 333  Perry 1980, p. 425  Duke 1985, p. 333 Ayensu 1981, p. 110  Sobti et al. 1978, p. 52  Duke 1985, p. 333  Oliver-Bever 1983, p. 45  Xiao 1980, p. 379 de Padua 1977a, p. 36  Thappa et al. 1979, p. 1242 Duke 1985, p. 333 Reuveni et al. 1984, p. 20 Nishida et al. 1984, p. 1485 Perry 1980, p. 425  Perry 1980, p. 425 Sobti et al. 1978, p. 52
		Increase appetite		

TABLE 2 (continued)

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
		Dark malodorous stools	Extracts: anti- <i>Salmonella typhosa</i> Eugenol: larvicide, anti-septic Linalool: antimicrobial, antiviral Thymol: anthelmintic, antibacterial Anethole: carminative Safrole: carminative Tannin: bactericidal, antiviral	Duke 1985, p. 333 Sobti et al. 1978, p. 52 Nishida et al. 1984, p. 1435 Perry 1980, p. 425 Perry 1980, p. 425 Duke 1985, p. 333 de Padua 1977a, p. 36
<i>Perilla frutescens</i> (L.) Britt. LABIATAE Wild coleus, perilla mint, Beefsteak plant, purple mint	hnav tsuj - (W) "wearing new clothes" hnav labb - (G)	Leg pain Leg weakness	Extract: central nervous system depressant Histidine: used in treatment of arteriosclerosis obliterans Linoleic acid: used in treatment of arteriosclerosis obliterans Iodine: antibacterial Apigenin: antibacterial	Natl. Acad. Sci. 1975, p. 150 Duke 1985, pp. 354 - 355 Keys 1976, pp. 256 - 257 Perry 1980, p. 191 Duke and Ayensu 1985, p. 378 Duke and Ayensu 1985, p. 378 Duke 1985, pp. 354 - 355
		Measles, rashes, chicken pox, itch	Luteolin: anti-inflammatory Methionone: treats rashes	Duke and Ayensu 1985, p. 378 Duke 1985, pp. 354 - 355
		Stomachache	Perilla ketone: stimulates intestinal motility	Kozuka et al. 1985, p. 480

	Histidine: treatment for gastric ulcers	Duke 1985, p. 354
	Oleic acid: choleric	Keys 1976, p. 256
Nosebleed	Anthocyanin: hemostatic	Duke and Ayensu 1985, p. 378
Fever and chills	Extracts: antibacterial	Natl. Acad. Sci. 1975, p. 150
	Iodine: antibacterial	Perry 1980, p. 191
	Adenine: antiviral	Perry 1980, p. 191
	Apigenin: antibacterial	Duke and Ayensu 1985, p. 378
Earache	Luteolin: anti-inflammatory	Duke and Ayensu 1985, p. 378
	Perilla ketone: causes acute bovine pulmonary emphysema and pneumonia in laboratory animals; Hmong believe illness is caused by an insect that lives under leaf	Koezuka et al. 1985, pp. 480—482 Wilson et al. 1977, pp. 573—574
	Painful urination difficult urination	Moskalenko 1986, p. 251
<i>zaub ntstig npua</i> — (W)	Salicylic acid: antibacterial	Duke 1985, p. 386
"vegetable to cook with pork"	Aucubin: antibacterial	Endo et al. 1981, p. 1000
<i>zaub ntsws npuas</i> — (G)	Chlorogenic acid: antibacterial	Duke 1985, p. 386
	Tannin: antibacterial, styptic	Duke 1985, p. 386
	Citric acid: styptic	Keys 1976, p. 268
	Potassium salts: diuretic	Watt and Breyer-Brandwijk 1962, p. 848
	Ascorbic acid: diuretic	Duke 1985, p. 386
	Baicalin: diuretic	Duke 1985, p. 386
	Sorbital: diuretic	Duke 1985, p. 386
	Citric acid: dissolves calculi	Keys 1976, p. 268
	Cinnamic acid: anti-helminthic	Duke 1985, p. 386

*Plantago cf. major* L.  
PLANTAGINACEAE  
Plantain

TABLE 2 (continued)

Scientific name* Family	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Plumbago</i> cf. <i>zeylanica</i> L. PLUMBAGINACEAE Ceylon leadwort	<i>paj tab</i> - (G) "uneven flower"	Headache	Salicylic acid: analgesic	Duke 1985, p. 386
		Stomachache	Sorbitol: cathartic	Duke 1985, p. 386
		Bone fracture	Allantoin: treats gastric ulcer, anti-inflammatory	Duke 1985, p. 386
			Gentisic acid: analgesic	Duke 1985, p. 386
Select fetal sex			Oleanolic acid: skin irritant	Duke 1985, p. 386
			Benzoic acid: promotes healing	Duke 1985, p. 386
<i>Polygonum cuspidatum</i> Lieb. and Zucc. POLYGONACEAE Japanese knotweed	<i>qaub pes</i> - (W) <i>Kaub dleg</i> - (G) "sour water plant"	Decrease tired feeling	Plumbagin: stimulates central nervous system	Krishnaswamy and Purashothaman 1980, p. 876 Watt and Breyer-Brandwijk 1962, p. 850 Duke and Ayensu 1985, p. 486
		Promotes weight gain	Glucose: nutrient	
		Bone fracture, headache	Fructose: nutrient	
		Diarrhea	Tannic acid: antidiarrheal antibacterial	Duke 1985, p. 563
Regulate menstruation, protects fetal vitality, postpartum diet		Chicken pox	Resveratrol: antibacterial	Arichi et al. 1962, p. 1766
			Emodin: gonadotrophic	Natl. Acad. Sci. 1975 p. 185
Veneral disease			Gallic acid: bacteriostatic	Duke and Ayensu 1985, p. 507

<i>Polygonum runcinatum</i> Ham. ex D. Don POLYGONACEAE	<i>ntsug qais</i> — (W,G) "bunching seedling" <i>ntsug quab</i> — (W,G) "sour seedling" <i>quab quav yeeb</i> — (G) "sour opium plant"	Decrease weak extremities Promote good health	Leucoanthocyanidin: anti-inflammatory Leucoanthocyanidins: cardiotonic Polydatin: decreases blood lipids	Duke and Ayensu, 1985 p. 507 Duke and Ayensu 1985, p. 507 Xiao 1980, p. 371
<i>Ricinus communis</i> L. EUPHORBIAEAE Castor oil plant, Castor bean	<i>ntoo qatib lab</i> — (G) <i>ntoo qatib lab</i> — (W) "red chicken tree" <i>triv taw dlaav laab</i> — (G) "red eagle foot"	Diarrhea Wounds, cuts, chicken pox Morning sickness, increase energy during pregnancy Uterine prolapse, postpartum pain Stomachache, stomach lump	Tannic acid: antidiarrheal Rutin: spasmolytic Gallic acid: hemostatic bacteriostatic Entire plant: ecbohic uterine stimulant Endotrypsin: digestive enzyme Lipase: digestive enzyme Amylase: digestive enzyme Maltase: digestive enzyme Castor oil: cathartic, purgative Glycerine: bowel irritant Glycerine: emollient Oleic acid: used in ointments Stearic acid: used in lotions Tannin: bactericide, viricide	Duke 1985, p. 563 Duke 1985, p. 563 Duke 1985, p. 563 Kong et al. 1976, p. 122 Duke 1985, p. 408 Duke 1985, p. 408 Duke 1985, p. 408 Keys 1976, p. 105 Keys 1976, p. 105 Duke 1985, p. 408 Duke 1985, p. 408 de Padua 1977b p. 23
		Rash Fever, infection Muscle pain, bloody stool, dropped stomach (enlarged liver)		

TABLE 2 (continued)

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Saxifraga</i> cf. <i>stolonifera</i> Merrb. SAXIFRAGACEAE	<i>plawj</i> - (W,G) <i>plawj tsuas</i> Mountain area from peak to middle of slope	Diarrhea in children Red itchy eyes General body pain, weakness, stomachache, impotence, quickening, keeps spirits away	Arbutin: antibacterial Arbutin: antibacterial	Taneyama and Yoshida 1979, p. 69 Taneyama and Yoshida 1979, p. 69
<i>Sedum telephium</i> L. CRASSULACEAE	<i>sam moj dab</i> - (W,G) "frighten bad spirit away" <i>xab mej kab</i> - (G)	Rash Wound Painful urination Promotes quickening, stops spotting, pregnancy and postpartum dietary, bruise, bone fracture, promotes weight gain, increase strength	Entire plant: antiviral Plant: antimicrobial Plant: antimicrobial	Shirobikov et al. 1981, p. 897 Dornberger and Lich 1982, p. 215 Dornberger and Lich 1982, p. 215
<i>Solanum</i> cf. <i>coagularis</i> Forsk. or <i>S. incanum</i> L. SOLANACEAE Indian nightshade	<i>lws kab</i> - (W) "bitter fruit" <i>txiv ab</i> - (G)	Antidote for bad food Food, spice	Hyoscyne: antispasmodic Rennet-like enzyme: digestion Linoleic acid: essential fatty acid Tryptic enzyme: digestive enzyme	Beaman and Muhammed 1976, pp. 920 - 924 Watt and Breyer- Brandwijk 1962, pp. 998 - 995 Watt and Breyer- Brandwijk 1962, pp. 998 - 995

<i>Solanum nigrum</i> SOLANACEAE Black nightshade	<i>zau ab</i> — (W) <i>zau ab</i> — (G) "bitter vegetable"	Food especially enjoyed by elderly	Carbohydrates: nutrient	Watt and Breyer- Brandwijk 1962, pp. 993 — 995
			Melibiose: nutrient	Watt and Breyer- Brandwijk 1962, pp. 993 — 995
			Maltose: nutrient	Watt and Breyer- Brandwijk 1962, pp. 993 — 995
			Sucrose: nutrient	Watt and Breyer- Brandwijk 1962, pp. 993 — 995
			Acetylcholine: improves brain functioning	DeMelo et al. 1978, p. 19
			Solanine: nervous sedative for paralysis agitans (Parkinson's Disease)	Muenscher 1962, p. 208
			Diosgenin: relieves stress fatigue	Oliver-Hever 1966, p. 105
			Extracts: central nervous system depressant, cardiac depressant, hypotensive, vasodilator, analgesic, antispasmodic, anti-inflammatory	Natl. Acad. Sci. 1975, pp. 221 — 222 Natl. Acad. Sci. 1975, pp. 221 — 222
			Carotene: essential nutrient Vitamin C: essential nutrient	Watt and Breyer- Brandwijk 1962, pp. 996, 998
		Burns	Tannin: astringent, antibacterial	Duke 1985, pp. 449 — 450
			Solanocapsine: antibacterial	Natl. Acad. Sci. 1975, pp. 221 — 222
		Berries extract blood suckers from nose	Solamargine: antifungal	

TABLE 2 (continued)

Scientific name <sup>a</sup> Family Common English name	Hmong name (White Hmong - W) (Green Hmong - G) "English translation"	Hmong uses	Chemical: action <sup>b</sup>	Constituent reference
<i>Valeriana paniculatum</i> (Jacq.) Gaertn. PORTULACACEAE	<i>ts huaj zya hnub</i> - (W) "seven day medicine" <i>nkob iy zeeb</i> - (W) "very important" <i>kaub laug zeeb Hmoob</i> - (G)	Food, increases appetite promotes weight gain, promotes good health, postpartum food, wound, decreases weakness	No constituents found	
<i>Valeriana cf. officinalis</i> L. VALERIANACEAE Valerian, setwall, Garden heliotrope, all-heal Amanilla, nard, cat's love	<i>ntiv</i> - (W,G) <i>txham laaj</i> - (G) <i>luj</i> - (G)	Prevents miscarriage   Bone fracture, bruise	Valeric acid (valerinic acid): spasmolytic, muscle relaxant Extracts: sedative Extracts: increase blood flow Pinene: irritant	Hendriks et al. 1981, pp. 86-87 Della et al. 1981, p. 297 Ding 1985, p. 410 Duke and Ayensu 1985, p. 685 Duke 1985, p. 588
<i>Zebrina pendula</i> Schnizl. COMMELINACEAE Wandering jew, Creeping jenny, Rolling calf bed Red water grass	<i>raus lab</i> - (G) <i>raus liab</i> - (W) "red trailing plant" <i>tsaws taab</i> - (G)	Bruiise Rash, itch, hives, insect bite and swelling Increases appetite, decreases weakness	Extracts: increase sleep quality  Choline: lipotropic Extracts: increase sleep quality  Anthocyanins: hemostatic Caffeic acid: antiseptic, decreases capillary permeability	Leatherwood and Chauffard 1982, p. 115 Brouillard 1981, p. 143 Brouillard 1981, p. 143

<i>Zephyranthes rosea</i> Lindl.	<i>tshuaj dlos</i> — (G)	Upset stomach	Lycorine: emetic, cathartic	Perry 1980, p. 14
IRIDACEAE	<i>tshuaj dos</i> — (W)			
Lily grass	"medicine onion"	Fertility, amenorrhea,		
Snow drop	<i>dos yis</i> — (W)	bone fracture, food,		
	<i>tshuaj tsuas tzhav</i> — (G)	produce male child		

"Plants identified as "comparable to" a species appear with "cf" between the genus and species. Analyses of potential efficacy of Hmong uses were made in conjunction with known phytochemicals present in that species.

"Pharmaceutical actions were drawn from the reference indicating the presence of the phytochemical whenever possible. Most of the actions were derived from the following references: *CRC Handbook of Medicinal Herbs*, Duke 1985; *The Pharmacological Basis of Therapeutics*, Goodman and Gilman 1975; *The Merck Index of Chemicals and Drugs*, Stecher, Finkel, Siegmund and Szafranski 1960; *Stedman's Medical Dictionary* 1976.

"Because the plant is known to cause illness or death in laboratory animals, further testing of the plant should be done to determine if there is any association between plant use and SUDS.

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