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Review

# Discussion on evolution of Mongolian medicinal material names and countermeasures for standardization

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ABSTRACT

Mongolian pharmacy is an important part of traditional medicine for the Chinese nation, with a long history and a complete theoretical system. The Mongolian people have accumulated and summarized the types and usage of Mongolian medicines in the practice of fighting against diseases over a long history. Mongolian medicinal resources are rich and diverse, the processing is self-contained, and the methods of medication are scientific and reasonable. Mongolian pharmacy not only has a deep historical relationship with traditional Chinese medicine but has also absorbed the essence of ancient Tibetan and Indian Ayurvedic medicine in the process of its development. We can identify the historical traces of the continuous exchange, communication, and integration of various ethnic medicinal cultures from the names of Mongolian medicinal materials. Because of the differences in languages and cultures of the various ethnic groups, the names of Mongolian medicinal materials have undergone a long historical period of evolution. These need to be further standardized owing to complications caused by the existence of synonyms and homonyms.



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## 1. Origin and evolution of names for Mongolian medicines

The names of medicinal herbs in the modern Mongolian pharmacy can be summarized into three types. One is the name used in Mongolian, the second is to borrow the name from loanwords from the Arabic, ancient Indian, Tibetan, and traditional Chinese medicines, and the third is to translate the name from a local dialect to the Mongolian.

### 1.1. Names used in Mongolian language

Original and habitual names in the Mongolian language are the mainstream Mongolian medicinal herb names. A total of 216 of the 440 commonly used Mongolian medicinal herbs have been named and used in earlier Mongolian languages (Lobsang, 2011). Before the 13th century, the Mongol ancestors living on the Mongolian plateau accumulated a wealth of medicinal knowledge. Written in 1240, the *Secret History of Mongolia* is a masterpiece of Mongolian historical literature that records the ancient Mongolian names of wild plants in the context of ancient Mongolian life. This text represents the first documentation of drug names in the Mongolian language, including for Qiqihina (*Malus baccata* (L.) Borkh.), Sodun (*Sanguisorba officinalis* L.), Haliyarson (*Allium senescen* L.) (Song, 2014), and more than ten other kinds of medicinal plant. According to textual research, these plants are medicinal and food homologous plants and linguistic data confirm that modern folk-Mongolian names are the evolution of ancient Mongolian names (Hasbaggen, 1995). The 1330 edition of *Principles of Correct Diet* recorded some drug names, such as *Tarbaga* (*Marmota*), *Chichihana* (*Hippophae rhamnoides* L.), in the Mongolian language. By the 18th century, when the Tibetan medical texts *Four Medical Classics* and *Lantabu* were translated into Mongolian, most of the medicinal herbs could be translated using their customary names, such as *Juniperus formosana* Hayata, *Rheum officinale* Baill, *Vitis vinifera* L., *Eriobotrya japonica* Thunb, *Glycyrrhiza uralensis* Fisch, and *Foeniculum vulgare* Mill. Subsequently, the large-scale reference book *the Source of Wisdom*, compiled as the Mongolian translation of the Tibetan *Tengyur*, recorded more than 320 drug names, of which 103 existing names of the Mongols, accounting for about 32.18% (Chen, 2020). This book played an important role in standardizing the names of Mongolian medicinal herbs. In addition, almost all animal medicines have had Mongolian names since then.

### 1.2. Names borrowed from loanwords

Many names of Mongolian medicinal herbs have been introduced by transliteration. This is closely related to the developmental history of Mongolian medicine and is also a vivid embodiment of national cultural exchanges and blends. Historically, Mongolian medicine has absorbed the essences of Arabic, ancient Indian, Tibetan, and traditional Chinese medicines. These influences have constantly enriched the varieties of Mongolian medicinal materials, and many materials are named through transliteration, especially the names of non-local medicinal materials. For example, the Mongolian names of *Santalum album* L., *Aquilaria sinensis* (Lour.) Spreng., *Borneolum Syntheticum*, *Dracocephalum moldavica* L., *Euryale ferox*, *Myristica fragrans* Houtt, *Amomum kravanh* Pierre ex Gagnep, *Inula helenium* L., *Carthamus tinctorius* L., and *Cuminum cyminum* L. are derived from Sanskrit and are still used today. With the spread of Buddhism in Mongolia in the late 16th century, many Western traditional medicine introduced to Mongolia gradually evolved into Mongolian medicinal materials that use transliterations of Tibetan medicine names, such as *Zingier officinale* Ros., *Chebulae Fructus*, *Gardenia jasminoides* Ellis, *Toosendan Fuctus*, *Stellera chamaejasme* Linn, *Aconitum nagarum* Stapf, *Echeveria*, *Xanthoceras sorbifolia* Bunge, and *Adenophora stricta* Miq. Similarly, some Mongolian names come from the transliteration of Chinese names, such as the herbs *Shiraia bambusicola* Henn, *Angelica sinensis* (Oliv.) Diels, *Mangifera indica* L., *Picrorhiza scrophulariiflora* Pennell, *Plumbum rubrum* ($Pb_3O_4$), *Astragali Radix*, *Prunus persica* L., *Hyoscyamus niger* L., and *Nelumbo nucifera*, as well as the minerals alunite, agate, soda niter, travertine, and osdraconis. In addition, a small number of Mongolian medicines have names derived from other ethnic languages. For example, *Punica granatum* L., *Gentiana urnula* H. Sm., sulfur, peafowls, and sea-snail are from Persian and Uighur; quartz and spirits are from Arabic (Lobsang, 2011).

### 1.3. Names translated into Mongolian language

The gradual translation of many borrowed loanwords into Mongolian and the achievement of expert consensus are innovative measures. The Tibetan–Mongolian comparative dictionary *The Source of Wisdom*, compiled in 1742, lists 101 Mongolian medicines whose Mongolian names were standardized by paraphrasing, and are still used today, such as Chaganmelheiqilov (*Kaolinitum*) and bilzvhai (*Passer montanus*) in miha (Buhebateri, 1995). In addition, some drug names were transliterated into Mongolian in later practice; examples include translations from the original Chinese into Mongolian names for Habursilqiqig (*Primula septemloba* Franch), Altanhuaqiqige *(Trollius chinensis* Bunge), Horhaimogv (*Ophiocordyceps sinensis* (Berk.) G.H). Sungetal, Looligzagas (*Syngnathu* ssp.), and Morinzagas *(Hippocampus*), and from original Tibetan into Mongolian for babgaiinsus (*UrsiFellis* Pulvis), hargabor (*Sus scrofa* L.), and xibli (*Equisetum arvense* L.) (Gao, 2013).

## 2. Discussion on standardization of names of Mongolian medicinal materials

### 2.1. Problem of irregularities in names of Mongolian medicinal herbs

#### 2.1.1. Phenomenon of synonyms

Synonyms exist for medicinal herbs that have multiple names, with different names being derived from botanical names, colloquial names, and other names in medicine. For example, in the *Canon of Mongolian Medicine*, *Muscus* has the Sanskrit name *Gaturi*, the other name of *Zimazhida*, the Tibetan names *Gabuzhimogebu* and *Rizhandewa*, and the religious language name *Zimazhi* (Zhambaldorji, 2007). Because Mongolian medicine has a historical relationship with traditional Chinese and Tibetan medicines, drugs generally have two or more names, and some even have dozens of aliases.

#### 2.1.2. Phenomenon of homonym

Homonyms are a common phenomenon in Mongolian medicinal materials, which causes great inconvenience to clinical drug applications and standardization efforts. The common phenomenon of homonyms has long plagued Mongolian medical workers. Inner Mongolia has a vast territory and a large east–west span. Different regions in the east and west have different understandings of Mongolian medicinal materials with the same name, and the medicinal motifs used are far from the same, such as Arong (*Leontopodium leontopodioides* (Willd.) Beauv.) from *Leontopodium longifolium Ling f. longifolium*, *L. leontopodioides* and *Leontopodium smithianum* Hand. -Mazz. (State Administration of Traditional Chinese Medicine Chinese Materia Medica editorial committee, 2004). The reasons for such differences include a lack of clarity in the literature and differences in naming of particular medicinal materials in different regions.

**Table 1**
Sorting out phenomenon of synonyms or homonyms with same name.

| No. | Chinese names | Mongolian names | Original plants | Another names |
|---|---|---|---|---|
| 1 | Tumuxiang (*Inulae Radix*) | Manu | The dried roots of *Inula helenium* L. of Asteraceae family | Manu-badala<br>Gaoyou-ebesule<br>-qiqige |
| 2 | Dahuang (*Rhei Radix et Rhizoma*) | Gexiuna | The dried root and rhizome of *Rheum palmatum* L., *Rheum tanguticum* Maxim.ex Balf. and *Rheum officinale* Baill. of Polygonaceae family | Zhumusa,Ximoxing |
| 3 | Chuanlianzi (*Toosendan Fructus*) | Barura | The dried and ripe fruit of *Melia toosendan* Sieb.et Zucc. of Meliaceae family | Buhe-Chagan-Maodunwuri |
| 4 | Xiaohuixiang (*Foeniculi Fructus*) | Zhaoergudasu | The dried and ripe fruit of *Foeniculum vulgare* Mill. of Umbelliferae family. | Haoniyasu |
| 5 | Baifan (Alunite) | Chagan-baibang Dacuer | Sulfate Minerals Alumite Group *Alumite* is processed and refined to make Alunite | |
| 6 | Baidoukou (*Amomi Fructus Rotundus*) | Chagansugemule | The dried and ripe fruit of *Amomum kravanh* Pierre ex Gagnep. or *Amomum compactum* Soland ex Maton of Zingiberaceae family | Elparimu,<br>Bugerenusain |
| 7 | Gancao (*Glycyrrhizae Radix et Rhizoma*) | Xiheri-ebusu | The dried root and rhizome of *Glycyrrhiza uralensis* Fisch., *Glycyrrhiza inflate* Bat or *Glycyrrhiza glabra* L. of Fabaceae plant family | Xingari,<br>Maodunnaiximu |
| 8 | Dongchongxiacao (*Cordyceps*) | Haoruhai-mogu | The ergot family fungus *Cordyceps sinensis* (BerK.) Sacc. parasitic on the dry complex of the subpods and larval carcasses on the larvae of the bat moth family. | Yerisagongbu |
| 9 | Shiliu (*Punica granatum* L.) | Anari | The dried ripe peel of *Punica granatum* L. of Punicaceae family | Seburu |
| 10 | Danggui (*Angelicae Sinensis Radix*) | Dangun | The dried root of *Angelica sinensis* (Oliv.) Diels of Umbelliferae family | Chagan-dangun |
| 11 | Bingpian (*Borneolum Syntheticum*) | Xilgaburi | Camphor, turpentine, etc. are crystalline products synthesized from raw materials. *Dryobalanops aromatica* Gaertn f. | Chagan-gaburi |
| 12 | Honghua (*Carthami Flos*) | Gurigume | The dried flowers of *Carthamus tinctorius* L. of Asteraceae Family | Ebusun-gurigum |
| 13 | Roudoukou (*Myristicae Semen*) | Zadi | The dried seed kernel of *Myristica fragrans* Houtt. ofMyristica fragrans (Nutmeg) | Nama |
| 14 | Chenxiang (*Aquilariae Lignum Resinatum*) | Agaru | The resinous wood of *Aquilaria sinensis*(Lour.) Gilg of Daphneaceae family. | |
| 15 | Beishashen (*Glehniae Radix*) | Chagan-Surulc | The dried root of *Glehnia littoralis* Fr. Schmidt ex Miq of Umbelliferae family. | Saorilc |
| 16 | Qianshi (*Euryales Semen*) | Tahei-taolugai-lianhua | The dried mature seed kernel of *Euryale ferox* Salisb. of Nymphaeaceae family. | Garansa |
| 17 | Hezi (*Chebulae Fructus*) | Agaru | The dried and ripe fruit of *Termina1ia chebu1a* Retz. or *Termina1ia chebu1a* Retz. var. *tomentella* Kurt. of Combretaceae family. | Ebusun-manglai,<br>Haorunyintarulaga |
| 18 | Caowu (*Aconiti kusnezoffii Radix*) | Beng-A | The dried root tuber of *Aconitum kusnezoffii* Reichb. of Ranunculaceae family. | Manqin,<br>Hala,<br>Haorusu,<br>Hari-bengA |
| 19 | Huhuanglian (*Picrorhizae Rhizoma*) | Honglen | The dried rhizome of *Picrorhiza scrophulariiflora* Pennell of Scrophulariaceae family. | Baoru-wendusu,<br>Baoru-honglian,BUsexle |
| 20 | Zhizi (*Gardeniae Fructus*) | Zhurura | The dried and ripe fruit of *Gardenia jasminoides* Ellis of Rubiaceae family. | Gaomusile |
| 21 | Tao | Tuguri | The dried mature seeds of *Prunus persica* (L.) Batsch or *Prunus davidiana* (Carr.) Franch. of Rosaceae family. | Taoshi, taozi |
| 22 | Langdu (*Euphorbiae Ebracteolatae Radix*) | Tarinu | The dried root of *Euphorbia ebracteolata* Hayata or *Euphorbia fischeriana* Steud. of Euphorbiaceae family. | Yehe-tarunu,<br>Haorutu-tarunu,<br>Sun-haorutarunu |
| 23 | Huangqi (*Astragali Radix*) | Hunqier | The dried root of *Astragalus membranaceus* (Fisch.) Bge. var. *mongholicus* (Bge.) Hsiao or *Astragalus membranaceus* (Fisch.) Bge. Fabaceae family. | Xieri-saridema,<br>Burulanage-zhatazhaoer |
| 24 | Liuhuang (surphur) | Huhuri | *Sulfur* natural elemental mineral chalcogen | Museyi |
| 25 | Tanxiang (*Santali Albi Lignum*) | Chagan-Zandan | The dried heartwood of *Santalum album* L. of Santalaceae family. | Zandan-garibu, Sachaoge,<br>Hali-zandan |

*2.1.3. Phenomenon of mixing names of Mongolian medicinal plants with names of medicines*

The phenomenon of mixing and inconsistency between the names of constituent medicinal materials and Mongolian medicinal materials in Mongolian medicinal preparations. Due to regional differences, it is not uncommon for the same Mongolian medicinal material to have multiple sources. For example, the Mongolian medicinal material "Jileze" or "ChaganJileze" recorded in *Chinese Materia Medica* (Mongolian Medicine Volume) is the flower of the Gentianaceae plant, which comes from three sources, namely *Gentiana straminea* Maxim., *Gentiana crassicaulis* Duthie ex Burk and Tibet Gentian (Scientific name: *Gentiana tibetica* King ex Hook. f.) (State Administration of Traditional Chinese Medicine Chinese Materia Medica editorial committee, 2004). However, the medicinal herbs Qinjiao (*Gentiana macrophylla* Pall) (Pharmacopoeia Committee of the Ministry of Health, 1998), listed in the Mongolian prescription "Tiao Yuan Da Bu Er Shi Wu Wei Tang San" is actually "Jileze" botanical name.

In *The Drug Standards of Ministry of Health of the People's Republic of China (Mongolian Medicine Volume),* the front part is the standard for Mongolian medicinal materials, and the latter part is the standard for Mongolian medicinal preparations, but there are inconsistencies in the names of some Mongolian medicinal materials. For example, another medicinal material "Gardenia" in the prescription of "Tiao Yuan Da Bu Er Shi Wu Wei Tang San", its Mongolian medicinal material name is not "Gardenia", but "Big Gardenia" (Pharmacopoeia Committee of the Ministry of Health, 1998). If so, the mixed use of medicinal materials and plant names will lead to confusion in prescription medicine. Clearly distinguishing the names of medicinal materials and plants is the premise of correct drug use, and can further standardize the names of Mongolian medicinal materials, so as to meet the requirements of "one medicine, one name".

*2.2. Suggestions for regulating names of Mongolian medicinal herbs*

*2.2.1. Carry out textual research on herbal medicine to clarify basis of medicinal materials*

By reviewing relevant literatures and textual researches on herbal medicines, we could further standardize the names of Mongolian medicinal materials and reduce irregularities owing to synonyms and homonyms. Furthermore, experts could be recruited to conduct indepth and meticulous research on nonstandard drugs to provide sources, literature summaries, medicinal properties, efficacy reports, clinical applications, and modern research results, all of which need to be classified (Table 1). The drug base source is unknown, which is not conducive to the standardized development of Mongolian medicinal materials.

*2.2.2. Unify standards and regulate names*

In recent years, Inner Mongolia Autonomous Region has carried out 40 Mongolian medicine standardization projects and formulated 42 Chinese medicine (Mongolian medicine) standards. The standardization system is basically sound, and the level of standard promotion and application has been greatly improved. The Mongolian Medicine Standardization Project will include the standardization of names for Mongolian medicinal materials, and the Chinese-Mongolian theme vocabulary of Mongolian medicinal materials will be studied and formulated. The name of Mongolian medicinal herbs will be regulated by the criterion of the theme word "uniqueness". Classification by medicinal part and efficacy may be convenient for retrieval through different literature search ways.

*2.2.3. Strengthen study of Mongolian medicinal literature throughout ages*

Relying on Mongolian pharmacy doctoral program, we can cultivate top talents in research into Mongolian medical literature, who will engage with literature translation and annotation, and others who will the work on the standardization of Mongolian medicinal material names.

*2.2.4. Utilize modern scientific and technological means to determine composition of mainstream medicinal materials*

In view of the long-term coexistence of multi-based elements of Mongolian medicinal materials, modern technologies such as IR, UV, NMR, MS, and DNA molecular marker technology can be used to determine the chemical makeup of mainstream varieties of Mongolian medicinal materials.

## 3. Conclusion

The evolution history of the names of Mongolian medicinal materials reflects the process of Mongolian medicine absorbing the reasonable content of other traditional medicines and constantly enriching and developing itself. The names of Mongolian medicinal materials still have the phenomenon of synonyms, foreign bodies with the same name, and inconsistent names between different standards, which need to be further standardized. To standardize the names of Mongolian medicinal materials, we must first strengthen the research on Mongolian medicine literature, conduct in-depth and meticulous research on non-standard medicines, and clarify the basis of medicinal materials. Secondly, the standardization work of Mongolian medicine should be synchronized, and the standardization of the names of Mongolian medicinal materials should be regarded as an important part of standardization. Finally, in view of the fact that Mongolian medicinal materials coexist with multiple bases, it is necessary to make full use of modern scientific and technological means to determine the mainstream varieties. The "14th Five-Year Plan" of Traditional Chinese Medicine (Mongolian Medicine) of inner Mongolia Autonomous Region issued in 2021 clearly stated that the standardization process of traditional Chinese medicine (Mongolian medicine) should be accelerated, and the national standard research project of traditional Chinese medicine should be implemented, and the "Chinese Medicine Encyclopedia" (Mongolian Medicine Volume), "Chinese Medicine Collection" (Mongolian Medicine), and "Chinese Traditional Chinese Medicine Encyclopedia" (Inner Mongolia Volume) should be accelerated to promote the interoperability of Mongolian medicine standards and Mongolia. These works will surely promote the standardization of Mongolian medicinal material names.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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