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AMERICAN GINSENG
A GENUINE TRADITIONAL CHINESE MEDICINE

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SUMMARY

Commercial scale wild collection of American ginseng (Panax quinquefolius) roots by Indigenous Peoples for export trade to China formally began in 1718 CE in Montreal. In the 300 years since, this native North American species firmly became part of the Chinese Materia Medica. To this day, nearly all North American ginseng is exported to China (>97% of Canada's 2015 export volume). Although there is historical record of relatively minor use in Native American medicine systems of tribes of Canada and United States, and some incorporation of use into 19th century American systems of medicine such as Thomsonian medicine and Eclectic medicine, respectively, traditional Chinese medicine is the only codified system of medicine wherein the qualities and therapeutic actions and indications of American ginseng are presently classified in a national pharmacopoeia and therapeutic compendium. Cultivation of American ginseng in the People's Republic of China first began in 1947 but did not reach commercial scale until about 1980. Today, the Chinese medicine concept of 'daodi' (geo-authentic crude drugs) is even applied to American ginseng that is cultivated in certain locations in China by certain 'traditional methods'. While cultivated American ginseng roots of all three production regions (Canada, China, and United States) are used therapeutically in Chinese medicine practice, daodi herbal medicine researchers in China are studying their differences, i.e. composition and quality variation and

Key words: Daodi - Chemoecotype - Native American Medicine - Traditional Chinese Medicine

ecological adaptation of P. quinquefolius from different producing areas towards determining optimal site selection and production methods for cultivation of a Chinese medicine quality of American ginseng in China.

Introduction

The significant economic and medical importance of American ginseng in China today may be due to an historical accident. In the three centuries since the first shipments of American ginseng were exported from Québec to China, a comprehensively documented history of its eighteenth century commercialization and trade has already been written by others and exists in the extensive literature. This article contributes new insights by examining how this native North American plant species was not only adopted into Chinese medicine practice but was also introduced and adapted for controlled cultivation in particular ecoregions of China resulting in the relatively recent designation of certain Chinese-grown chemocotypes as geauthentic traditional Chinese medicine drugs.

As part of a late seventeenth to early eighteenth century French Jesuit mission to China, mathematician and cartographer Father Père Jartoux (1669-1720) participated in a mapping survey of Tartary by order of Emperor Kangxi (b. 1654; reigned 1661-1722), fourth emperor of the Qing (Manchu) dynasty. In July 1709, the expedition arrived at a village in northeastern China “*not above four small leagues distant from the Kingdom of Corea, which is inhabited by those Tartars called Calca tatzé*”. A villager brought the expedition a basket of four entire Tartarian ginseng plants that had been wild harvested in the neighboring Changbai Mountains. This plant is known today as ‘*chang bai shan ye shan ren shen*’ (長白山野山人參) or in English as wild [Chinese or Korean] mountain ginseng (*Panax ginseng* C.A.Mey.; Araliaceae). Father Jartoux made a life-size botanical illustration which he also described in great detail in a letter dated 12 April 1711, published the following year in the

scientific journal '*Philosophical Transactions of the Royal Society of London*'. In describing the habitat where the Tartarian ginseng grew wild, Father Jartoux's letter curiously predicted that '*Gin-seng*' should also be found in Canada:

*All which makes me believe, that if it is to be found in any other Country of the World, it may be particularly in Canada, where the Forests and Mountains, according to the relation of those that have lived there, very much resemble these here*¹.

A French Jesuit missionary and ethnologist Joseph-François Lafitau (1681-1746), living in the Iroquois nation within colonial New France (at Sault-Saint-Louis, Québec), read the Jartoux letter in 1715. Utilizing the description and illustration provided in the Jartoux letter, Father Lafitau made inquiries with the Iroquois and commenced a search for the plant around his mission. In the summer of 1716 he found what he believed was the same '*Gin-seng de Tartarie*' described by Jartoux, although the Iroquois were already familiar with this plant known to them as '*Garent-oguen*' (also spelled '*garentoquen*'), meaning 'resembles man' or 'a man's thigh' in Iroquoian language. This plant is known today as '*ye sheng xi yang shen*' (野生西洋参) or as wild American ginseng (*Panax quinquefolius* L.; Araliaceae) in English language. In 1717, Lafitau presented his findings in a report addressed to Philippe II, Duke of Orléans, Regent of the Kingdom, which was published in Paris in 1718². Because the meaning of the term used for Chinese ginseng held the same meaning as the Iroquoian term for American ginseng, Lafitau theorized that the indigenous population in America must have originated from Asia³. These early eighteenth century scientific reports by French Jesuit priests appear to be the genesis of the American ginseng export trade from Canada to China beginning in 1718.

By the 1750's, botanists began to recognize a phenomenon that would eventually be named the "*eastern Asian-eastern North*

American floristic disjunction”, describing an entire range of related genera and species found to be occurring in these two regions of different continents, but not occurring anywhere else in the world. *Panax ginseng*, occurring in eastern Asia [northeastern China (Qing Dynasty), (Korean) Kingdom of Joseon, and Russian Far East of Russian Empire], and *Panax quinquefolius*, occurring in eastern North America (colonies of Kingdom of France and of the British Empire), fit into this floristic disjunction discovery⁴.

While wild American ginseng root has been exported into international commerce since the early eighteenth century, it became subject to Appendix II controls of the Convention on International Trade in Endangered Species (CITES) in 1975⁵. In Canada, *Panax quinquefolius* was first designated as a threatened species in 1988 but was up-listed to endangered species status in 1999. It occurs in southwestern Québec (highest concentrations today are found south of Montréal in Monteregian) and southern Ontario (“along the Niagara Escarpment and the eastern edge of the Precambrian Shield”)⁶.

Native American use of ginseng

American ginseng was considered to be a medicinal substance of relatively minor importance in Native American medicine⁷. According to medical anthropologist Daniel E. Moerman, of the 2,582 medicinal plants cited in his “*Native American Ethnobotany*” (1998), the use of American ginseng in Native American medicine ranked low⁸. In herbalist Roy Upton’s “*American Herbal Pharmacopoeia*” (2012), it is suggested that a number of the uses for American ginseng that have been attributed in the literature to traditional medicine practices of Native Americans, especially of the Iroquois Nation, were likely adopted from the Chinese, after the export trade from Canada to China began, and later some uses described by European settlers were also adopted. Furthermore, as per Upton et al.:

A genuine traditional Chinese medicine

When the plant was first found in the New World by French Jesuits, it was noted that the Iroquois did not particularly prize the herb. Subsequent to learning of the high regards placed on it by the Chinese, the Iroquois appeared to adopt its use as a panacea. Many native peoples gathered the roots to barter with white traders. It is unclear how much of the popularity of this root was based on traditional native usage, and how much was due to its high economic value to Asians⁹.

Native American medicinal uses of American ginseng have been described in a range of books by anthropologists and ethnobotanists including statements made by tribal elders of tribes including the Anishinaabek, Cherokee, Creek, Delaware, Houma, Iroquois, Menominee, Meskwaki, Micmac, Miami, Mohegan, Ojibwa, Pawnee, Penobscot, and Potawatomi^{10,11}.

Start of ginseng trade to China in 1718

Not long after the verification that wild American ginseng growing in Québec was related and similar to wild Chinese ginseng, the French *Company of the Indies* (*Compagnie des Indes*) engaged indigenous collectors to gather the roots for export trade to China. At first, the *Company of the Indies* permitted anyone to sell American ginseng and also allowed trading vessels to carry it to China on speculation, not knowing if the trade would amount to anything. Ginseng exports from Québec sailed first to the port of La Rochelle on the French Atlantic coast before continuing on to China. The value and export demand from China grew so quickly that American ginseng became an economically important Canadian commodity second only to fur. In 1751, the Company monopolized the trade^{12,13}.

The export trade of North American ginseng, almost entirely to China, has continued for 300 years. In 2015, Canada exported 2,632.97 MT of cultivated American ginseng root, of which about 2,555.92 MT (95.7%) went to China (2,464.03 MT to Hong Kong,

56.34 MT to mainland China, and 35.55 MT to Taiwan)¹⁴. In 2015, the United States exported 69.5 MT of wild-collected American ginseng root, of which 67.1 MT (96.5%) was shipped to Chinese destinations (52.3 MT to Hong Kong, 14.5 MT directly to mainland China, and 0.3 MT to Taiwan). Also in 2015, the United States exported 258.5 MT of cultivated American ginseng, of which 207.4 MT (80.2%) was shipped to Chinese ports (161.3 MT to mainland China, 40.5 MT to Hong Kong, and 5.6 MT to Taiwan)¹⁵.

Insignificant use by European colonizers and settlers

Not highly regarded in American medical practice, American ginseng was not even listed in most nineteenth century dispensaries, pharmacopoeias or pharmacognosy textbooks. After its wild harvesting was commercialized in the early eighteenth century, it remained primarily a wild-crop for export, mainly to China but also France.

The 1776 edition of “*Dictionnaire de l’Académie Française*” defines ginseng as a plant that grows in both Tartary and Canada with a range of claimed medical uses by the Chinese that have not been confirmed in Europe¹⁶. In the 1827 edition of “*Pharmacopée française, ou Code des médicaments*”, American ginseng is listed, albeit as “*Panax de la Chine*” [*Panax quinquefolium* L., *Aureliana Canadensis*, Iroquæis Garent-Oguen, Sinensibus ginseng. Lajiteau]¹⁷.

While initially appearing only on the ‘Secondary List’ of the second decennial revision of the “*Pharmacopoeia of the United States of America*” (USP) in 1842, ‘Panax’ (described as the root of *Panax quinquefolium*) had a short pharmacopoeial life. Forty years later, in 1882, American ginseng was dismissed from the sixth decennial revision of the pharmacopoeia¹⁸. ‘Secondary List’ drugs were articles deemed to be of secondary importance, on probation towards dismissal - or towards promotion to the Primary List, but, in any case, not for use in officinal preparations¹⁹.

In the eleventh edition of “*The Dispensatory of the United States of America*”, with reference to the root of *Panax quinquefolium*, Wood and Bache (1858) wrote:

*The extraordinary medical virtues formerly ascribed to ginseng had no other existence than in the imaginations of the Chinese. It is little more than a demulcent, and in this country is not employed as a medicine. Some persons, however, are in the habit of chewing it, having acquired a relish for its taste; and it is chiefly to supply the wants of these that it is kept in the shops*²⁰.

In the physiomedicalist dispensatory by William Cook, M.D. (1869), American ginseng root is described as only a very mild tonic possibly useful for simple forms of dyspepsia, nervousness or hysteria but “*Its powers are altogether too light to be of service in depressed cases*”²¹. And in the entire 840 pages of Flückiger and Hanbury’s “*Pharmacographia*” (1879), American ginseng is not even afforded its own monograph but is mentioned only briefly as a possible adulterant (due to careless wild collection) in the commercial supplies of *Radix Senegae* (*Polygala senega* L.) and *Radix Serpentariae* (*Aristolochia serpentaria* L.), respectively²².

In late nineteenth century Eclectic medicine, “Panax”, described in ‘*King’s American Dispensatory*’ (1898) as the root of *Aralia quinquefolia* Decaisne and Planchon (syn. *Panax quinquefolium* Linné, *Ginseng quinquefolia* Wood), was considered to be a mild tonic and stimulant “*useful in loss of appetite, slight nervous debility, and weak stomach*”, although it needed to be taken for a long duration because temporary administration “*gives but little benefit*”²³.

Incorporation of use into Chinese Medicine

Less than 50 years after the export trade of American ginseng from Canada to China began, its medical use was mentioned in the 1765 publication “*Ben Cao Gang Mu Shi Yi*” (*Omissions from Ben Cao Gang*

Mu) written by Zhao Xue-min (1719-1805)²⁴. In a paramedical manual published by the Institute of TCM of Hunan Province in 1970 [translated to English in 1974 as “*A Barefoot Doctor’s Manual*”], a monograph for *Panax quinquefolium* (without indicating the origin of the species as North America) is included in “*Section 2 – Common Chinese Medicinal Herbs*”, wherein the main conditions for use are stated as:

*Deficiency of energy [wind] and blood, internal injuries caused by deficiency-activity [worry], convalescent weakness, no appetite, palpitation, insomnia and forgetfulness*²⁵.

Four years after the founding of the People’s Republic of China (October 1949), the first edition of the “*Pharmacopoeia of the People’s Republic of China*” was published in 1953. It was not until the seventh edition of the pharmacopoeia, published in 2000, that an official monograph for American ginseng entered under the title *Radix Panacis Quinquefolii* (西洋参, *Xiyangshen*), with the following actions and indications:

Action: To tonify qi and nourish yin, remove heat and promote the production of body fluid.

*Indications: Used for deficiency of qi and yin, internal-heat, cough and asthma, phlegm mixed with the blood, asthenia-fire, dysphoria and tiredness, diabetes, dry and thirsty mouth and throat*²⁶.

In 2010, one decade after becoming official in the Chinese pharmacopoeia, the Chinese Medicine Division (Hong Kong Department of Health) entered its monograph for *Radix Panacis Quinquefolii* into Volume Three of the “*Hong Kong Chinese Materia Medica Standards*”²⁷. In 2013, Taiwan’s Committee of Chinese Medicine Pharmacy entered *Radix Panacis Quinquefolii* to the Second Edition of the “*Taiwan Herbal Pharmacopoeia*”²⁸. Thus, in twenty-first century China, standards for the use of American ginseng root in

Chinese medicine appeared in the official compendia of not only the People's Republic of China but also of the Hong Kong Special Administrative Region and of Chinese Taipei (Taiwan). And in twenty-first century Canada, as per two Health Canada monographs, "American Ginseng", and "Traditional Chinese Medicine Ingredients", respectively, licensed American ginseng products may be labeled and marketed according to the TCM indications for use as specified in the "*Pharmacopoeia of the People's Republic of China*"^{29,30}. In the United States, after a 121-year hiatus, from 1882 when American ginseng was dismissed from the sixth revision of pharmacopoeia, it was reentered into the twenty-sixth revision of the USP in 2003³¹. It is worth noting that at the time that American ginseng reentered the USP, close collaboration between USP and the Chinese Pharmacopoeia Commission began in order to prioritize the development of new USP monographs for botanicals used in TCM. While the current pharmacopoeias of both China and the United States provide methods for determining the composition, identity, purity, quality and strength of American ginseng root, the chemical composition of the roots of the three *Panax* species used in TCM, *P. ginseng*, *P. quinquefolium*, and *P. notoginseng* is very similar and can be difficult to differentiate³².

Traditional Chinese Medicine theories of Geoherbalism and Daodi
China's "Good Agricultural and Collection Practice (GACP) for Chinese Crude Drugs", passed in 2002, provides a regulatory definition for 'Daodi':

Chapter X Supplementary Provisions: *Geo-authentic (Dao Di) crude drugs refer to those of traditional Chinese crude drugs with specific germ plasm, production sites, or with specific production techniques and processing methods;*

Article 33: *Geo-authentic (Dao Di) crude drugs should be processed according to traditional methods. Any change in methods should be based*

on sufficient experimental data, and should not affect the quality of the Chinese crude drugs³³.

Geoherbalism, the practice of using medicinal plants harvested from specific ecoregions for their special medicinal properties, is based on traditional ecological and medical knowledge and is a component of traditional Chinese medicine (TCM) theory³⁴. The Chinese concept of geoherbalism involves the use of *daodi* medicinal substances believed to deliver the highest clinical efficacy³⁵. This concept can be traced back to ancient times, for example Chinese classics, “*Shen Nong Ben Cao Jing*” [(神農本草經) Divine Farmer’s Classic of Materia Medica; compiled in the first century C.E.] and “*Ben Cao Gang Mu*” [(本草綱目) Compendium of Materia Medica; compiled and written by Li Shi-zhen (1518~1593)], both document different indications for use of certain medicinal plants harvested from different producing areas, that may have similar function but should be treated differently in clinical application³⁶.

In modern day China, due to innovations in intellectual property law, geoherbalism can be protected as traditional Chinese medical knowledge under China’s geographical indication regulatory framework³⁷. Wisconsin, United States of America, is considered (in China) to be a geo-authentic or *daodi* origin for American ginseng and, as such, has been used as a standard analytical geographical area for determination of the most suitable location for its *daodi* cultivation within China. The Institute of Medicinal Plant Development (IMPLAD) developed a geographic information system for traditional Chinese medicine (TCM-GIS) that is used to map potential geographic locations most similar to the Wisconsin ginseng growing region. The TCM-GIS tool has verified that cultivation of American ginseng should remain concentrated in northeastern and northern China, which is the same region where Chinese ginseng (*Panax ginseng*) is produced³⁸.

Due to the 300 years of use in China and several decades of intensive research to develop suitable agricultural areas and methods for cultivating TCM-quality American ginseng in China, it is now believed that *daodi* American ginseng has adapted and formed in three Chinese ecoregions, the Northeastern Provinces (Heilongjiang, Jilin, and Liaoning), Beijing, and Shandong. Within the three American ginseng-production regions in China, two distinct chemo-ecotypes of *P. quinquefolius* have now been identified³⁹.

Start of American ginseng cultivation in China

Already in 1711, while Lafitau (in Montréal) appeared to understand that the qualities and effects of a medicinal plant could vary due to adaptation to different ecosystem conditions, he believed that ginseng from Montréal, New France and ginseng from northeastern China should be indistinguishable due to nearly the same terroir and climatic conditions occurring where ginseng grows naturally in Canada and Tartarie⁴⁰.

While China has been the major importer of American ginseng over the past 300 years, initially from Canada and eventually also from the United States, the introduction of material obtained from Montréal for experimental cultivation in China occurred in 1947. From its introduction in 1947 until about 1960, American ginseng was cultivated in the Lushan Botanical Garden, Lushan, Jiangxi Province⁴¹. It wasn't until 1975 however that experimental cultivation research stations were established for American ginseng in 10 locations through the Jilin Province Science and Technology Department along with the Chinese Academy of Sciences and Institute of Botany. In 1980 the large-scale cultivation phase began and by 1990 there were 400 hectares of American ginseng cultivation in China⁴². Reportedly, in 1988, the Ministry of Health of the People's Republic of China made the determination that American ginseng grown in China had reached the same quality level as material imported from Canada or

the United States. It was at this point that Chinese-grown American ginseng became classified as an authentic Chinese drug. By 1997, Jingyu County, Jilin Province, became known as China's American ginseng town, producing 30 tons of root annually as well as 6 tons of seeds⁴³. By 2005 there were 900 hectares of American ginseng cultivation in China⁴⁴.

Following the already mentioned publication of GAPs for Chinese Crude Drugs, which came into force in 2002, corresponding implementing regulations were enacted including the "*Management Measures of Chinese Crude Drug GAP Certification*" and "*Chinese Crude Drug GAP Certification Evaluation Criteria*". Prior to 2010, there were Chinese GAP certified production bases for American ginseng root situated only in Jingyu County, southern Jilin Province⁴⁵. By 2013, the Jilin provincial government had developed standard operating procedures for the GAP production of American ginseng in Jilin and also established an archive and germplasm bank for selected American ginseng seeds. Furthermore, the province developed regional quality standards for assessing Jilin-grown American ginseng according to TCM criteria⁴⁶.

Daodi American ginseng from China

Based on the research of Professor Huang (co-author of this paper), the reason for the quality differentiation of American ginseng among different producing areas (that are considered to be *daodi*) can be summed up as three factors: (1) biological and genetic factors; (2) ecological environmental factors; and (3) human factors. Among those, the biological / genetic and the ecological / environment are critical factors. The external environmental factors, especially the climatic conditions are the main factors that affect quality variation. After long-term adaptation in a specific ecological environment, the quality of American ginseng from different areas will be more stable, that is called ecological adaptation. The relation between qual-

ity differentiation of herb and ecotype classification is an important scientific issue in research of *daodi* herbs in China. To investigate this relation, root samples were collected from four-year cultivated American ginseng plants in the three major genuine (*daodi*) producing areas of American ginseng including the Northeast provinces, Beijing and Shandong province, respectively. Ultra-performance liquid chromatography was used to analyze the contents of eight ginsenosides (Rg1, Re, Rb1, Rb2, Rb3, Rc, Rd, Rg2). Data for nine ecological factors, including temperature, moisture and sunlight, were obtained from the ecological database of Geographic Information System for Traditional Chinese Medicine (GIS-TCM). Soil samples from the sampling sites were also tested. Effective boron and iron, available nitrogen and potassium, as well as other trace elements and soil nutrients, were determined by conventional soil physicochemical property assay methods. Analytical methods of biostatistics and numerical taxonomy were applied to differentiate ecotypes from the three main American ginseng producing areas in China based on ginsenoside content, climate, soil and other ecological factors. The results show that there are two chemoecotypes of American ginseng in China: ginsenoside Rb1-Re from outside Shanhaiguan, and ginsenoside Rg2-Rd from inside Shanhaiguan. Similarly, there exist two types of climatic characteristics: inside Shanhaiguan (Beijing, Shandong) and outside Shanhaiguan (Northeast). These results provide experimental evidence of the quality variation and ecological adaptation of American ginseng from different producing areas and suggest that the formation and differentiation of chemoecotypes of American ginseng are closely related to variability of the climatic and geographical environment⁴⁷.

Conclusions

Prior to the 18th century French Jesuit ‘discovery’ of American ginseng in Québec, New France, as an economically important wild

resource for export to China, it appears to have played a useful but relatively minor role in aboriginal culture, medicine, and trade. At the same time, in the context of use by European colonizers and settlers, while American ginseng was initially monographed in the *Pharmacopée Française*, albeit as “*Panax de la Chine*”, its entry onto the “Secondary List” of the *Pharmacopoeia of the United States* was very short lived (1842-1882). It was regarded to be a substance of marginal therapeutic value but recognized as economically important for export. From the 300 years of importation and medical use in China including the 20th to 21st century efforts to develop Chinese-grown American ginseng of a quality suitable for use in TCM practice, American ginseng has been adopted by China and adapted to the Chinese ginseng growing ecoregion. Without the strong Chinese interest in American ginseng, it is not certain that it would play a significant role in American medical herbalism today. Even now, the Canadian government permits the labeling and marketing of licensed American ginseng medicinal products using its Chinese name, *xiyangshen*, and listing the indications for use as outlined in the *Pharmacopoeia of the People’s Republic of China*. In the case of American ginseng, it appears that this native North American plant species emigrated to northeastern China where it is now well established and classified as a *daodi* or geo-authentic Chinese medicinal plant for use in the Chinese system of medicine.

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