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Collecting Knowledge about Medicinal Ingredients in Northwestern Sichuan in the 1950s

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Abstract

This article explores China's state-level knowledge production on medicinal ingredients in northwestern Sichuan in the 1950s. Drawing on county-level archives, published materials and interviews, this historical article traces how different levels of governments and state-owned trading companies produced knowledge about medicinal ingredients and its production. It argues that on one hand the state's procurement standards codified the knowledge about medicinal ingredients from the marketplace and the local producers. On the other hand, direct extraction of knowledge from the medicine gatherers and cultivators verbalized and collected the previously tacit local knowledge about the production of medicinal ingredients, which would help to alleviate the shortage in the supply of traditional Chinese medicines throughout the 1950s.

Keywords: Chinese medicine; Knowledge production; Medicinal ingredients; Pharmacy; Traditional Chinese medicine

1 Introduction

On June 4, 1956, *People's Daily* commented on the shortage in medicinal ingredients across China and analyzed that one factor was the lack of an emphasis on production:

> "Originally, cultivating medicinal herbs requires much more labor and money than growing crops. Some home-grown medicinal herbs need five or six years to mature, requiring more fertilizer and certain skills; meanwhile, peasants who collect wild medicinal ingredients often have to take dry food with them and climb mountains for long periods of time, living in deep forests for days or even months. For example, the *Zhu Sha Lian* (朱砂莲 Radix Aristolochiae Kaempferi) in Emei County is a medicinal plant whose root grows on rocky cliffs and it requires risking one's life by hanging from a rope for dozens of feet to collect it."[1]

Both gathering medicinal ingredients from the wild and cultivating medicines required specialized knowledge and techniques. Nevertheless, the producers were not respected and the techniques were not valued. According to the author, this was one of the factors that contributed to the drop in the amount of available Chinese medicinal ingredients on the market (Note 1). This commentary was just one of many that called for more attention to the techniques and knowledge in medicinal ingredients in the mid-1950s. Previous research has demonstrated that there was a shortage of medicinal ingredients across China in the mid-1950s.[2] However, we know little about the issue raised in the above quote—if there was a scarcity of medicinal ingredients, how did the government increase production? How, specifically, did the attention to the knowledge of producing medicinal ingredients really work?

This article explores the knowledge production projects that were carried out by different state actors on medicinal ingredients in Northwestern Sichuan in the 1950s (Note 2). Drawing on county-level archives, published materials and interviews, this article traces how the Chinese state produced knowledge about medicinal ingredients and its production. The knowledge production process was significant not only because it influenced the output of ingredients, and hence, the supply of core materials to fulfill market demand for Chinese medicines, but also because the state established itself as the authority and owner of the knowledge.[3]

Previous studies have shown that Chinese imperial courts have a long history in commissioning and supervising the compiling and formalization of the pharmacopeias, known as *Ben Cao* (本草 materia medica) in China. As He Bian shows, *Ben Cao* literature used to be state-sanctioned activities, indicating the courts' efforts at standardizing and regulating the usage of medicinal ingredients.[4] Apart from commissioning the complications of the *Ben Cao* literature, as Asaf Goldschmidt

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observes, during the Song Dynasty an Imperial Pharmacy was designed to monitor the drug markets and then transformed into a public-health-oriented institution.[5] From the 17th century onwards, with the "amateurization" of *Ben Cao* and the development of the long-distance trade of medicines, more people participated in the complication of *Ben Cao* texts, making it hard for any single text to claim authority and be "official."[6] The transition from official commission to civic participation in the compilation of Chinese pharmacopeia paralleled the evolution of the medicine market in China. The commodification of medicinal ingredients during the Ming and Qing dynasties ushered in the emergence of merchants and medicine houses as the primary actors in the trade in Chinese medicines.[7] From the mid-19th century on, while Chinese medicine encountered Western medicine, the trade in Chinese medicinal products prospered in the process of globalization and experienced ups and downs in the Republican era.[8]

After the establishment of the People's Republic of China (PRC) in 1949, healthcare was one of the state's priorities. Current studies have shown the central government's efforts to tackle epidemics such as anti-schistosomiasis campaigns, to promote public hygiene, and to construct rural health stations.[9] However, we have little information about the materials that were critical to Chinese medicine: the medicinal ingredients.[10] Through the previous studies on the medicinal ingredients in the PRC period, we knew two things. First, the 1950s witnessed several waves of shortage in medicinal ingredients. Second, the fate of traditional Chinese medicine (TCM) was interwoven with the evolving state policies and shifting attitudes among political leaders and elites in medical community.[11] Most of the current studies focused on the period between 1953 and 1956, the so-called socialist transformation period. By using local archives, this article pays special attention to the early years of the PRC, especially before the mid-1950s. While scholars show that the government was "late" in the management of Chinese medicinal ingredients, in the medicine-sourcing localities, medicinal ingredients were deemed as important commodities that were crucial for provincial- and county-level income. Actually, it was under these local efforts that knowledge production started not as a top-down policy which usually was seen as from the center to the locality, but rather from the locality and then converged with nation-wide trends.

Focusing on knowledge production in Chinese pharmacy, this article is particularly relevant to previous research on the social epistemology of Chinese medicine. It is specifically in conversation with the studies on the production, standardization, and systematization of Chinese medicine knowledge. Current studies, the majority of which are conducted by anthropologists, have revealed the interwoven relationship between state-building and the reinvention of Chinese medicine traditions, the standardization of Chinese medical knowledge as transmissible and "teachable," the institutionalization of ethnic minority medicine, and the cross-cultural "worlding" of Chinese medicine.[12] Nonetheless, we know little about how the PRC transcribed, collected, standardized and produced knowledge about the original medicinal materials after its establishment in 1949. This marked a watershed moment for Chinese history in many aspects, but did it also pinpoint a watershed moment for China's medical and pharmaceutical history? How did the "New China" deal with its past traditions of healing and therapeutics while striving for a modernized and scientific medical system? How has the knowledge of Chinese medicine and pharmacy evolved with the changing state policies in relation to market and social transformations?

This article attempts to answer these questions through the case study of the production of the knowledge about Chinese domestic medicinal ingredients in northwestern Sichuan (Fig. 1). This article examines knowledge production from two aspects: first the "quality" of the ingredients as knowledge encoded in the ingredients. The author demonstrates how, on the one hand, the state-owned trading companies and commerce organs' purchasing rules and standards crystalized market expectations and hence knowledge about the ingredients—the physiological characteristics of the ingredients in relation to efficacy and authenticity. The standards, on the other hand, formalized the expertise of medicine gatherers, who collected wild medicinal components with their hands. Gatherers have to coordinate their skills in handling raw materials in order to fulfill the state-administrated commercial institutions' procurement criteria. Second, another aspect of knowledge production is direct rationalizing and verbalizing the medicine peasants' knowledge about collecting medicinal ingredients from the wild. By examining these two aspects of knowledge production about medicinal ingredients, this article argues that the government's knowledge production in the field of medicinal ingredients was an important part of its management of the medicine trade. At the same time, the government built itself as the authority of the knowledge that originally came from the medicine gatherers.

2 New administration of the circulation of medicinal ingredients

Up to the eve of the founding of the PRC in 1949, there was limited state intervention on the circulations of medicinal ingredients. Medicinal ingredients used to be in the hands of the merchants who were brokers or were agents in trading medicines. This network has existed in China for a long time. Meanwhile, current scholarship remarks that the changing political regimes in Chinese history indeed had enacted various texts that functioned like "codes of conduct" in the pharmaceutical industry. For instance, Tang Tingyou in *History of Chinese*

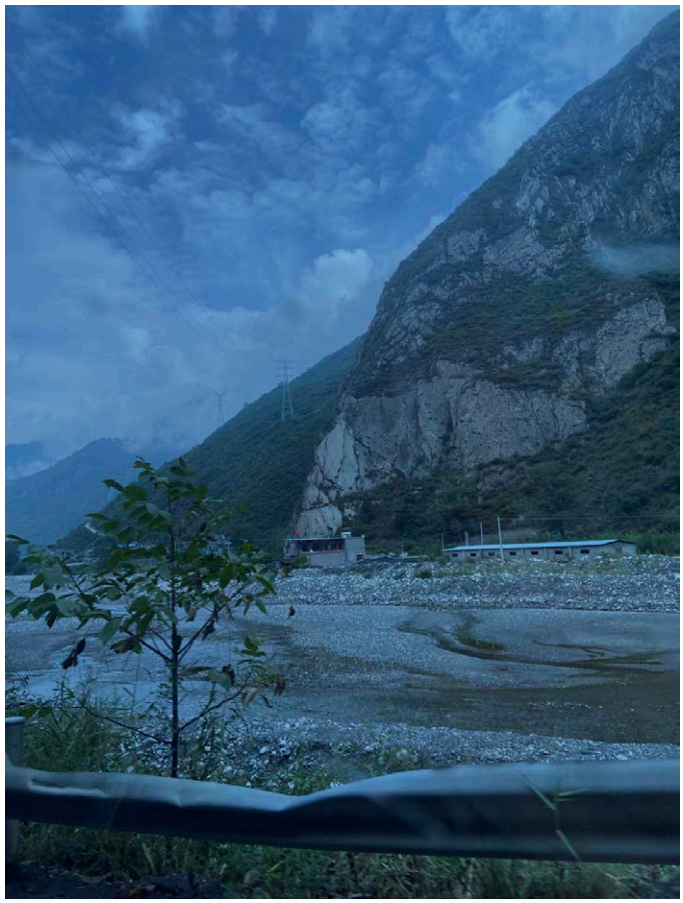

Figure 1 The typical valley topography in Northwestern Sichuan taken by the author.

Pharmaceutical History, regards various *Ben Cao* literature such as *Shen Nong Ben Cao Jing* (神农本草经 *Shen Nong's Classic of Materia Medica*) as the canons for drug prescriptions in medical formulas.[13] Also, the famous Chinese pharmacologist Xue Yu (薛愚) traced the history of Chinese pharmacy back to ancient times and included imperial laws, medicinal formulas and *Ben Cao* literature all as texts that had an instructional function in the usage of drugs.[14] Nevertheless, there were no regulations or standards that were enforced by governing authorities on the usage of drugs.[15]

After the Nationalist Government united China and consolidated its regime in Nanjing in 1927, public health became a major concern for the Nationalist state's political legitimacy.[16] In the arena of pharmacy, the compilation and publication of China's first modern pharmacopeia—*Zhong Hua Yao Dian* (中华药典 *Chinese Pharmacopeia*) in 1930 could be seen as a milestone.[17] As Paul Unschuld points out, China has a long history of *Ben Cao* literature which could be seen as drug encyclopedia, but "none of these could justly be called a pharmacopeia in the modern sense of this term, simply because they were not designed to provide physicians or pharmacists with fixed standards of drug quality and drug usage, adherence to which was enforced by government authorities."[15] According to one of the key compilers of the 1930 *Chinese Pharmacopeia* Meng Mudi (孟目的 Moody Meng), originally the Ministry of Health wanted to adopt the British pharmacopeia and made some minor revisions.[18] There were some additions of drugs that were traditionally used in Chinese pharmacy in the final published edition. The compilation process attempted to incorporate domestic usage, which was especially relevant to Chinese domestic medicinal ingredients. In the principles for compilation, the authors Moody Meng and Pu Chen wrote:

> "The original plants or animals should be recorded for crude drugs. Except for those that are well-known, all crude drugs should bear their academic names and the family and genus to which they belonged. For those that are indigenous to our country, the sourcing localities should be noted in order to pique our people's interest in domestically produced medicinal ingredients."[19]

The 1930 Chinese Pharmacopeia could be interpreted as an attempt by the Nationalist Government to standardize drug use in China. Nonetheless, while some Chinese medicinal ingredients such as *Da Huang* (大黄 Radix et Rhizoma Rhei), *She Xiang* (麝香 Moschus) and *Gan Cao* (甘草 Radix et Rhizoma Glycyrrhizae) were included, it was primarily a pharmacopeia published for people who had knowledge of modern pharmacology.[20] Aside from that, there

were no standards or market grading for the majority of medicinal ingredients that circulated in society and used in people's everyday life. To a large extent, previous political authorities had limited interventions on the social use and circulation of Chinese medicinal ingredients when the PRC was established in 1949.

The establishment of the PRC did not result in a watershed moment for the commerce and regulation of medicinal ingredients. Between 1950 and 1953, in the arena of public health, the state's priority was controlling epidemics, establishing health infrastructure and promoting public hygiene.[21] Particularly, even in the pharmaceutical industry, the state paid more attention to the industrialization and manufacturing of biomedicine pharmaceuticals. In the "first five-year plan (1953–1957)," the "medical and pharmaceutical industry" was placed under "light industry":

> "In the next five years, the construction of the pharmaceutical industry will focus on (producing/manufacturing) antibiotics, chemically synthesized special drugs and various related chemical intermediates that have a significant effect on people's health. Meanwhile, we should pay attention to the research and experiment of Chinese medicine and cultivation and processing of medicinal ingredients."[22]

A modern pharmaceutical industry capable of producing antibiotics and synthetic drugs was the focus of the state's economic development plan. While it indeed mentioned China's domestic medicinal ingredients, they seemed not to be the top priority in establishing China's pharmaceutical industry.[23] Recounting the early years in the development of China's medical industry, many commentaries published in the mid-1950s agreed that there was a lack of attention on developing Chinese medicine when compared with western medicine. For instance, in a commentary published by Xinhua News Agency in 1958, it criticized that: "in the past, the units in the pharmaceutical industry did not acknowledge the significance of Chinese pharmacy. The staff think that people who developed western drugs did not have to know about Chinese pharmacy, while those effective Chinese medicines were researched by foreigners, and then Chinese go to learn from the foreigners."[24]

In general, the circulation and commerce of medicinal ingredients in urban areas was pretty much on its own until the "Socialist Transformations Era" in 1955 and 1956 when private businesses were publicized as state-owned or converted to joint state-private ownership.[25] Before the "Socialist Transformation," private enterprises and the medicine houses remained the dominant force in China's pharmaceutical market—for both Western and Chinese drugs. For instance, the owner of the famous *Tong Ren Tang* (同仁堂) in Beijing recalled that "in the early months after liberation, *Tong Ren Tang* was under chaotic management. As a large capitalist, I had no good impression of Chiang Kai-shek but am also afraid of the Communist because of the Nationalist Party's propaganda."[26] In Chengdu, the large medicine house *Xiao Ji Han Tang* (萧集翰堂) remained as private business until 1956 when it was incorporated into a joint state-private company.[27] Generally speaking, before 1956, the commerce of medicinal ingredients in the urban area was undergoing socialist transformation but the circulation of medicines in rural areas was largely untapped by the government.

Things began to change after 1954 as the central government shifted its attitudes towards traditional Chinese medicine (TCM). Previous studies argue that the Communist State held an ambivalent attitude toward Chinese medicine in its early years.[28] On the one hand, the Communist party, as claimed to be a modernizing regime, had ambivalent attitudes toward TCM. On the other hand, as Scheid and Karchmer observed, "it (TCM) was useful for dealing with wartime shortages and the absence of modern medicine in rural areas."[29] The year of 1954 saw the transition of the state's policy towards TCM. Many current studies remarked this as the turning point of the Communist Party of China's policy toward TCM.[30] Particularly, in terms of the circulation of medicinal ingredients, the Ministry of Health issued a report on July 3, 1954, to the central government mentioning the previous years' work relating to traditional Chinese pharmacy:

> "In terms of Chinese medicines used by Chinese medicine practitioners, there has been an imbalance between supply and demand due to inappropriate management since liberation. Meanwhile, as the price of new drugs (biomedicine drugs) decreased year after year, an increasing number of people used them, influencing the development of traditional Chinese pharmacy."[31]

To address this problem, several aspects of Chinese medicine work were proposed and could be summarized as: (1) organizing state-own Chinese medicines production, supply and sales agencies; (2) organizing management committees coming from the Ministry of Health, Ministry of Commerce, Ministry of Trade, Ministry of Agriculture, ministry of light industry; and (3) advancing the dosage and mixing of Chinese medicine to modernize and scientize Chinese medicine.[31]

The above central government files and documents, while delineating a timeline, demonstrate the central government's increasing awareness in managing Chinese medicine and pharmacy as a response to shortages and as an instrument for their claim to state legitimacy. How localities reacted, and how these changes in the Ministry of Health and the attitudes of the state's party leaders were received by local cadres remained elusive. Thus, it is necessary to look at the localities.

While previous studies focused on 1954 as a watershed moment in which the Chinese central government began to pay more attention to Chinese pharmacy, the provincial governments and state-owned companies actually stayed active at the local level.

Most relevant to the management of medicine trade is the appearance of local-level local products companies. In the September of 1950, a state-owned local products company was established in Guan county (current city of Dujiangyan), the largest distribution center for medicinal ingredients in western China.[32] Guan county was situated at the exit of the Min river. Along the Min river, as the People's Liberation Army marched upwards and established people's governments, state-owned companies were established one by one. For instance, in 1950, a branch of nationality trading company (民族贸易公司) was founded in Wenchuan county (汶川).[33] It was reported that it immediately began to procure medicinal ingredients.[33]

While the state-owned trading companies usually founded headquarters in the urban areas, they also established purchasing agencies in the nearby villages. For instance, as soon as the Guan County Local Products Company was founded, it found a procurement agency in Shiyang Township—the largest *Chuan Xiong* (川芎Rhizoma Chuanxiong) output of the province.[34] Meanwhile, there were other forms of public-owned organizations that traded medicines. In Mao county in 1951, a cooperative was established in Baishuizhai. In 1954, there was a Supply and Sales Agency Liaison Station (供销社城关联络站) that organized medicine sources for the Supply and Sales Agency at larger market towns. It also provided hostel services for the passing-by messengers and porters.[35] Until 1955, the state-owned institutions and trading companies went up the Min river and went deep in the west. Meanwhile, to accommodate the pastoralists, and to adapt to the situation in western Sichuan grassland, the county-level ethnicity trade company of Songpan formed mobile trading groups (流动贸易小组) near Songpan.[36] These local-level trading units were the organs that supported the circulation of medicinal ingredients. According to interviews with medicine gatherers in Li county, they remembered selling the ingredients to the nearest stations and stores. The name of the stations changed: might from *Gong Xiao She* (供销社 cooperative agencies) to *Lian She* (联社), but they were actually the same people in the same store in the village (Note 3). For the medicine business, new institutions brought new incentives to the medicine producers in the mid-1950s. In Li county in western Sichuan, several medicine gatherers I interviewed recalled that they began to invest more time in digging medicines after the emergence of cooperative agencies (供销社) (Note 4). A survey done in 1991 reported that the first cooperative station in Taoping was set up in 1955 and the official co-op agency was set up in 1956.[37] For the gatherers, one good thing about being incorporated into the state's hierarchical trading system was that the newly established purchasing agencies saved the gatherer' labor to carry the medicines out of the mountainous region. Before that, medicine gatherers needed to transport the medicines they collected from the wild to Wenchuan, the nearest market town. One gatherer Mr. Chen remembered that when he needed to sell the medicines, he would get up before dawn and needed to rush back before it got dark because he did not have money for staying over at an inn (Note 5). Wenchuan was the largest market town, about 18km from Taoping village. It was also where Mr. Chen could purchase rice and other daily necessities. The establishment of a state purchasing station in township brought convenience to the peasants to sell their agricultural products and to promote the business of local products. Ms. Yu, born in 1942, also recalled the existence of state's purchasing agency and did not remember digging before its emergence. "We dug medicine and sold them to *Gong Xiao She* in Taoping" (Note 6).

Behind these installations of the state's purchasing companies and stores in the rural region was a medicinal ingredient marketing system anchored in the administrative and political hierarchy. The flow of medicinal ingredients, as the most important raw materials for making Chinese drugs, was put into a system as Du Liping, using the case from Guangxi, summarized as follows:

> "During the 1950s - 1970s, the trade in traditional medicines was undertaken within an officially established hierarchical system. Essential based on the government's administrative structure, the system manifested diversified networks that combined a vertical 'paper' connection between provincial and regional levels, an interconnected spatial system at the regional level, and a dendritically structured network from the regional level down to the local networks."[38]

In this system, the marketing of medicinal products was embedded in the government's administrative structure. First, the trade in medicinal ingredients was brought into a hierarchical system that was composed of level-by-level government organs and state-run commercial entities such as state-run trade companies. This had a long-term influence on knowledge production initiatives because knowledge production was typically transmitted down as top-down policies, and more crucially, government organs and commercial organizations served as agents and authorities in the knowledge-making process. Another overlapping effect of being included into the administrative system was that marketing of medical substances became part of political duties rather than merely marketing operations, and so was influenced by administrative policies.

In sum, in the years of the PRC, the government tried to manage the supply of medicinal ingredients by instilling commercial and administrative institutions. As the author will show in the next two sections, these institutions were not just the agents of the state's policy of purchasing the ingredients. They were important agents and actors in extracting and collecting the knowledge about medicinal ingredients.

3 Quality: codifying and standardizing the knowledge about medicinal ingredients

In 1947, a writer named Outdated Pharmacy Officer (过时药店官) published two comical stories on the *Monthly of Chinese Pharmacy Workers*. Both stories were triggered by the invisible market standards of Chinese crude drugs. One story went as follows:

> "A manager at a large drug store welcomed a medicine trade agent one day in the 1910s. The agent tried to peddle the manager some peppermint or *Bo He* (薄荷 Herba Menthae). The agent stated that he now has some Er-Dao (二刀 second-cut, meaning harvested for the second time) peppermint from Taicang county in stock, which has green leaves and red stems, as well as a good smell and color. The manager, who had little knowledge of medicinal ingredients, mistook the Er-Dao for secondary quality when it actually referred to its second-cut timing when compared to the *Tou Dao* (头刀 first-cut) ones.[39] In fact, the second-cut peppermint from Taicang was the best and most sought after by pharmacies. Those first-cut ones were of poor quality and were used in distillation and oil production."[40]

This story circulated as a joke in the Chinese pharmacy industry in Shanghai. This story emphasized the importance of understanding how certain ingredients are used, as this determines the value of the ingredients. Meanwhile, as the writer claimed, the manager was "without solid foundation (the manager switched to his current job without essential training)." This story exemplified the invisible or tacit knowledge within the pharmacy business circle that was neither standardized nor verbalized and could only be learned through immersive long-term practice.[41] While showing the writer's irony towards the inexperienced manager, the above story implied an iceberg of the rich accumulated knowledge that was circulating in the business of Chinese medicinal ingredients but was not standardized or verbalized.[42]

Examining the government files regarding purchasing standards and the gradings of medicinal ingredients, this section demonstrates how the government attempted to standardize and produce knowledge of the ingredients by codifying them into purchasing "qualities." Purchasing standards embodied both knowledge about medicinal ingredients and the skills and experiences required to obtain the ingredients. Codified "quality" was on the way to standardize medicinal ingredients that were mostly natural and collected in the wild. The physiological characteristics of the ingredients, such as shape, color, smell, length, and size, as well as efficacy and authenticity (道地 *Dao Di* in Chinese) information, were typically included in the description of qualities.

For instance, in the piles of archives regarding the procurement of medicinal ingredients in Wenchuan county, Mao county and Guan county, many were concerned with "quality" of the ingredients. The procurement reports usually detailed the shape, color, size, length of the target medicines. For instance, in the procurement plan of Mao county around 1952, it recorded the different types of *Du Huo* (独活 Radix Angelicae Pubescentis) with price and expected quality:

> "have 'nine eyes' and large size, no sands."
> For *Pao Shen* (泡参 Radix Panacis Quinquefolii), they needed to be "sturdy and look white."
> For *Qiang Huo* (羌活 Rhizoma et Radix Notopterygii), they should "have many silkworm-shaped head, sturdy stems, dried body."[43]

These quality and expectation descriptions for the intended medicinal substances can be viewed as formalized and standardized market knowledge: what the customer specifically desired. Meanwhile, it was established that the physical characteristics of the herbs were related to their authenticity and efficacy. Finally, it should be noted that these "standards" can be viewed as codified knowledge of medicine gatherers, who physically gathered the targeted medicines with their hands and preserved the fresh medicinal ingredients using highly sophisticated techniques.

Standards and gradings for certain medicinal ingredients have long been on the market and therefore this was not a novel concept. For example, *Shi Yang Zhen Zhen Zhi* (《石羊镇镇志》 *Gazetteer of Shiyang Township*) recorded the different grades of *Chuan Xiong*:

> "There are different levels of *Chuan Xiong*. The largest ones are the *Gong Wang* (贡王); the secondary ones are *Xiong Wang* (芎王); then there is *Tong Xiong* (统芎); Besides, there is *Shan Chuan Xiong* (山川芎) and *Ru Xiong* (乳芎)."[44]

Nonetheless, these were previously non-verbalized and informal market knowledge. The state-owned companies and commerce organs' verbalization, collection, and formalization of knowledge about specific Chinese medicinal ingredients was novel in the 1950s. By codifying purchasing "standards," the state's commercial institutions were actually transcribing the market knowledge as well as the knowledge about the medicinal ingredients.

In this process, the previously established commercial organizations served not only as agencies in the marketing of medicines but also as bureaucratic entities that assisted the central government in standardizing and extracting knowledge from the local market and medicine producers. Take one medicinal ingredient—*Qiang Huo* as an example. In terms of the grading schemes of *Qiang Huo*, there were different levels.[45] In the summer of 1951, the Department of Commerce of Western Sichuan (川西商业局) sent a detailed directive to the county-level state-run trading companies in Guan county, Mao county, Wenchuan and Li county. This directive specified the exact standards on *Qiang Huo* they should purchase from the gatherers.

(1) Quality: total dry, small shape, thin tail, gray, fur busk, strictly clean all the sands.
(2) Grading:
    a. First grade: *Qiang Wang*: have a large bulk at the end and have thick stems (有疆羌头子而根条粗壮者择为一等货，名羌王);
    b. Second grade: *Tiao Qiang*: do not have a bulk head but have a thick stem; or those that have a bulk head but have a weak body (无羌头子而根条粗壮，或有羌头子而根条较弱者择为二等货，名条羌);
(3) Package: use bamboo to wrap, every case 200 catties; should package tightly thus not need to package again when sending to Chongqing.[45]

Qiang Huo was a native medicinal root to northwestern Sichuan. Local people usually harvested wild *Qiang Huo* in the mountains while some also cultivated this plant for domestic use. Its root is the most valuable part that could be used to disperse cold and resolve dampness within the human body and is said to be good for joint pain. The above grading of *Qiang Huo* has been mostly used on the market for years. However, it was not until the government tried to manage the circulation of the ingredients that they were verbalized and collected into texts. From the above case, we see that the quality of medicinal ingredients have been in the markets for years but at this moment, the state tried to manage the production through gathering of the market knowledge. The purchasing quality standards from the administrative organs and state-owned commercial entities could be viewed as methods of standardizing the knowledge about certain medicinal ingredients.

Moreover, the state-owned trading companies incorporated the expertise and knowledge of the gatherers—who produced the raw medicinal ingredients at first stage—into the procurement quality criteria and grading processes. The standards were detailed and always covered the shape, size, level of dryness, length, smell, and other physical characters. Taking wild gathering as an example: while the nature determines the wild ingredients' "quality," to first harvest and then process specific ingredients required the medicine gatherers' specialized knowledge and skills. For the gatherers, these standards caused trouble sometimes and influenced the way they processed the raw ingredients. Specifically, the level of dryness was very demanding. Mr. Chen needed to dry his medicines before he could sell them, while some gatherers stayed at the acquisition stations and requested the staff purchase their medicines that did not meet the standards (Note 7). The drying process is actually highly skilled. As *Collection of Techniques for Production Chinese Medicinal Ingredients*, a collection of technical knowledge regarding medicine production published in 1959, recorded the drying process of *Qiang Huo*:

> "When the roots of *Qiang Huo* grow to the size of a large finger or a small wine glass, they can be dug out in autumn. When digging, pay attention to go deep (into the soil), do not break the root, dig up and fold off the reed stem, shake off the mud and sand. Then put them under the sun or use mild heat to dry their moisture to half dry, take off the pile in a dry place to avoid rain, covered with brown clothes, straw or other fabrics to make them 'sweat', until the inside looks red-yellow, and then take them out and put them under the sun or using fire to fully dry."[46]

This drying process, although referred to the cultivated *Qiang Huo*, was also applicable for the wild ones. The above paragraph indicated specific techniques required, including knowing the right place to dry the ingredients (under the sun or using fire), mastering the drying temperature, and observing the right level of dryness. Also, it was intriguing that the ingredients cannot be fully dried at first, the process of "making it sweat" was an important part before producers could fully dry them. Above all, the drying process was highly skilled and required experience and knowledge about the physical properties and usage of certain medicinal ingredients. While the purchasing standards just logged that the ingredients should be dry, behind these were codified knowledge about the production process.

In this respect, the purchasing "quality standards" functioned as the compass that shaping the techniques required for producing medicinal ingredients. As Figure 2 shows, there were interactive relations between bottom line producers, their local knowledge, and the administrations and the knowledge production projects. The government issued directives to guide local administrators to extract local knowledge. Quality standards could be seen as the intermediary—the administrations could use the quality standards to manage production while the quality standards *per se* could be seen as crystalized local knowledge. To be sure, formalizing and codifying the quality of

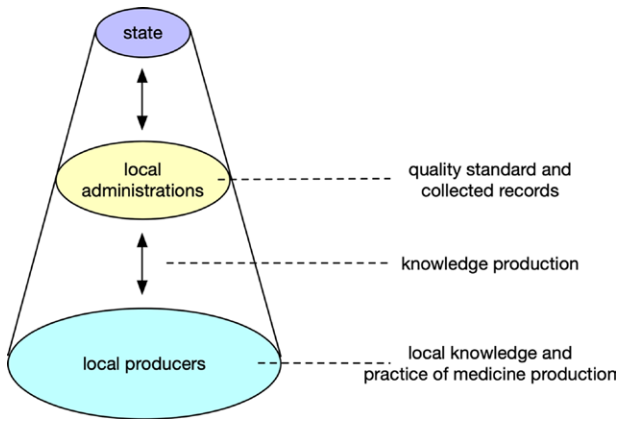

Figure 2 Interactive relations between local producers, local administrations, and the state in the knowledge production projects (designed by the author).

medicinal ingredients was just one way of the state's collection and production of the local knowledge. As the next section will show, the state could directly extract knowledge from the local medicine gatherers and cultivators via meetings, resources surveys and other methods.

4 Collection and transcription: extracting knowledge about medicine production

Other than the quality control as a way of knowledge extraction, the government extracted and produced knowledge regarding the collection, production and preservation of wild medicinal ingredients by directly transcribing the tacit knowledge of production from the medicine gatherers and cultivators. For instance, in January of 1953, the Southwestern Branch of China's Local Products Company (中国土产公司西南区公司) issued a directive to its fellow branches to collect specimen of wild medicinal ingredients and use them as pedagogical tools:

> "As people's lives improved, the demand for medicines increased. However, some medicinal ingredients are in shortage and we should enhance production by organizing peasants to increase production. Nevertheless, there are too many wild medicinal ingredients, especially those that are indigenous to ethnic minority regions. For instance, *Bei Mu* (贝母 Fritillaria), *Dong Chong Xia Cao* (冬虫夏草 Cordyceps), *Qin Jiao* (秦艽 Radix Gentianae Macrophyllae), *Qiang Huo* (羌活 Rhizoma et Radix Notopterygii), *Gan Song* (甘松 Radix et Rhizoma Nardostachyos), *Mu Xiang* (木香 Radix Aucklandiae). Only a few specialized medicine gatherers could recognize them. As a result, many medicines have not been utilized yet and left on the ground. For people who were not familiar with these medicines, it took them a long time to recognize the medicines and the income from gathering could not secure a stable life. Therefore, many gatherers seemed to be low-key. In order to intrigue their interests in gathering medicines, our branches should collect the stems, lines, leaves and whole medicines that are promising and profitable such as fritillary, caterpillar fungus, dried and made into specimen. Then, categorize and grade the medicines, display them in the procurement stations. Meanwhile, our branches could make *cards* that could be carried around. There should be basic information of the ingredients on the cards including the growing season, the method to gather and preserve, processing, value and usage. These could be used to educate local people with the knowledge about the medicinal ingredients and made it easier for people to dig and gather those medicines."[47]

Although this directive did not go into detail about how the educational activity was carried out, it could be interpreted as a request to rationalize and standardize not only the quality of medicinal ingredients but also the method of gathering medicinal ingredients in the wild. We can see here that knowledge production firstly began with verbalizing and standardizing the qualities of medicinal ingredients.[48] According to the report, the local products company asked cadres to categorize and grade the raw medicinal ingredients. This was a standardization process: the cadres chose the best ones based on their knowledge, later becoming the standards. Nonetheless, the source of the codified standards was important in this case. While the report assumed that the cadres would do the work, the cadres had to consult with local medicine producers in order to do so. Given that the majority of the medicinal ingredients in this report were collected in the wild, it is not surprising that they were all unique. Standardizing the qualities of wild medicines thus necessitated inductively generated knowledge about the physical properties of specific ingredients in relation to their use and efficacy. *Qiang Huo*, for example, was a medicinal root that was widely collected in Northwestern Sichuan. The top grade ones, as shown in the previous section, should have a bulky head and a thick body. What was important here was where this knowledge came from. The cadres were required to consult with local medicine producers and merchants about the drug's usage and market demand. Thus, this was a process of knowledge production in which experience and knowledge from producers and market participants were transcribed and standardized into different grades of medicines.

Second, this report was intriguing in that it also implied extracting knowledge about the gathering process. To "make it easier for people to dig medicines," the local products company asked its branches to create cards with information about the growing season, locality, and harvesting method of specific plants. This required the card makers, many of whom had little knowledge of medicine gathering, to converse with the gatherers and gather information from them. Although not stated, each step required contributions from people who had experience gathering or cultivating medicines, and the process was essentially a knowledge production process.

More importantly, this directive, which recognized the knowledge and skills of the medicine gatherers, at the same time claimed the authority of knowledge production over the gathering and cultivation of the medicinal ingredients. The assumption was that local residents had been gathering wild medicinal ingredients for years and had accumulated local knowledge about gathering medicines, but that this knowledge had not been verbalized, standardized, or systematized. Now the government stepped in and used texts as tools to verbalize and, at the same time rationalize their local knowledge.[49]

The collection of knowledge in Northwestern Sichuan echoed the situation on the national level. In 1958 in Beijing, the Crude Drug Department at the Ministry of Health invited "experienced pharmacy workers" to share the knowledge about recognizing, identifying and using medicinal ingredients.[50] In the report, it recorded

the knowledge about preserving *Huang Lian* (黄莲 Chinese Goldthread Rhizome):

> "dig out and sweep off the mud and dry with heat, cannot be washed."[50]

It also recorded knowledge in timely gathering and identification, which came primarily from the gatherers and pharmacy workers. For instance, *Dang Shen* (党参 Radix Codonopsis) should be:

> "collected in spring before germination and in autumn after the return of the pulp" and it should be processed immediately at the sourcing region: "dug them out and dried 80% of their water, then rubbed them with a wooden board to make them solid, because otherwise they would detach from the bone after the drying process."[51]

In the above cases it was the staff at the Crude Drug Department who articulated the experience of the medicine workers' knowledge about the growing season of the medicinal plant, the particular method of gathering, and way of the crucial initial processing for preservations. However, as the true practitioners of the gathering labor, the medicine gatherers actively contributed to the dialectical knowledge production process, as they possessed the necessary knowledge, whereas public health work staff did not. Similarly, as Sigrid Schmalzer noticed, "in the scientific farming movement in the 1960s, the state, for both political and practical reasons, could not do without the active cooperation of rural people."[52]

The extraction of knowledge could also be seen in the procurement of medicinal ingredients. Wang Rongjiu, a procurement staff in Liaoning, was assigned to take charge of local medicine procurement; however, he only knew *Fang Feng* (防风 Radix Saposhnikoviae) and *Dong Qing* (冬青 Radix Ilex Pubescens). "Wang initially thought that medicinal ingredients were just tree and barks."[53] However, after learning from "old medicine peasants" (老药农), Wang learned that "medicines had different names in various localities. *Jie Geng* (桔梗 Radix Platycodonis) was called flower of monks' hat (和尚帽子花) in Shizhangzi township (时仗子乡), but was called *Da Wan Hua* (打碗花) or monk's head (和尚头) in other places."[53] After learning from the local medicine gatherers, Wang successfully educated himself as an expert in medicinal ingredients. However, although learning from the gatherers, the knowledge production had to be done through the voice of the cadres. It was in this translation process that the state claimed its authority and ownership of the knowledge. The medicine gatherers, while contributing to the foundations of the knowledge, were usually in the background.

Apart from the commercial institutions and cadres, medicine gatherers indeed contributed their knowledge to the continuing scientific study of Chinese crude drugs in the 1950s. Through the mouth of the scientists, the knowledge of the gatherers was "translated" into the sociotechnical ensemble that fit in the state's new agenda. This began to happen especially after 1955, when there was a shortage of medicinal supply across the nation and there was a wave of surveying the local ingredients. In July 1955, Xu Yan and Fu Kezhi, went for a collection trip in Northwestern Sichuan. Their goal was to collect specimens of TCMs to sort out the resources of Chinese medicine (中药资源), as the column of their report titled.[54] Medicine peasants, as they called them, helped with their collection. Particularly, in the case of caterpillar fungus, they recorded the name but lamented that they did not succeed in collecting one. Nevertheless, they recorded the knowledge collected from the gatherers:

> "According to the experienced medicine peasants, during lunar spring February to March, where there is *Dong Chong Xia Cao*, white dew is not covered; with a tiny hoe digging up, there are small seedlings (i.e. mycorrhizal body), and the worm body is still active. In the summer, the snow melts, the grass grows, the Chong Cao seedlings fall off, the worm body is diminished, and it is difficult to spot digging out."[55]

Despite being buried as a background and merely information provider, the gatherers first had a voice about their knowledge and skills in written textual records through the records of the scientists. The scientists who knew the "right" term, such as "mycorrhizal body," verbalized and transcribed their knowledge gained through actual work in nature. According to Sean Lei, science as translation should be grounded in the sociotechnical ensemble.[56] Thus, scientists served as agents in the knowledge production process, translating gatherers' local knowledge into a recognized system.

The extraction of medicine gatherers' knowledge in Northwestern Sichuan was not uncommon. On the national level, the shortage in medicinal ingredients after the mid-1950s collectivization drained the production output pushed the government to emphasize knowledge production about the ingredients. Many commentaries regarding the manufacture of wild medicinal ingredients appeared in the most significant TCM magazine, *Zhong Yao Tong Bao* (《中药通报》*China Journal of Chinese Materia Medica*).For instance, in 1956, Lin Zhen wrote an essay titled *Gathering of Chinese Medicinal Ingredients*. It theorized the gathering process as:

(1) recognize standard plants
(2) identify and make clear the medicinal part
(3) pay attention to the timing of gathering
(4) manage the distribution.[57]

The reports in *China Journal of Chinese Materia Medica* indicated the government's efforts to rationalize the gatherers' knowledge about collecting ingredients from the wild.

Local governments also produced knowledge about the harvest and cultivation of medicinal ingredients by organizing peasants to "meetings." In 1958, the Guan County Department of Commerce organized a meeting that invited medicine peasants and village leaders to talk

about their experience. While the meeting proceedings recorded three speakers' speech, two of them were village cadres, who talked about organization logistics and one peasant specially talked about his experience in trying to cultivate the wild medicinal ingredients he dug out. Zhao Haizhou, a peasant from Xuankou Township, recalled that:

> "I have been digging for medicines for more than a decade. I always go to dig for medicine after the agricultural season. I also try to cultivate the wild seeds of the medicinal ingredients. For instance, *Mao Ci Gu* (毛茨菰 Pseudobulbus Cremastrae seu Pleiones). A kind of wild medicinal ingredient. There are huge mountainous ones and small hill ones. while those grow in the huge mountains have narrow green leaves about four or five inches long, the smaller ones have single or double leaves about three or four inches long…There is a kind of mother-and-son *Mao Ci Gu*. Beneath the fruit was a stone-shape chunk—called the 'eggs' of the mother *Mao Ci Gu*. Dig it out along the sprout and you can plant it."[58]

Zhao Haizhou then described in detail how to take care of the cultivated ingredients. It could be seen that the colloquium name of the ingredients, the method of digging the appropriate part of the plant for further cultivation, and the way of caring for it were actually local knowledge that the state officials barely knew of but needed. These meetings were thus important for the extraction of local knowledge about medicine production.

One intriguing thing about these meetings was the audience. While most of the participants were cadres, they were not the real actors who produced the medicines. Thus Zhao Haizhou's speech might just be of symbolic importance while the other two cadres' sharing of "organization work" on the mountains might be more instructive for other cadres. Nevertheless, these meetings indicate the local government's effort to transcribe and disseminate the knowledge about the production of medicinal ingredients.

If quality control of the medicinal ingredients contributed indirectly to knowledge production, the efforts covered in this section extracted and collected local production knowledge more directly. Local medicine gatherers had a significant part in providing their expertise to the process in both ways. Meanwhile, in the knowledge production process, the government claimed its authority in producing the knowledge about medicinal ingredients.

5 Conclusion

Scaling up production of Chinese domestic medicinal ingredients was of great significance for China in the 1950s. Under these circumstances, this paper demonstrates first, how, as different levels of governments and state-owned companies became more involved in the distribution and production of medicinal ingredients, transmissible and standardized knowledge of the local ingredients and local production methods became increasingly important for increasing the output of medicine production. The state transcribed and collected local knowledge about medicinal ingredients via formalizing quality standards and extracting local producers' knowledge. Knowledge production functioned as an important tool and necessary pathway to manage the supply of medicinal ingredients. Second, while local producers contributed significantly to the knowledge production process, it was the Chinese state that initiated the collection and standardization process in the 1950s. This laid the foundation for the institutionalization of TCM in later years. Finally, the production of knowledge about medicinal ingredients was significant not only because it assisted in addressing the shortage of traditional Chinese pharmaceuticals, but also because it demonstrates the state's efforts in building a modern pharmaceutical industry in China.

Notes

1: In this article, I use "medicinal ingredients" as the English translation of Chinese term "*Yao Cai* (药材)." I also use this interchangeably with other common terms including "traditional Chinese medicines," "Chinese drugs" or "Chinese medicines."

2: In this article, Northwestern Sichuan mainly refers to the Upper Min region: the areas surrounding the upper reaches of the Min River (Min Jiang 岷江)—a tributary of the Yangtze River.

3: Interview with Mr. Chen on October 19, 2019 in Li county, Sichuan Province. Interview with Ms. Yu and Ms. Zhou on July 11, 2018 in Li County, Sichuan Province.

4: Interview with Mr. Chen on October 19, 2019 in Li county, Sichuan Province. Interview with Ms. Yu and Ms. Zhou on July 11, 2018 in Li County, Sichuan Province.

5: Interview with Mr. Chen on October 19, 2019 in Li county, Sichuan Province.

6: Interview with Ms. Yu on July 11, 2018 in Li County, Sichuan Province.

7: Interview with Mr. Chen, October 18, 2019 in Li County, Sichuan Province.

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Author contribution

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Conflicts of interest

The author declares no financial or other conflicts of interest.

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