

Traditional Medicine in China Today

Kathleen McConnell

Introduction

This paper is a study into the differences in the development of pharmaceutical products from traditional medicines in the US and in China. China was chosen to be part of the study as it provides a contrast to the system of medicinal product development within the United States. The development and use of medicinal plant products is a dynamic and growing part of China's economy and has attracted international interest. The study site chosen for China is Hubei Province, China.

The China Three Gorges University has active programs in Traditional Medical training, modern medical training, and medicinal plant research for the development of medical products and biochemistry. The university is in an agricultural region with many traditional and modern medical doctors active in the development of new products.

I spent five months in Yichang, teaching English at the University and doing ethnographic research in 2003. Yichang is the site of the Three Gorges Hydroelectric Project, and the Three Gorges Dam, completed in partnership with engineers from the United States in the '90's.

A History of Traditional Medicine

In China, traditional medicine has an easily accessible written record extending over 2000 years. It is the accumulation of knowledge about medicine derived by practice and experimentation through the ages. The first teachings were passed on by word of mouth. At the time of the Qing Han, (221-206 B.C.) there were many books about Chinese medicine, but all of them were lost. The earliest preserved book is called "Shen Nong Bencao Jing", author unknown (Jiang 1996a). This book includes animal, plant and mineral ingredients, 365 recipes in all. It is described as a summary of Chinese

medical knowledge before the Han, and the basis of all later medical knowledge. In the Nan and Bei Dynasty, Tao Jing Hong, reorganized and added to this text, calling it the “Bencao Jingji zhu”, or “Commentaries” to Shen Nong. He added 365 medicines, and included information on plants, where and how to collect and process them.

In the Tang Dynasty foreign medicines were imported and increased the variety of available medicines. The government requested people to revise and enlarge Tao Jinghong’s book, adding 144 medicines. This book was revised and published by the government, making it the oldest reference codex in the world. It included 844 medicinal recipes, with pictures and examples.

Texts refer to four great doctors in the creation of TCM. In the Song Dynasty, 12 to 1300 AD, a doctor called Tang Shen Wei combined the “Jiayou buzhu Bencao” and the “Tujing Bencao” together, adding more than 500 recipes. He collected recipes from doctors and the public, and included large amounts of material from other books. Zhang Zihe wrote on purgatives. Li Dong Yuan studied the spleen and stomach processes, and Zhu Dan Xi made discoveries in yang-yin balance.

In the Ming Dynasty, approximately the 1600’s, Li Shi Zhen (1364-1644AD) compiled the book “Bencao Gangmu” or “Compendium of Materia Medica” published in 1578, including 1,892 drugs. It was a reorganization and summing up of knowledge about medicine before the 15th Century. He corrected the pictures and mistakes, and divided the medicines into types, including the name, explanation, usage, invention, recipe and other information under each medicine. Li Shi Zhen used the older written records to retest old recipes and his books have become the foundation for modern TCM.

In the Qing Dynasty, Zhao Xue Ming wrote the “Bencao Gangu Shihi”, correcting mistakes and adding 216 new medicinal recipes. By this time, over one hundred books on medicine had been published, but those mentioned here were the text books, summing up the state of knowledge for the time. Wu Qujun wrote two books; one recorded 1,714 kinds of medicines and the other, 838 types of medicine. He included

every plant's color, character, smell, usage, habitat and location for collecting. These books are used today as the basis of traditional medicines. New recipes using modern scientific methods are developed from these same traditional medicines.

Beginning in 1954 the central government reorganized and republished the most important books, and new works about medicinal plants and animals were written. There were three facets to the reorganization and renewal of traditional medicine research (Jiang 1996b).

1. The basic theory of Chinese medicine was reorganized, incorporating plant biochemistry and modern medicinal terms.
2. The theory of appraising both traditional medicinal properties and patient symptoms was rethought, incorporating modern medicine and biochemistry of the patient.
3. The methods of manufacture of traditional medicines was modernized and the quality of the medicines was improved.

The collection of wild plants was organized on a larger, more nationally co-ordinated scale, for the production of medicines on a national scale, and medicinal plants were incorporated into agriculture to increase quantities available. Attention was focused on research into the biochemical synthesis of traditional medicines. To continue and build the new traditional medicine, education was standardized nationally, and traditional medicine books were edited for uniformity. The law concerning administration and managing health care was created and standardized.

From 1991 to 1994 the composition of 484 of these ancient compounds were retested. Documentation and recent experiment demonstrate that traditional research extended to treatments against viruses and bacteria, 6.7% of the recipes were to treat cancer, 57.34% were to treat digestion, circulation and breathing problems, and 80.95% were internal medicines (Jiang 1996). Recent estimates suggest that TCM requires 10-15 years and a cost of \$1.5 billion for 1 medicine to be developed.

The development of new medicines is a growing industry in China, due to both the revised methodology of development and increasing financial incentives. The next section will review the new categories of traditional medicine in terms of processing or obtaining it from the raw material, and in terms of form of use, and in terms of administering. Each of these categories refers to a continuum along which many different biochemical interactions may take place, this fluidity in conceptualization increases the researchers ability to find solutions to the problem of finding new drugs.

Rethinking New Medicine Classifications and Definitions

Rethinking numbers 1. and 2. above, results in a greater ability to develop and manufacture existing traditional medicines and new medicines: rethinking number 3. These categories were originally devised after 1949, and since then, they have been refined as need has indicated.

Category 1

1. The raw plant material and its product.
2. Synthesized, or half synthesis and raw material made into raw material and its product.
3. The product withdrawn from the natural material, or fermented from the material.
4. Compounds imported into China for study, not yet given the drug management authority approval to appear on the market.

Category 2

1. Foreign drugs permitted to be produced and marketed, not in the Chinese medical dictionary or imported into China.
2. First separations of unknown compounds
3. Foreign compounds not yet on the market, changed from topically administered to internally or injection administered.

Category 3

1. New compounds created from chemicals.

2. New compounds created from chemicals and herbal material where chemicals have the main function.
3. Herbal products that have appeared on the market.
4. Materials or drug products from animals or their organs.

Category 4

1. Medical dictionary accepted foreign raw herbal medicine and products.
2. Imported raw herbal material or product, manufactured into medicine
3. Synthesized products that are permitted in the China market.
4. Changes to traditional herbal medicines that do not change its pharmacological function, but only change the soluble percentage or stability.
5. Foreign compounds approved for the market.
6. Foreign raw material medicine from made into marketed products.
7. Change in type of drugs.
8. Changes in method of administering the form of drug. (This does not include new drugs in Category 2 and 3).

Category 5

1. Herbal medicines that have already been on the market, formula changes to improve health benefits.
2. Additions to improve the use period or biochemical action.
3. Additions that do not increase the use period or biochemical action.
4. Newly discovered use for already marketed medicine.

In the nine years from 1987 to 1995, 504 new herbal medicines have been examined and approved for retesting and manufacture. Table 2 is taken from volume 4 of "Theory of the Practice of Traditional Chinese Medicine and the Program of Research (Jiang 1996b). The table shows the number of herbal plants approved in each category for each year, after examination by the Health Department.

**Table 2. Nine Years of Herbal Medicine Development,
by Category from (Jiang 1996)**

Year	Category 1	Category 2	Category 3	Category 4	Category 5	Total for Year
1987	2	3	4	2	0	11
1988	3	2	14	16	1	36
1989	3	3	13	11	2	31
1990	7	4	23	17	0	51
1991	2	1	31	25	0	59
1992	4	2	36	40	1	97
1993	9	7	22	36	0	74
1994	2	0	34	60	1	97
1995 (half a year)	4	2	22	35	0	63
Total	36	24	199	242	3	504
% of Total	7.14%	4.76%	39.48%	48.02%	0.60%	100%

Table 3 shows the same nine years, from 1987 to 1995, with the total number of new medicines including both traditional, western medicines and various combinations of both. Category 3 with 199 medicines, includes chemical formulas, traditional and chemical formulas, formulas from animal products and herbal formulas. Category 4 with 242 medicines, includes accepted foreign raw herbal medicine and products; imported raw herbal materials or products, manufactured into medicine; synthesized products that are permitted in the China market; changes to traditional herbal medicines that do not change its pharmacological function, but only change the soluble percentage or stability; foreign compounds approved for the market; foreign raw material medicine from made into marketed products; change in type of drugs; and, changes in method of administering the form of drug. (This does not include new drugs in Category 2 and 3).

Table 3. New Chinese Herbal Medicines and Western Medicines, 1985-1995.

Type	Raw Material Medicine	Herbal	Medicine used to assist the product	Product and Patent Medicine	Imported Raw materials combined in China	Total
Western Medicine	203	0	12	650	13	878
Chinese Herbal Medicine	6	20	0	339	0	365
Total	209	20	12	989	13	1243

This next table, Table 4, illustrates that during this nine-year period, roughly 70% of all new medicines were derived from western medicine, and 30% from Chinese traditional medicine. In the new Chinese herbal medicine, single component formulas are in the minority. For this ten year period, there are only 41 of 365 that were derived from a single raw material. Most, 324, are compound prescriptions. The new Chinese traditional medicines were developed for medical use, not surgery, gynecology, pediatrics and facial treatments.

**Table 4. New Medicines—70% from Western,
30% from Chinese Traditional Medicine**

Year	Medical	Surgery	Gynecology	Pediatrics	Facial	Total
1987	10	1	0	0	0	11
1988	27	3	2	1	3	36
1989	25	4	0	2	0	31
1990	44	2	2	2	1	51
1991	47	5	3	3	1	59
1992	59	14	5	2	2	82
1993	61	6	4	3	0	74
1994	83	6	3	4	1	97
1995 (half of year)	52	1	2	4	4	63
Total	408	42	21	21	12	504
% of Total	80.95	8.33	4.17	4.17	2.38	100

Education in TCM

Cultural Memory and Biodiversity

The bulk of new biochemical formulas originate from traditional medicines. Formulas are developed, tested and refined by observant healers with no access to modern biochemical testing equipment over the course of many generations of healers. Nazarea (1998) diagrams the development of traditional medicines as a result of environment, selection choices, cultural memory and gene banking.

Biochemical discovery consists of two phases. In phase 1. the traditional knowledge holders develop the plant through selective genotypic manipulation and experimentation over time. In phase 2. research companies, often with close links to university scientists, develop traditional plant medicines into stable compounds. Pharmaceutical companies

then acquire the information through purchase. Discovery consists of two phases. This slide demonstrates Phase One of discovery.

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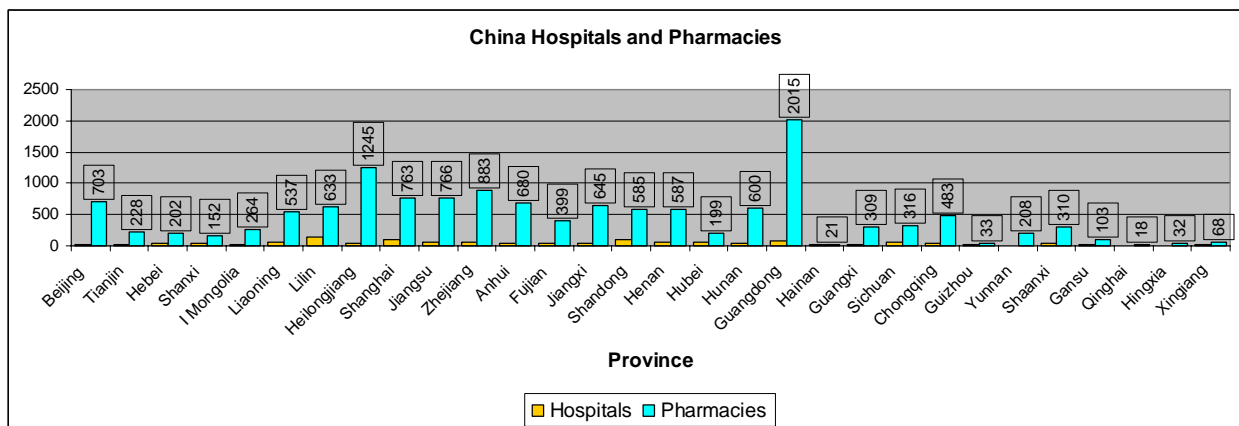
Table 1 -- Number of Hospitals, Pharmacies and Universities in China, 2005

Province	Hospital	Pharmacy	University	Province	Hospital	Pharmacy	University
Beijing	30	703	6	Henan	64	587	3
Tianjin	16	228	3	Hubei	61	199	10
Hebei	49	202	8	Hunan	39	600	5
Shanxi	48	152	2	Guangdong	83	2015	7
Inner Mongolia	22	264	2	Hainan	12	21	1
Liaoning	63	537	6	Guangsi	24	309	4
Jilin	151	633	2	Sichuan	62	316	6
Heilongjiang	48	1245	1	Chongqing	32	483	1
Shanghai	100	763	5	Guizhou	18	33	4
Jiangsu	61	766	12	Yunnan	2	208	2
Zhejiang	54	883	5	Shaanxi	45	310	0
Anhui	31	60	4	Gansu	18	103	2
Fujian	33	399	2	Qinghai	3	18	0
Jiangxi	33	645	2	Lingxia	7	32	1
Shandong	91	585	8	Xingjiang	18	68	2

A large number of universities in China offer undergraduate and graduate degrees in Traditional Medicine in addition to modern medicine and biochemistry. Many of these

departments are engaged in testing traditional medicines for pharmaceutical marketable products. They obtain funding from the state and National government, and in partnerships with pharmaceutical companies, Chinese and foreign. Figure 1 shows the distribution of traditional health care centers and learning centers, that is, hospitals, pharmacies and universities by province, autonomous region and municipality in China.

Figure 1. The Number of Hospitals and Pharmacies for each Province, Autonomous region and Municipality in China.



Interviews with Traditional Doctors

The interviews I conducted included many with students and administration. They also included three doctors of traditional medicine who demonstrate the wide range of approaches and possibilities available to traditional doctors today in China.

The interview was with the grandfather of one of the students at the China Three Gorges University. We took a taxi to a downtown bus stop where we boarded a large van of people traveling to the town of Jingzhou, in Hubei Province. It was about a three hour bus ride. The town has a large section of the Great Wall of China in the center of town. Just of this is the main market where I bought another layer of winter clothes before I did anything, as it was so cold. The market has very good woolen products for

sale at a low cost. We walked to their apartment house, a 4th floor walk up, brick block of apartment houses on a street of similar blocks.

Interview 1 – Dr Chen Zhao Xing

Dr Chen Jie Zhao Xing is a doctor of traditional medicine. He is 60 years old and has been practicing traditional medicine for 45 years, from 1958, in the same town. He is still learning from his masters and teachers. He had four teachers, from the first he learned TCM causes of disease of the bones. From the second teacher he learned Kung Fu, from the third teacher he learned how to find the TCM plants; through this time and from all teachers he learned what plants to use; and from the fourth teacher he learned about internal diseases, because they have so much effect on patient's suffering from bone diseases or broken bones. And, the internal health of the organs affects the healing capacity of bones.

Dr Chen has taught for thirty years at various TCM schools, and at a school run by the Jingzhou Hospital. He also has a private practice where his patients include town administrators, farmers and children. He currently has two patients.

He has been working on a medicinal plaster that helps to speed and improve healing of broken bones, and bones damaged by diseases, for the past eleven years. He has combined the healing properties of many TCM plants with a bone setting plaster mix and created a premixed bone setting plaster. He has collaborated with TCM plant gatherers, doctors at Jingzhou Hospital and local manufacturers over the past eleven years, experimenting with different plant mixes, paying particular attention to the microenvironment of the most phytochemically active plants. This was followed by years of testing on animals, and people with a range of bone problems. The process of experimental testing was supervised by his teachers, and doctor associates at the hospital. He consulted constantly with these medical experts and also communicated with other well-known bone disease and osteology medical experts throughout China. He attended conferences and was referred to these people by medical personnel, both

TCM and modern medicine practitioners, and by medical administrators who wanted to confirm that he had received a nod of approval from them. Either formally, through written letters and within the process of certification, or by word of mouth he has consulted and collaborated with many of the nationally recognized osteology experts.

Dr Chen went through the process of obtaining the certificates and patents to protect his invention and to enable legal marketing. It takes about one year to obtain the certification:

1. Certificate of Permission Business Administration
2. register ownership of trademark
3. Patent to protect ownership by applying to Science Technology Bureau, Beijing. They have the laws to protect patent ownership and the administration to deal with infringements.
4. Certificate of Business.

Dr Chen showed me the certificate of patent ownership issued by the National Patent Office in Beijing, approved by the Ministry of Health. The Chinese National Knowledge Ownership Bureau has many sections; he obtained the certificate from the Medical Patents Section. Until he obtained the necessary certificates his medicinal plaster was only manufactured in Jingzhou. He has applied for permission by the Medicine Bureau in Beijing to have it manufactured nationwide. He has applied for Certificate of Business Incorporation, which was granted July 16, 2003. The patent covers his new discovery as a material of medicine, a development from his own knowledge and his own mixture. As such, it is a strong patent, in legal terms. Dr Chen emphasized that the government is actively encouraging the development of new medicinal patents.

This medicinal plaster is now available in Jingzhou, and it will be available nationwide within the next two to three years, according to Dr Chen. He has had many Chinese Pharmaceutical companies approach him to buy the patent. He named Jiangxi Province Factory, Jiangsu Technology Agency, Hong Kong Factory, and Shenzhen City Factory. The deals include an offer to buy the patent and co-operate with him to develop it. He

does not want to accept these deals, so he does not contact them. The offer from Jiangxi Province was to pay him 1,150,000 Yuan for complete rights of ownership of the patent. These Chinese Pharmaceutical companies know the amount of profit to be made from a TCM so they do not want to let Dr Chen maintain ownership of his patent while co-operating with him to develop it commercially.

Dr Chen knows that the amount of money to be made for this product not just for his generation, but for his children and grandchildren, is far greater than that, so he will not agree to these deals. It is interesting that the Pharmaceutical companies will not agree to a development and marketing collaboration without them owning the patent. So, he is developing the product himself, and then a Pharmaceutical products factory will mass product the plaster and medicine packages.

Now that Dr Chen is familiar with the process of certification and patents, he is in the process of obtaining a second patent for a preparation that when applied will improve and enrich blood movement up to the brain for headaches caused by poor circulation especially in older people. The process includes writing an essay about the TCM theory of medicine used, statistics on patients who use it, and recovery statistics.

Interview 2 -- Dr Yang Xing Shu

I was taken to visit Dr Yang by one of the students I taught English. He is her family doctor and she had been going to him since she was a child. He has a storefront office and dispensary where people can stop by without an appointment, or with an appointment, and discuss their trouble with him. His dispensary assistant will then weigh TCM products onto a plain white paper and wrap it up for the patient and he will give some final words of advice. Dr Yang, 62 years old, had no formal education in TCM, but learned from his father and his grand father, his mother's brother. He went to formal school until he was fifteen years old, after this time, his training in TCM began.

He has no license, however, his son is being trained in TCM at the China Three Gorges University and has a license, and is apprenticing with his father in the business. Dr

Yang has another clinic in another part of town where he also sees patients on different days.

Dr Yang diagnoses each person and creates a medicine unique for each person, saying, “created medicine is better treatments”, made different for each person. Just to see a person helps him make an accurate diagnosis. He quoted the following to me: “bianzhenlunzhi, shenbinchufang : to see, to know, to think, treatment of illness.

He buys the medicinal plants from companies, specific companies get their supplies from different farmers, so he can specify plants from a certain region or with a particular medicinal quality, by buying from specific suppliers. Some materials are easy to find, some are very difficult, some are wild materials, and some are farmed. He works with the nearby Traditional Chinese Medicine Hospital, and also refers patients to the modern medicine hospital to check with modern machines the diagnosis they have made. They will work with both medicines simultaneously on the same patient, giving them a TCM to drink and the patient will obtain modern medicine from the pharmacy, hospital or doctor.

I also interviewed the son, Yang Rengun, a graduate student in TCM at China Three Gorges University, which was called the Medicine College at the time. He graduated in 1995 after three years with a Bachelor of Medicine. He has gone on studying at China Three Gorges and taking courses. Like his father, he is an internist.

Interview 3 – Dr Zhang Zheng

I interviewed Dr Zhang at his office and lab in the Department of Immunology within the Medical College of the China Three Gorges University. Dr Zhang Zheng is a doctor of Traditional Medicine teaching and directing research with traditional medicines. The China Three Gorges University is part of a national research program into TCMs that may be used in treating cancer, AIDs and other immunodeficiency diseases such as Avian flu and SARS. Each university in the program studies certain TCMs toward this common goal of finding cures.

The TCM he is studying is not at the stage to find a manufacturing partner, the anti-cancer TCM needs more experimentation, as does the SARS cure under study.

Research universities look for two types of partnerships, co-operative research partners, and manufacturing partners. All manufacturing partnerships must come from private enterprise, either Chinese or foreign. China's central government funds research, but only to a certain point; then encourages private funds from China and foreign companies, mainly pharmaceutical, to provide more money. At present, there is no foreign Pharmaceutical company co-operating with the China Three Gorges University Medical Department, but at some other universities in China they have formed partnerships. This will be the focus of future field work.

Chinese universities prefer partnerships with foreign institutions that can provide the technology that most China institutes lack. Chinese universities do send professors overseas to begin building relationships, but not professors of TCM. Foreign institutes do not have departments of TCM so it is difficult to build ties without counterparts. Chinese professors of TCM do go to Japan to study herbal medicine and pharmacological biochemistry as there are well established mutual institutional relationships.

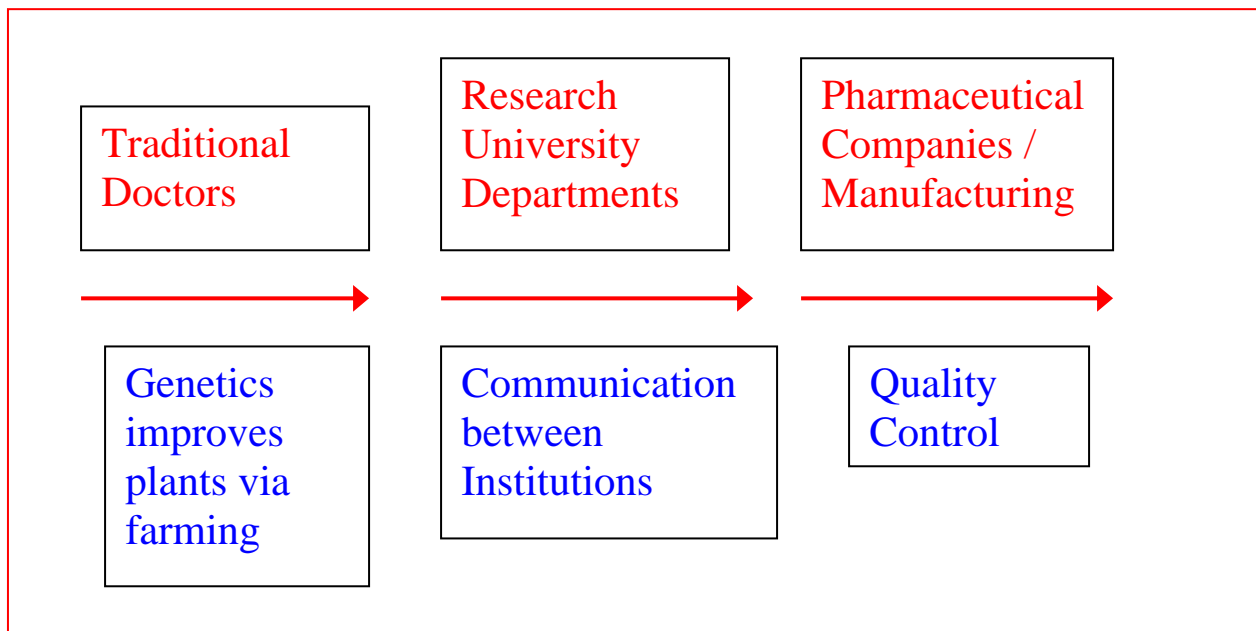
The problem of "brain drain" of China's scientists is present, but the advantage of greater access to research money and technology is weighed against the separation from the source of TCM: direct access to plants and traditional plant experts. In many cases, microenvironmental differences in obtaining plants, and variations in plants within the same species can affect the final experimental TCM.

The work that Dr Zhang has done can illustrate the stages in the development of a modern medicine from TCM. A compound TCM medicine is called a "fufang", the department is studying a lung cancer fufang medicine, and a liver cancer fufang medicine. They have proved the effectiveness of the TCM in keeping animals alive.

They have explicated the mechanisms by which the TCM works on animals. The real expense occurs in the third phase of experimentation, using modern technology to replicate and improve the TCM. This is the point at which China's set-up is the weakest.

Dr Zhang himself has illustrated this process in the following diagram.

Figure 2. The Relationships between Traditional Medicine, University Research Departments and Pharmaceutical Companies.



This diagram illustrates some of the major conclusions that can be drawn from the interviews. The most effective medicine from TCM depends on more information and study about the plants including studies of the microenvironment and habitat of the most biochemically active plants and agricultural research. Communication and collaboration outside of the closed circles of both TCM and modern medicine is not optional it is essential, TCM is the beginning point, not the end and we have to study *how* to find medicines.

The relationship with foreign institutions can work two ways: an HIV cocktail was created in the US and is being developed in Hubei Province at Hubei Province Peoples Hospital, in Wuhan, where doctors are curing HIV patients.

Interview 4 -- Dr Han

Ms Han Li is the manager of the Microbiology and Immunology section of the Medical Research Department of China Three Gorges University. She has a Bachelor in Biology with a research major in experimentation. She teaches students basic research practice. The SARS project is under her direction. The Premier of China came from Beijing and asked her personally, to complete this task. The SARS outbreak caused the government to assign many Universities to create SARS medicines, each working from a different traditional medicine and different medical concepts. They did not pick the most likely candidate for a cure and assign each university to work on the same TCM, or some aspect of the biochemical and medical research.

In China Three Gorges University SARS team created a medicine against SARS in 2003, from materials bought from Pharmaceutical companies. They made it themselves, but it is not mass-produced. When I asked “why not”, she said that the factory cannot make it mass produced and control the mixing precisely. Some factories have done this, and can bring it into the market in a drink powder, but not the Yichang Pharmaceutical company. They are presently studying how to make it more useful, that is, consistently high quality and bioactive while mass-produced in the factory. As Han Li used the term, ‘useful’ also means TCM + Western medicine and technology = useful.

Government Role

The Ministry of Health in Beijing is the center for modern and traditional medical health administration. This includes legal responsibilities, administrative and information networking, and financial distributions. Within the Health Office, there is a TCM

Administration Bureau of the Provinces, and each Province has a corresponding Health Office and Traditional Medicine Administrative Bureau.

National

The central government in P.R.China encourages seeking outside funding to support research. A complaint frequently heard during interviews is that money is not available for the development of products. Medical doctors and biochemists at universities want to form partnerships with pharmaceutical corporations from Europe and the United States. If a university develops a pharmaceutical product they can produce it in partnership, or sell the formula. University departments prefer to enter longterm partnerships with pharmaceutical companies to fund research and to manufacture successful compounds. They do not see these partnerships as research partnerships with pharmaceutical companies.

International

There is a response at the institutional and international level to current global epidemics. National and international agencies opened offices in Beijing 2003. In the absence of well-thought out policies—there are no well-thought out policies—an active presence is regarded as necessary for many reasons; to prevent privately owned pharmaceutical companies gaining control of a medicinal product that may bring great profit to China's national economy, and, the UN wants to ensure that medicines that could control global epidemics are not controlled by private and national interests. The WHO opened offices in China in October 2003 to assist in prevention and training programs for AIDS and SARS and other outbreaks. They also work with government and research institutions testing AIDS and SARS medicines derived from Chinese traditional medicines. The US has opened CDC (Communicable Disease Center) offices in Beijing to assist China CDC and Ministry of Health with administrative advice and training to contain the spread of AIDS, to assist with the SARS epidemic, and now the avian flu virus. The World Federation of Traditional Chinese Doctors, in cooperation with the WHO, has opened Foundation headquarters in Beijing 2003 because of the growing

need for the development of Chinese traditional medicines into modern pharmaceutical products.

National Development and Epidemic Threats

There is very little information available on the development of traditional medicines into modern pharmaceutical products in China, although it is viewed as vital to China's future and a dynamic medical research area. As in the U.S., discussion bypasses the most cost-effective method of 1. locating traditional medicines with potential as pharmaceutical products; and, 2. the most cost-effective methods for biochemical testing of traditional medicines.

Poor information flow takes another form in China. Traditional plant knowledge is well documented, but researchers' access to specific traditional medicines for biochemical analysis is limited to word of mouth through personal relationships, as this valuable information is closely guarded.

The recent SARS and avian viral outbreaks highlighted the weak information sharing systems, the lack of publication access/withholding research, and the isolation of university departments seeking funding.

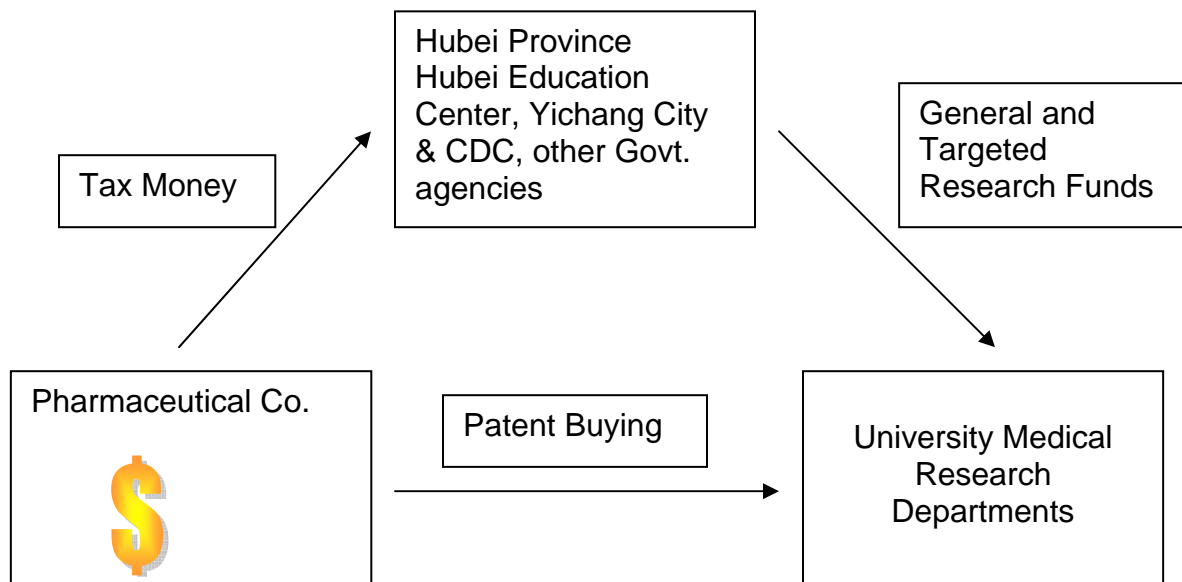
Funding

The financial perspective is that when used together, TCM plus western medicine and technology is less expensive than western medicine. This is the goal medically and financially when all China medical research is undertaken: how to combine the best of western technology and medical research with what they already know of TCM

Pharmaceutical Companies provide money for research, but they do not enter into research agreements with Universities where the research takes place. Pharmaceutical companies buy medical patents and then produce the items. Universities do not work closely with profit motivated companies. As Han Li stated, "these are not suitable

companies”. The financial support for research comes from government, Province and national. Some money comes directly from the government agency, the national contribution is given to the University, to the Department and then to the research project. When a University develops a medical product and has it patented, they may sell it to the Pharmaceutical Company.

Figure 3. The Financial Relationships Between Pharmaceutical Companies, Province and National Government.



Agriculture

The role of agriculture in traditional medicine is increasing, not decreasing. As China's growing population expands into wild lands that have been traditional gathering areas for many of the medicinal plants and the animal products, wild gathering methods must be replaced by agricultural management. The city of Ankang has laid out the three points towards improving herbal medicine and business for the city: 1. Enlarge

production and promote sales, 2. reorganize the medical profession, 3. develop the Chinese herbal medicine base.

Gathering medicinal plants is a traditional role, and traditional doctors, particularly those engaged in research and study of medicinal plants may enter a close relationship with traditional gatherers and make special requests, and obtain specialized information about environment, plant habitat, time of gathering. In questioning, I found out that these people, who pass this skill on from generation to generation within their family, may or may not be farmers. They are rural people with intimate knowledge of the land and plants. Some are not able to read and write, especially the older generation. There are some who have had a few years of school before returning to the land and their families' traditional occupations.

There are two different issues regarding the plants. There are cultivated plants that have been cultivated traditionally for a very long time for medicinal purposes, and there are wild plants whose properties are valued in medicines, that are gathered and that may or may not be cultivated traditionally. Today, these two plant groups are being studied to improve large-scale cultivation practices, and to introduce wild plants to cultivation techniques. Some plants are very difficult to cultivate due to habitat requirements. I have learned something of the wild collecting areas; however, these plants and issues surrounding their cultivation will be the topic of future field work.

The agriculture of wild plants takes many forms, from simple reseeding and replanting root and branch segments to encourage spreading and faster regeneration, to seed gathering and sowing, nurture and gathering. There are some wild plant gatherers who are working with agricultural experts to study ways of culturing wild varieties from seed to harvest, in order to ensure a growing supply of much needed plants. Their traditional expertise is valued as an irreplaceable part of agricultural experimentation.

The following is some information on regions where wild plants are collected in wild lands and herbal medicine plants are grown in farms. More field work remains into the

nurturing and collecting of wild plants. Some questions that remain to be addressed, are, what lands are reserved for wild plant collecting, are the plants endemic or introduced, are the lands sufficient for this purpose to the growing community needs.

Provinces

Peking Colleague Hall Ltd Co.

Jilin Province Jingyu country, Henan Province, Shanxi Province Linghuan country, Hubei Province, Shandong Province, Zhejiang Province, Anhui Province, Haozhou country.

Anhui Province

White peony in northern Huanhe, Panaquilon and cucommia bark in Dabie mountain area, Chrysanthemum in the Jianghuan area, Paconol along the bank of Huanhe, chrysanthemum in the south mountain district.

Guangzhou Province

Qingyuan Shenzhitang Modern Chinese Herbal Medicine Ltd. Co. Shakou Village in Yingde 10,000 acres.

Guangxi Province

Chuangwu country 300 acres in finger citron.

Longren Business Enterprise Group 300 acres in multiflower knotweed tuber.

Hualong Medicine Inc. Co. Sijiazhuang city, 1,000 acres planted.

Henan Province

Meilun Medicine Co. in Tianjin city, Qinglong village Isatis root, bupleurum root, Baicalensis, Red sage root.

Hunan Province

10,000 acres lily bulb, white hyacinth bean, Prunella spike, Houttuynia sp., Cherokee rose-hip, Peucedanum, S ning Poensis, Solomon seal rhizome.

Jilin Province

Wangqing country Sinensis , Acanthopanax root Wusong country.

Liaoning Province

Ningxia Province

Ephedra Yongningzheng Shaqu, Desert living Cistanche in Chunyu Country, fontal licorice in Mapao river in Cijiaobao village in Ningwu, Medicine plant in sand in Shabianzhi in Yanchi, fontal licorice of Yuanheng Grass Company in Zhongning, fontal licorice in Hulingyan Medicine Company in Pingluo.

Shandong Province

Linju Country Food Ltd Co. 3,000 acres coden root, 2,000 acres Cunanchum bungei, 2,000 acres Baiclensis spp., 1,000 acres Red sage root, 2,000 acres Propinquans sp.

Shanxi Province

Tianshili Group Shangluo area 5,000 acres red sage root and Bupleurum root
40,000 acres Japanese yam.

Szechuan Province

Chinese Herbal Medicine Drink Ltd Co. 122, 650 acres.

Three Nine Group Zhongjiang country 10,000 to 30,000 acres.

The Auspicious Clouds Chinese Herbal Medicine Drink Co. Huangfeng village in Pengshan city.

Tainshi high mountain bamboo groves, 15,000 acres for herbal medicine in Guixi Nanxiang country in Yingtan city.

Yunnan Province

Noto Ginseng in Wenshan, Gastrodin in Shaotong, Chinese yam in Lijiang, “south medicine in Xishuanbanna, the tunnel medicine in Chuxiong.

Plants

Many books have already been published on the medicinal plants of the China region. While I was teaching at the China Three Gorges University, I obtained the information I could from the library collections, especially all the books concerning Hubei Province medicinal plants. Most of the documents on TCM plants have not been translated and are not available outside of China; however, they can be bought and ordered from bookstores and publishers as long as you are in China. A great deal of work needs to be done on the botanical distribution of medicinal plants in Provinces, on the taxonomy of the speciation of medicinal plants, and on biochemical studies of medicinal plants.

The following list includes all the medicinal plants I found in the books in the library, and on the China internet.

Plant	Province	Cultivated -Wild	Uses	
Angelica sinensis (Oliv.) Diels				
Apium graveolens Linn.				
Aralia cordata Thunb.				
Arnebia euchroma (Royle) Johnst				
Artabotrys hexapetalus (L.f.) Bhandari				
Artemisia cina Berg.				
Aquilaria sinensis (Lour.) Gilg.				
Belamcanda chinensis (L.) Dc.				
Callicarpa kwangtungensis Chun.				

Plant	Province	Cultivated -Wild	Uses	
Carduus Crispus L.				
Cephalotaxus fortunei Hook.				
Cephalotaxus hainensis Li				
Cistanche deselerticla Ma emend Ma				
Clausena lansium (Lour.) Skeels				
Claviceps microcephala (Wallr.) Tul.				
Claviceps purpurea (Fr.) Tul				
Corydalis stricta Steph.				
Curcuma longa L.				
Dendranthema boreale (Makino) Ling				
Dioscorea nipponica makino				
Erigeron annuus (L.) Pers.				
Euodia rutaecarpa (Juss.) Bench.				
Evolvulus alsinoides L.				
Euphorbia hirtavar topica L.C. Wheeler				
Fagopyrum cymosum (Trev.) Meisn				
Fomes japonicus Fr.				
Ganoderma capense (Lloyd) Teng				
Ganoderma lucidum (Leyss. Ex Fr.) Karst				
Gelsemium elegans (Gardn. et Champ.) Benth				
Gnentum parvifolium (Warb.) C.Y. Cheng				
Glycine max (L.) Merr.				
Leptochloa chinensis (L.) Nees.				
Ligusticum sinense Oliv.				
Lythrum salicaria Linn.				

Plant	Province	Cultivated -Wild	Uses	
Murraya paniculata (L.) Jacks				
Panax japonicum C.A. Meyer				
Panax ginseng C.A. Mey				
Panax notoginseng (Burk.) F.H. Chen				
Picrasma quassioides (D.Don) Benn.				
Polygonum multiflorum Thunb.				
Populus tomentosa Carr.				
Potentilla freyniana Bornm				
Rhododendron micranthum Turcz.				
Schefflera arboricola Hayata				
Scutellaria baicalensis Georgi				
Securinega saffruticosa (Pan.) Rehd.				
Stauntonia chinensis DC.				
Stephania japonica (Thunb.) Miers.				
Taxus yunnanensis Chen et L.K. Fu				
Uncaria sinensis (Oliv.) Haval.				
Vinca minor L.				

Conclusion

The development of new medicines to meet new needs from traditional Chinese Medicines is proceeding along lines different from that of medicine in the United States.

Traditional medicines are at the heart of a growing medical and pharmaceutical industry. Traditional medicines and plants are studied within the University research departments of botany, biochemistry, immunology and medicine. Funding from Province and national government that is obtained from taxation, is set aside for research into traditional medicines. In this sense, traditional Chinese medicine is becoming self-sustaining within existing and new institutions. The two lines of medical philosophy, western and Chinese, are becoming integrated at the most basic and intimate levels of pedagogy, research and practice.

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