

Medicine and Culture

Chinese-Western Medical Exchange (1644-ca.1950)

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Symposium Summation by Charlotte Furth, Ph.D.

The Ricci Institute at the USF Center for the Pacific Rim is pleased to publish two extracts from its March 2007 symposium, "Medicine and Culture: Chinese-Western Medical Exchange." Marta Hanson's keynote lecture on the Jesuits' introduction of Western medical knowledge to China during the Qing dynasty drew an overflow crowd to the USF hilltop. Charlotte Furth's summation synthesized the works of 10 leading scholars and doctoral candidates who presented their research at the Institute's day-long symposium on Chinese-Western medical exchange held the following day.

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Jesuits and Medicine in the Kangxi Court (1662-1722)

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What kind of healing took place in the early Manchu court during the reign of the Kangxi emperor (r. 1662-1722)? Chinese physicians offered acupuncture, moxibustion, massage, and medicinal tonics. Yet the Kangxi emperor disliked Chinese acupuncture, loathed the smell of mugwort (*Artemisia* used for moxibustion), would never get a massage, scoffed at Taoist longevity practices, and expressed skepticism of southern tonics and restoratives. The Mongolian steppes offered unique medicinals such as Jorhai roots for aching joints and dried Yengge fruit for stomachaches and diarrhea. Manchuria and Korea produced the species of ginseng the Manchus prized so much that they established a monopoly over its trade to secure its transport from their homeland and Korea to their new capital in Beijing. From the Jesuits came 'Peruvian bark', brandy, tonic wines and Canary wine used for masses, the surgeon's scalpel, and an anatomical view of the human body.¹

Reading the writings of the Jesuits and the Kangxi emperor on medicine together provides a unique window on the medical pluralism, the Chinese-Western exchange of therapies, concepts, and images of the body, and the range of therapies practiced within the Manchu court of the Kangxi emperor. Based on

sources in Manchu and in Chinese, there were three key cases of Chinese-Western medical exchange during the Kangxi reign, each illustrating a different type of cross-cultural interaction. The first case of 'snakestones' illustrates how a sought after medicinal in mid-17th century Europe and China has since been practically forgotten in history. The second case of Jesuits' Bark may be taken as a successful 'gift exchange' of a

Western medicinal recorded in the writings of Jesuits and the Kangxi emperor and about which historians have since concurred marked a shift in the emperor's support for the Jesuit mission. The third case of Western anatomy translated into Manchu suggests that despite considerable scholarship on this book since, the Western perspective of a universal body and the Aristotelian thought Western anatomy conveyed did not change how either the emperor or his physicians thought about their own or Chinese bodies. Nor did it change medical practice within or outside the imperial court. On the contrary, the Kangxi emperor believed

in the uniqueness of his own 'imperial body' and in corporeal variation among people from different regions within the Chinese empire.

The Case of Snakestones, 1685-88

The earliest indication of Kangxi's interest in Western medicine appears to have been in March 1685 when he sent two of his courtiers—Ledehun (unknown dates) and Ming Ju (1635-1708)—to the Flemish Jesuit astronomer Ferdinand Verbiest (1623-1688) to ask him to arrange for European physicians to come to his court.² On the first of August 1685, Verbiest wrote a

letter about the Emperor's wish to the Belgian Jesuit Charles de Noyelle (1615-1686), the 12th Superior General of the Society of Jesus. In addition to explaining why Western medicine was important for the Jesuit China mission, he requested that they send more medical books and Jesuit physicians to China. Sometime between 1685 and January 1688, when Verbiest died after being thrown accidentally from a horse, he wrote a 5-page treatise titled *Lapis serpentinus* or 'snakestones'. Considering his work on cannon

casting for the Qing military since 1674, it is not surprising that the first thing Verbiest translated in response to Kangxi's initial interest in European medicine was about a substance then famous for

treating wounds and poisonous bites.³ The Manchu version of the *Lapis serpentinus* is the first of the four Manchu medical texts that the Jesuits wrote and, along with two Chinese versions, represents the first written example of Western-Chinese medical exchange in the Kangxi court.⁴

What were these exotic snakestones? Why did the Kangxi emperor want to find out about them and how did the Jesuits know about them? Although the translations were not dated, it is likely that Verbiest wrote them in response to Kangxi's newly expressed interest in European medicine in 1685.⁵ The Chinese term for snakestone *xidushi* means the 'stone that attracts venom' or the 'venom-attracting stone'. Verbiest appears to have been the first person to use these Chinese and Manchu terms in his treatises on them.

Snakestones were not recorded in Ming or even early Qing materia medica. The author of the late-Ming Systematic materia medica (*Bencao gangmu*, printed 1596), Li Shizhen (1518-1593), described several types of 'stones' associated with snakes such as *shehuang* (yellow of the snake) or *shehanshi* (stone contained within a snake).⁶ These 'snakestones', however, were most likely designated bezoar—a concretion found in the stomachs and intestines of some animals, usually ruminants, and sometimes in humans. Bezoar was thought to be a poison antidote and was known throughout the ancient world.⁷ The more common type of bezoar in Chinese medicine came from cattle and was called *niuhuang* (yellow of oxen) or (oxen bezoar). Instead of a concretion from the stomach or intestines of snakes, Verbiest wrote about a substance or

'conglomeration' that came from the head of snakes and had its origin in India, not China.

Having the quality to extract poison, Verbiest wrote that "[T]his stone can cure the wounds and bites from snakes, scorpions, millipedes, and poisonous snakes. Furthermore, it can also be used as a treatment against sores."⁸ Put on a wound or bite, the stone would adhere to the flesh, absorb the poison, and once saturated, fall off on its own. Human or cow's milk would then be used to extract the poison from the stone so it could be reused indefinitely. Once the milk turned green, the milk would be discarded and the stone stored for later use.⁹ Scientific analysis of modern-day snakestones show them to be charred bone or bone ash, which is porous and light with a highly absorptive power of up to 20–25% of its own weight.¹⁰

The case of snakestones in the Kangxi court are interesting from a historical perspective because they represent a medicinal that was once highly valued when it first arrived in Europe in the 1650s. It also clearly interested both Verbiest and the Kangxi emperor, but it has since been forgotten in history and is no longer used in medical practice. Originally called *pedras della cobra de Capelos*, snakestones first came to Europe via India in the 1650s. They were green or reddish, often shaped like a lentil, and the size of a small coin.¹¹ The Polish Jesuit Michael Boym (1612-1659) recorded the earliest reference to snakestones in European texts. He had returned to Italy by August 1652 as a representative of the Ming pretender Emperor Yongli, who had converted to Christianity in the hope of gaining Western support to help reestablish the Ming dynasty.¹² While residing in Rome for three years, Boym was a champion of the China mission and introduced Chinese culture to the Europeans, particularly her fauna and flora. Boym described the healing properties of the snakestone in the *Flora Sinensis, fructus florsque*, published in 1656 in Vienna. He included an illustration of the serpent the Chinese allegedly called a 'Gento' and from whose head the snakestone was reputedly extracted.¹³ Snakestones were part of the gift economy like Venetian glass prisms, elaborate clocks, mechanical toys, and engravings¹⁴ that the Jesuits participated in with their Chinese patrons to ensure continued support. The next European to write about snakestones was another member of the Society of Jesus, the German Jesuit Athanasius Kircher (1602-1680). Just a decade after Boym's entry in *Flora Sinensis*, Kircher devoted a chapter in his *China Illustrata* (1667) "About the amazing qualities of the snakestone, called 'la piedra della cobra' by the Portuguese."¹⁵ Kircher even conducted an experiment on snakestones in 1663 in which he had a poisonous snake bite a dog and then placed the stone on the snakebite where it allegedly adhered on its own. According to his testimony, his experiment confirmed the efficacy of snakestones: Finally, having drained off the poison, it fell away by itself, like a leech saturated with blood. The dog was free from the poison, and although feverish for a while, was restored to his former health after about a day.¹⁶ Apparently inspired by Kircher's snakestone experiment on the dog, another Roman contemporary of Kircher named Carlo Magnini tested his own sample of a snakestone when a viper by chance bit a laborer. Magnini recounted that his snakestone had the same effect on the bitten man as Kircher had described for the dog, except that the human subject also required drugs for his heart before fully recovering. Kircher reported this human experiment as additional evidence of the efficacy of snakestones as antidotes to poisons.¹⁷ Kircher espoused a Christian interpretation of poisons that posited a benevolent God as their creator to help purify the air and cleanse the earth for human habitation.¹⁸ Verbiest's explanation of snakestones intended for the Kangxi emperor clearly reveals a debt to Kircher's magnetic philosophy and interpretation of the 'natural action of poisons'. Verbiest concluded with an obvious reference to Kircher's theory that poisons demonstrate the benevolence of God: All these absorb the poisonous qi of all creatures and, in that way, they feed their own substance and they protect the human race. This clearly shows that the lord loves the human beings. He has devised and harmonized creatures of every sort, each according to their own nature, so that the whole world might be good and beautiful.¹⁹ For the famous Jesuit astronomer snakestones were no different than stars as one more means to reveal the omnipotent and benevolent power of the Christian Lord. Just as the Jesuits had withheld the Copernican concept of a sun-centered planetary system and misrepresented Copernicus to their Chinese colleagues from 1616 until 1760,²⁰ Verbiest similarly did not mention the controversy that ensued shortly after Kircher's two 1667 publications with essays on snakestones. In 1671, the Tuscan physician Francesco Redi (1626-1698), published a rebuttal in the form of a long letter to Kircher. He used the case of snakestones as a general challenge to the reputed efficacy of exotic and imported medicinals.²¹ Verbiest said not a word about this major controversy, which would have certainly circulated widely in the Jesuit community of the time since it involved the public rebuttal of the claims

about snakestones of one of the most well-known and prolific members of the Society of Jesus. As Martha Baldwin has shown, Redi may have focused his ire on imported medicines and Kircher's advocacy of snakestones for a variety of reasons ranging from personal ambition and the need for patronage from the Medici family to commercial reasons as a physician. Redi also simply may have resented the new competition Jesuits brought into a medical field physicians like him previously dominated.

The Case of Jesuits' Bark, 1693

Another medicine—like snakestones—introduced to Europe in the 1650s and even more explicitly associated with the Jesuits, was the South-American febrifuge known then by its native name Quinquina (Latin *Chinae chinae*, Chinese Jinji'na). This name is the etymological origin of the modern term 'quinine' for its active ingredient. Comparable to the Tuscan court's monopoly within its jurisdiction on the antidote theriac, the Jesuits had so much control over the collection in South American and sales in Europe of Quinquina that, in addition to 'Peruvian bark', it was often called 'Jesuits' bark' or 'Jesuits' powder' through the mid-18th century.²² It would take another century before the Swedish botanist Carl Linnaeus in 1742 coined the term *Cinchona officinalis* for 'Jesuits' bark'

in honor of the wife of the fourth Count of Chinchón, Francisca Fernandez de Ribera. Although this story is now understood to be a fabrication, Linnaeus and his contemporaries believed that the Countess of Chinchón had bravely taken the local medicine to cure a fever sometime between 1632-38 while living in Peru.²³ A Genoan physician Sebastiano Bado (ca. 1660s) first circulated this apocryphal story in a pamphlet he published in 1663, just in the decade when the Jesuits were making a great profit by brokering its sale.²⁴ By calling it the 'Peruvian Bark of Anastasis', he directly linked it to the most famous Jesuit in Italy publishing knowledge about the New World as well as Asia at the time as a means to promote the Society of Jesus. Whatever connection Bados had with the Jesuits, or his original intentions for publishing his 1663 pamphlet on 'Peruvian Bark of Anastasis', the quinine-healing episode of the Countess of Chinchón in Peru thereafter became associated with the Jesuits. This story not only informed Linnaeus's choice of Chinchón, it functioned as a form of early-modern advertisement for arguably the most successful New World drug in the newly forming global markets.

Both the snakestone controversy and Jesuit control over the new market for Quinquina in the 1660s-70s occurred in Europe while Verbiest was busy defending the Jesuit mission against Yang Guangxian's anti-Christian attacks from 1660-1664 in Beijing.²⁵ Resolved with the Calendar competition of early 1669, Verbiest was appointed director of the Calendrical Bureau where in addition to his duties to the Kangxi emperor he wrote letters and sent publications back to Rome to ensure continued support of the China

mission. In a letter dated 15 August 1678, Verbiest pressed for more Jesuits—trained in philosophy and theology and willing to adapt to Chinese customs—to join the China mission. Once the letter finally reached Europe in 1680, it was widely circulated. Through a circuitous route, the letter resulted in Louis XIV

agreeing to send a delegation of 'Mathématicians du roy' to China. An envoy from Siam visited the French court in 1684, which also signaled to the King that the timing was propitious. Previously, the Portuguese Jesuit Antoine Thomas (1644-1709) had assisted in the conversion of the prime minister to the Siamese monarch, Constantine Phaulkon (1647-1688), and so had laid the groundwork there for the French mission. Thomas then moved north to Beijing to assist Verbiest in the Calendrical Bureau.²⁶ The French delegation of six Jesuits left Europe early March 1685 and first stayed in Siam from September 1685 to June 1687 where one of them, Father Guy Tachard (1648-1712), remained behind.

The well-known story of how the Jesuits came to cure Kangxi of a malarial fever with Jesuits' bark illustrates a medical exchange that was considered successful by both sides at the time and remains an important historical episode.²⁷ According to the 1698 account of the French Jesuit Joachim Bouvet, the leader of the French delegation, Father de Fontaney, had successfully used Quinquina to cure the emperor of a malignant fever in July 1693. Although French Jesuits Claude de Visdelou (1656-1737) and Jean de

Fontaney (1643-1710) offered it to the emperor, they did not give it to him immediately; it had to be tested first on three other men with malarial fever. After they recovered, it was given to four members of the imperial family in a small dose with wine, none of who suffered from it. Only after these trials, would Kangxi take the medicine. For their cure of his fever, Kangxi awarded them with an imperial gift of a house where they could reside within his palace, reducing considerably their travel time of a couple of hours to and from the inner court. They also received a large tract of land near the inner palace to use as a church.²⁸ Kangxi also ordered that Gerbillon translate western knowledge of medicinal substances into Manchu.²⁹ Bouvet recounted to his Jesuit supervisors in France that because of the efficacy of their medicine, Kangxi became interested in Western knowledge of medicine and the human body. But his curiosity certainly predated the 1693 quinine episode since as early as 1685 he had Verbiest request Jesuit physicians join the China mission and Verbiest wrote the *Lapis serpentinus* sometime between then and when he died in January 1688.

Jean-François Gerbillon (1654-1707) and another French Jesuit who had arrived later, Dominique Parrenin (1665-1741), together completed a Manchu manuscript on Western medicinals. This text was printed as an Imperial Household vademecum (Latin 'go with me', or pocket reference) edition. Although other manuscript copies may have been made, only one Imperial Household edition remains extant in the Gugong imperial library.³⁰ This vademecum edition discussed specific medicines as well as diseases and their treatment. For diseases, they included epidemics, dysentery, chickenpox, boils, furuncles, abscesses, paralysis, illnesses of specific organs—lung consumption, liver, spleen, stomach, intestines—and specific body parts—broken bones, eyes, teeth, hands, and feet. Of all the types of European medicines the Jesuit authors discussed—medicinal syrups distilled from fruits, medicinal salts and waters, plasters and pastes, burn remedies, a sulphur-based cleansing formula, and wine-based and water-based formulas—not surprisingly, they wrote the first and most extensive entry on Jesuits' bark.³¹

Once having been cured by it, Kangxi gave quinine as a gift to certain officials who suffered from malarial fever. In 1705, for example, the emperor gave 10 ounces of quinine to one of his provincial commanders-in-chief, Zhang Yunyi, after learning that he had lost weight and had been weakened after nine bouts with malaria.³² The most famous example relates to Kangxi's closest Chinese bondservant, Cao Yin (1658-1712), who for some time was the Suzhou textile commissioner and the salt censor of Liang-Huai at Yangzhou for four terms of one year each.³³ While passing through Yangzhou, August 2, 1712, he caught a chill, which in his weakened state caused him to become seriously ill with an intermittent fever characterized by the alternating fevers and chills of malaria. Hearing of his illness, Li Xu (1655-1729), the then superintendent of the Imperial Textile Factory in Suzhou,³⁴ arrived two weeks later to visit him. Li Xu wrote a memorial to the emperor asking for 'the Emperor's own medicine' since Cao Yin was too weak by that time to make the request himself.³⁵ In his response to Li Xu's memorial, Kangxi warned against the dangers of the restoratives Chinese physicians prescribed in the south and advised using the Jinji'na of the Jesuits instead for its specific effect on such fevers:

You memorialized well. Now I wish to make a present of the medicine to cure malarial fever, but I fear it might be delayed, so I am allowing the use of horses from the couriers' office so your servant can rush on, day and night. If the malarial fever has not been complicated by diarrhea, there is no harm in taking the medicine, but if complications have occurred, you should not use it. In the south, there are so many doctors who all offer some 'special tonic' that one cannot count them all; you must be careful. Ts'ao Yin [Cao Yin] was very eager to eat ginseng and now he has caught this disease; it was caused by ginseng. Quinine (Jinjina) alone cures malarial fever. Use two-tenths of an ounce, powdered, mix with wine, and swallow. Afterward change to doses of one-tenth of an ounce, or eight fen [0.08 ozs], and repeat this twice; this will remove the root of the illness. If he does not have malaria, this medicine must not be used. You must be very thorough, I urge you, I urge you, I urge you.³⁶

Unfortunately, the ‘emperor’s medicine’ arrived too late to save Cao Yin’s life and he passed away weeks before it arrived.

A later Chinese source summarized Kangxi’s

opinion toward the ‘tree bark called Jinjiqin’ as a drug specific for such fevers and his belief in regional differences between north and south within China:

. . . Southerners like to use restoratives and

northerners like to use purgatives, but neither

one follows the appropriate middle way. Generally, warming and restorative drugs have a very subtle effect and very strong drugs have a visible effect. Formularies record a good many recipes for decoctions, but if one formula could cure one disease, why do they have to be changed

repeatedly? The West has a kind of tree bark called Jinjiqin that cures illnesses of intermittent fevers (i.e., malaria) with just one dose. Thus, one can see that using medicines is a case of [using them for] the right syndrome.³⁷

In contrast to the snakestone example, the case of Jesuits’ bark in the Kangxi court remains an emblematic story of Chinese-Western medical exchange. Jonathan Spence concluded that “Cao Yin’s request and the Emperor’s answer show how completely the positive sides of Western medicine could be accepted in China, and how openly the Chinese could adopt a new

technique.” Bouvet used the episode just five years later as evidence to his superiors of the success of their China mission and to legitimate their deployment of Western medical knowledge to proselytize the Chinese emperor and his officials. Quinine was a ‘token of exchange’ around which the Jesuits strengthened their relationship with the emperor and further legitimated the Jesuits’ China mission.³⁸

The Case of Manchu Anatomy, 1710-22

The Swiss German Jesuit Johann Terrenz Schreck (1576-1630) wrote the earliest Chinese translation devoted solely to introducing Western medical

knowledge to the Chinese sometime between 1625 and his death in 1630.³⁹ Four years later, Schall showed the manuscript to the Chinese scholar-official Bi Gongchen (jinshi 1616, d. 1644) who was allegedly so impressed with the text he asked Schall to develop it in more detail for Chinese physicians. However, Schall, preoccupied with making cannon by imperial order, had no time to do this. On his own initiative, Bi revised Schreck’s original manuscript *Renshen shuo* (A Treatise on the Human Body) into literary Chinese. Bi’s version was titled *Taixi renshen shuogai* (Western views of the Human Body, an Abbreviated Treatise) and was significantly longer by one-half. It was published in 1643 with Matteo Ricci’s *Xiguo jifa* (Mnemonic Techniques of Western Countries) appended.⁴⁰

Another manuscript on Western anatomy

attributed to the Italian Jesuit Giacomo Rho (1592-1638) also has the names of Terrenz Schreck and Niccolò Longobardo (1565-1655) on its title page and was mostly completed before Rho’s death in 1638.⁴¹ During the final decades of the Ming dynasty (1368-1644), Jesuits also wrote Chinese texts on western medicinal plants, drug preparation and distillation techniques, as well as translated passages about medical training, hospitals, and orphanages in Europe.⁴²

The most famous translation of Western medical knowledge, however, was not in Chinese, but rather is a late-17th century Qing translation into Manchu known in English as the *Manchu Anatomy*.⁴³

Although we know through Bouvet’s letters that he wrote lectures in Manchu on medical topics including anatomy for the emperor’s tutorials from 1689-92, unfortunately none are extant. During these years, Bouvet also began, though he did not complete, a Manchu

translation of a French anatomy text by Pierre Dionis (d. 1718). This initial work on Western anatomy reached full fruition a quarter century later with the production between 1710 and 1723 of several copies of the extensively illustrated Manchu manuscript on Western anatomy.⁴⁴ Bouvet and Parrenin based their Manchu translation largely on a French text about anatomy by Pierre Dionis, published in Paris in 1690, and complemented with illustrations based on anatomical plates by Thomas Bartholin (1616-1680) published earlier in 1677.⁴⁵

The Paris edition of this text at the Bibliothèque Nationale probably once belonged to the famous French sinologist Paul Pelliot (1878-1945). The

title page has the Manchu title on the left and the

Chinese on the right, both translate into English as *Explanations and Illustrations of the Vessels and Bones of the Human Body in Western Medicine*. On March 3, 1715, the Kangxi emperor also ordered a treatise in

Manchu on Western poisons and remedies. Based on Bouvet's earlier lectures and completed in 1722, Parrenin attached a Manchu essay on "Explanations of issues asked" to the Paris edition of the Manchu Anatomy, which he was also working on at the time. In "Explanations," he discussed medical topics of interest to the emperor such as poisons, antidotes, anatomy, pathology, and women's illnesses. With Parrenin's Manchu explanation of poisons and antidotes of 1715-22, we come 'full circle' back to Verbiest's first Manchu essay on venom-extracting snakestones written between 1685-88.⁴⁶ Since Schreck's initial Chinese translation of Western anatomy in 1625-30 to the Manchu Anatomy translation project of 1715-22, Jesuits had introduced to the emperors and a few Chinese officials in the court Western anatomical views of the body and Western-style drawing techniques. [Figure 1] The Jesuit translators intended to convey Aristotelian thought through anatomy, a key subject in the material sciences—one of the three 'theoretical sciences' that also included quantitative (math, music, astronomy), and immaterial (theology). The practical application of anatomy in surgery was not their concern.⁴⁷ The Manchu Anatomy thus presented a normative body that emphasized muscular structure over visceral functions yet the Galenic humoral model current in the 17th century still influenced what was depicted. The illustration of a left hand pulling up the brain to reveal the 'vesicle' or hypophysis (pituitary body) underneath illustrates this point. [Figure 2] In the humoral model, the pituitary body or 'vesicle' was considered the source of humor, phlegm, or 'sticky fluid' in the body. The Manchu texts indicates both its 'process resembling a tube' or the Infundibulum and that it is attached to the optic nerves.

The over 100 anatomical drawings in the various editions of the Manchu Anatomy were intended to convince Kangxi of the wondrous creation of the Christian god through its depictions of a universal anatomy of the human body. They not only clothed the figures in Chinese clothes, they sometimes made them look more 'Asian' to convey that what is depicted inside the body was the same for Chinese (and Manchus) as it was for Westerners.⁴⁸ The illustration of the optic nerves not only shows direct borrowing from the anatomical treatise of Pierre Dionis, but also depicts one significant change intended to convey that what is true for the Western body holds for the Chinese and Manchu body: a high Chinese collar of a scholar's robe covers the bare neck of the European original subtly implying that the 'head' is Asiatic.⁴⁹ [Figure 3, 4]

There is no evidence, however, of direct influence of this treatise on Chinese medicine or exposure beyond Kangxi and a few high officials in the Manchu court. Before an understanding of asepsis and anesthesia for surgery developed in the mid-19th century, anatomy had little therapeutic application.⁵⁰ Furthermore, there is no indication that Kangxi considered these drawings examples of the advanced level in 'Western learning' of a universal anatomy that applied as much to his own body as to the Jesuits and everyone else. In fact, the evidence in Kangxi's own writing from the same decades suggests the opposite.

Kangxi thought that as emperor his own body differed from those below him in the political hierarchy. Unlike them, his imperial body did not sweat and his clothes remained pure: Why inquire of this of the gentlemen of All Under Heaven, when it is unattainable for them? Up to this point in time, the clothes that I have worn for many years have not the slightest blemish, nor do they have the least bit of filth within them. Although I have worn them for several months, there is not a trace of sweat on them. This is due to the purity of my celestially endowed constitution. If my inferiors could be like me, could they not also wear their clothes for a long time?⁵¹ In one of his published lectures, the Kangxi emperor not only cautioned his offspring about the hazards of eating the cuisine of the region south of the Yangzi River, he also expressed a fundamental distinction he perceived between northerners and southerners. The differences in the soil and water of the two regions produced foods of such different qualities—salubrious in the north and deleterious in the south—which the stomachs and intestines of those who lived in each region differed. Eating southern cuisine, Kangxi warned, could literally result in a

softened and weakened northern body:

I have been on southern tours several times and have seen that the water and soil is very soft in the region south of the great river. The people are also weak. All of the food and drink that I saw was fresh, strange, and different; none of it had restorative or beneficial qualities for the people. . . Nowadays, there are northerners whose opinion it is to follow the example of the south in food and drink, but this absolutely must be avoided. Not only does the water and soil differ in each place, but also the intestines and stomach of the people differ. How could there be any benefits from endeavoring to imitate them and gradually bring on a softening and weakening of the body?⁵²

This quotation from one of Kangxi's alleged lectures to his sons casts a ray of light on the issue of the ways Chinese, and their Manchu rulers, understand human variation within the boundaries of the empire before the translation into Chinese began in the beginning of the twentieth century of European conceptions of human evolution and racial biology. This short lecture by Kangxi teaches several lessons on the topic: the most significant environmental divide is north and south of the Yangzi river; northern is superior to

southern; environment directly correlates with human corporeality; food and drink are the means by which diverse body types are formed; northern cuisine produces strong and robust physiques; southern cuisine nourishes comparatively weaker ones; and, perhaps most importantly, crossing the alimentary-geographical boundary from north to south causes injurious bodily transformations.

A Chinese Physician Reflects on Western Anatomy, 1834

This idea of corporeal difference across regions also extended to Chinese-Western divergences in anatomy in the writings over a century later of the Chinese physician Yu Zhengxie (1775-1840). In his *Classified Manuscripts Compiled in the Guisi Year* (Guisi leigao, 1833), Yu included an 1815 essay that commented directly on Bi Gongchen's expansions of Johann Terrenz Schreck's *Illustrations of the Human Body*.⁵³

This Chinese-language treatise on Western anatomy was by then more accessible to a Chinese physician than the several copies of the *Manchu Anatomy*, most of which ended up in European libraries and was never translated into Chinese. Yu contrasted what he perceived to be anatomical differences between Chinese and Western bodies:

The Chinese lungs have six leaves, while Westerners have only four; the Chinese livers have seven lobes, while theirs have three; the Chinese have two intestines, while they have six; the Chinese have their livers to the left of their hearts... whereas Westerners have theirs the other way around.⁵⁴

Yu also deployed these perceived Chinese-Western anatomical differences to argue that the proselytizing of Western missionaries was ultimately futile because those with different organs and vessels had correspondingly different religions:

How regretful it is that human beings' inner organs and vessels are so hard to tell from the outside! People with different organ systems believe in different religions. The Westerners are keen to preach their religion here, hoping that the Chinese will adopt it, but hardly do they know that the Chinese have a different set of organs and vessels. Those Chinese who are able to follow their religion must be the ones whose organs are incomplete. What purpose does it serve to their religion even if they managed to collect a few hundred or thousand people like that? If the Westerners realized this, they would probably be regretting already and just pack up and head home!⁵⁵

The Jesuit intention of presenting Western

anatomy as a universal anatomy manifesting the divine order of the Christian God had failed earlier to convince their primary target Kangxi.

Postscript

The three periods of Jesuits translations into Manchu of medicine, namely 1685–1688 on snakestones, 1688–1693 on medicinals including especially 'Jesuits' bark', and 1710–1722 on anatomy, reveal how the Jesuits played to Kangxi's preference for the Manchu language and what in European medicine they thought would both interest him and convey to him their view of medical aspects of their Lord's creation. Although the Jesuit translation of *Elémens de géométrie* into Manchu from 1670-1674 was translated into Chinese and then published in the 1723

mathematics encyclopedia *Shuli jingyun*,⁵⁶ the Jesuits' Manchu medical manuscripts however were neither translated into Chinese nor published for wider

distribution. Verbiest completed a Chinese and Manchu version of the Lapis serpentinus, but neither was ever published. There are also no known Chinese versions of the Manchu treatises on “Western Medicinals” (Si yang-ni okto bithe), the Manchu Anatomy (Ge ti ciowan lu bithe), or the appended “Explanations of Issues Asked” (Baicara ba be tucibume gisurehenge).

Endnotes

1. Jonathan Spence, *Ts'ao Yin and the Kang-hsi Emperor: Bondservant and Master* (New Haven: Yale University Press, [1966] 1988): for ginseng and Manchus, pp. 255-56, for canary wine, pg. 120 fn 161, pg. 255, fn 2. For range of other Jesuit medicines in Kangxi court, see ch. “Growing Old,” in Jonathan Spence, *Emperor of China: Self-Portrait of K'ang-hsi* (New York: Vintage Books, [1974] 1988): 91-112. By contrast to Spence's groundbreaking work, the classic on the Jesuit mission in China by Arnold H. Rowbotham, *Missionary and Mandarin: The Jesuits at the Court of China* (Berkeley: University of California Press, 1942) does not discuss medicine.
2. U. Libbrecht, “Introduction of the Lapis Serpentinus into China,” *Orientalia Lovaniensia Periodica* 18 (1987): 212.
3. For debate among Jesuits about appropriateness of Jesuits making cannons for the Chinese military first in the Ming with Adam von Schall and then in the Qing with Verbiest, see Jean-Pierre Duteil, *Le Mandat du Ciel: Le Rôle des Jésuites en Chine* (Paris: Editions Arguments, 1994): 229-32.
4. For general introduction to this title, see Nicolas Standaert, ed., *Handbook of Christianity in China Volume One: 635-1800* (Leiden: Brill, 2001): 789-90. Manuscript listed in Marta Hanson, “Manchu Medical Manuscripts and Blockprints: An Essay and Bibliographic Survey,” *Saksaha: A Review of Manchu Studies* 8 (2003). 1-32, #19. For the best overview on Jesuits and medicine in China, which also includes a bibliography, see Standaert (2001): 786-802.
5. Libbrecht (1987): 213.
6. There is an entry as well as an illustration of shihuang (yellow of the snake) in Li Shizhen, *Bencao gangmu* (Huaxia chubanshe, 1998): vol. 1, 118, 437.
7. Libbrecht (1987): 218-19.
8. I follow the translation in Libbrecht (1987): 212.
9. Summarized from translation on “The usage of the venom-attracting stone” in Libbrecht (1987): 212.
10. Libbrecht (1987): 227-28. Another meaning for snakestones today is a type of fossil in the shape of small snakes called Ammonites. See the articles that cover range of meaning of ‘snakestones’ in *Folklore*, Walter W. Skeat, “‘Snakestone’ and Stone Thunderbolts as Subjects of Systematic Investigation,” *Folklore* 23.1 (Mar. 1912): 45-80; W.R. Halliday, “Snakestones,” *Folklore* 32.4 (Dec. 1921): 262-71; and Prys Morgan, “A Welsh Snakestone, Its Tradition and Folklore,” *Folklore* 94.2 (1983): 184-91.
11. Baldwin (1995): 396.
12. Ronan and Oh, *East Meets West* (1988): 216, 219.
13. See Figure 2 in Baldwin (1995): 398-99.
14. Waley-Cohen (1999): 71.
15. Baldwin (1995): 396; Libbrecht (1987): 217.
16. Baldwin (1995): 398-99. She quoted this passage from Kircher, *China illustrata*, trans. Charles Van Tul (Muskogee, Okla.: Indiana University Press, 1987), pp. 80.
17. Baldwin (1995): 400. According to Baldwin, the second book, *Magneticum naturae regnum sive disceptatio physiologia* (Rome, 1667), published an even fuller entry on snakestones that included Carlo Magnini's independent attempt to replicate on a human Kircher's experiment on a dog.
18. Baldwin (1995): 400 and fn. 12.
19. Quoted from translation in Libbrecht (1987): 211.
20. Nathan Sivin, “Copernicus in China,” *Science in Ancient China, Collected Studies Series* (Variorum, 1995): 1
21. Baldwin (1995): 401.
22. Baldwin (1995): 409-10.
23. For extensive discussion of this story from a folklore perspective, see George Urdang, “The Legend of Cinchona,” *The Scientific Monthly* 61.1 (Jul. 1945): 17-20. Also summarized in Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (2004): 214, 217.
24. The original Latin title “Anastasius cortices peruviae, seu chinae chinae defensio” directly associates this “Peruvian Bark” to the same Jesuit Anastasius Kircher of “snakestone” fame. This may also be the

locus classicus of the Jesuits' Bark appellation thereafter.

25. For the 1664 and 1669 calendar cases, see two detailed studies of the political, scientific, and divinatory aspects of them: Huang Yi-long, "Court Divination and Christianity in the K'ang-hsi Era," *Chinese Science* 10 (1991): 1-20; and especially, Chu Pingyi, "Scientific Dispute in the Imperial Court: The 1664 Calendar Case," *Chinese Science* 14 (1997): 7-34.
26. Ronan and Oh, *East Meets West* (1988): 72-73, 75.
27. See the Chinese documents for the case in "Nuejifu Jinji'na shuang (guining) zhiliao" (Treatment for an illness of intermittent fever using Cinchona powder (quinine)), Chen Keji (1990): 29-30.
28. For summary of Bouvet's account, see Saunders and Lee (1981): 1-4. Also Teutlein (1941): 443. See also Jonathan Spence, *Ts'ao Yin and the K'ang-hsi Emperor: Bondservant and Master* (New Haven: Yale University Press, 1988 [1966]): 260-61.
29. The Chinese title for this text is *Xiyang yaoshu* (Treatise on Western Medicinals). The manuscript is preserved at the Gugong library in Beijing. See Hanson, "Manchu Medical Manuscripts," *Bibliography* #17.
30. See short introduction in Chinese to this text, by Li Huan, "Qing gong jiuwang manwen 'Xiyang yaoshu'" *Zijin cheng* (1999): 4.
31. *Ibid.*, 4.
32. See Spence, *Ts'ao Yin and the Kang-hsi emperor* (1988): 261. This incident may well have occurred when Kangxi stayed in Zhang Yunyi's compound during his fifth Southern Tour of 1705. See Hummel, v. 2, (1991 [1944]): 788.
33. See entry on Cao Yin in Hummel, v. 2 (1991 [1944]): 740-42.
34. See mention of Li Xu in Hummel, v. 2 (1991 [1944]): 731-32.
35. Spence, *Ts'ao Yin and the Kang-hsi emperor* (1988): 261.
36. Translation from Spence, *Ts'ao Yin and the Kang-hsi Emperor* (1988): 260.
37. From Shuyi section of *Qingchao yeshi daguan*, cited in Ma Boying. *Zhongguo yixue wenhua shi* (1994): 499. Note that instead of using the standard Chinese translation *Jinji'na*, the author wrote *Jinjiqin*, for *Quinquina*.
38. Lydia H. Liu, *Tokens of Exchange: The problem of translation in global circulations* (Durham, NC: Duke University Press, 1999).
39. See Nicolas Standaert, "A Chinese Translation of Ambroise Paré's Anatomy," *Sino-Western Cultural Relations Journal* 21 (1999): 9-33. Standaert argues that Schreck based his translation on the anatomical writings of the French barber-surgeon Ambroise Paré (ca. 1520-1590).
40. See Bi Gongchen in Hummel (1991 [1944]): 621-22. On the role of Bi Gongchen (and how the brain and medulla were represented) in Schreck's Chinese translation of Western anatomy, see Hugh Shapiro, "How Different are Western and Chinese Medicine? The Case of Nerves," Helaine Selin, ed, *Medicine Across Cultures: History and Practice of Medicine in Non-Western Cultures* (Dordrecht and Boston: Kluwer Academic Publishers): 356-59.
41. Standaert, "A Chinese Translation of Ambroise Paré's Anatomy," *SWCRJ* 21 (1999): 11.
42. See section on "Medicine," Nicolas Standaert, ed., *Handbook of Christianity in China Volume One: 635-1800* (Leiden: Brill, 2001): 787-90.
43. This has been reprinted in several facsimile editions, most recently by John Saunders and Francis Lee, eds., *The Manchu Anatomy and its Historical Origins* (Li Ming Cultural Enterprise, Taiwan, 1981). See Hanson, "Manchu Medical Manuscripts," *Bibliography* #16-4.
44. See especially, Hartmut Walravens, "Medical knowledge of the Manchu Anatomy," *Études mongoles et sibériennes*, 27 (1996): 359-74. For most accessible facsimile, see Saunders and Lee, ed., (1981). For broader context of Jesuit translations on anatomy, physiology, and medicine related to this text, see Standaert, ed. (2001): 788-89. For list of 9 locations of different editions or facsimiles of the *Manchu Anatomy*, see Hanson, "Manchu Medical Manuscripts," *Bibliography* , #16-1 through #16-9.
45. See Saunders and Lee, *The Manchu Anatomy* (1981): 5. Also entries on this text in H. Walravens "Medical knowledge of the Manchus and the Manchu Anatomy." *Études mongoles et sibériennes*, cahier 27 (1996): 359-74.
46. According to T.A. Pang, "Manchu Collections in Paris," *Manuscripta Orientalia: International Journal for Oriental Manuscript Research* 3.1 (March 1997): 33-39, Kangxi is said to have checked and corrected

Verbiest's Manchu manuscript every tenth day. Hanson, "Manchu Medical Manuscripts," Bibliography #17.

47. Summary of argument in Standaert (1999): 28.

48. See Daniel Asen, "Corporeal Materiality and Visual Knowledge: Images of the Body in Manchu Anatomy," paper presented at the symposium on "Medicine and Culture: Chinese-Western Medical Exchange from the Late Imperial to Modern Periods," Ricci Institute for Chinese-Western Cultural History, University of San Francisco, March 8, 2007.

49. For suggestion of use of Chinese dress as another visual tactic to spread the gospel see examples of illustrations that seem to represent Chinese or Manchu bodies through Chinese dress (images 9-14) in Daniel Asen "Corporeal Materiality and Visual Knowledge: Images of the Body in Manchu Anatomy," (2007): 24-25.

50. See ch. on "Surgery and Gynecology in the Nineteenth Century," in Erwin H. Ackerknecht, *A Short History of Medicine*, Revised Edition (Baltimore: The Johns Hopkins University Press, 1982): 186-92.

51. My translation from Tingxun geyan (Kangxi's lectures to his sons, 1730): 9b

52. My translation from Tingxun geyan (Kangxi's lectures to his sons, 1730): 62b-63a. Summary of same passage differs in Spence, *Emperor of China: Self-Portrait of K'ang-hsi* (1988 [1974]): 98. "The people of the North are strong; they must not copy the fancy diets of the southerners, who are physically frail, live in a different environment, and have different stomachs and bowels. So when I first saw how ill Wang Zhi seemed to be looking—thin and white-haired—I recommended to him the simple foods that I take regularly—among them unrefined milk, pickled deer tongues and tails, dried apples, and cream cheese cakes."

53. This point is also mentioned in the Bi Gongchen entry in Hummel (1991 [1944]): 622. Yu Zhengxie's essay was titled "Postscript to the Illustrated Explanation of the Human Body" (Renshen tushuo hou). See also Standaert (2001): 792-93.

54. See Qiong Zhang, "Hybridity and Fluidity: the Conception of Xin in Wang Honghan's Origin of Medicine, 1692," paper presented at the symposium on "Medicine and Culture: Chinese-Western Medical Exchange from the Late Imperial to Modern Periods," Ricci Institute for Chinese-Western Cultural History, University of San Francisco, March 8, 2007.

55. See Qiong Zhang, "Hybridity and Fluidity: the Conception of Xin in Wang Honghan's Origin of Medicine, 1692."

56. On Jesuit translations of European mathematics into Chinese and Manchu, see Catherine Jami, "European Science in China' or 'Western Learning'? Representations of Cross-Cultural Transmission, 1600-1800," *Science in Context* 12.3 (1999): 413-34. Catherine Jami and Han Qi, "The Reconstruction of Imperial Mathematics in China during the Kangxi Reign (1662-1722)," *Early Science and Medicine* 8.2 (2003): 88-109.

Medicine and Culture: Chinese-Western Medical Exchange (1644-ca.1950) [Symposium Summation]

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The papers at this conference look at the role of Western missionaries and scientists in the history of medicine in China. This is a very appropriate subject for the Ricci Institute—fitting because it starts with 16th and 17th century Catholics who sought to evangelize China, beginning with Matteo Ricci, and they, after all, were the first serious knowledge travelers to China from Europe. There has been a long history of talking about them—a history that I think this conference shows is changing. One old Western stereotype, of course, was that these were heroes of Christian religious truth as well as of science and modernity battling against traditional Chinese backwardness and superstition. From the other side came the critical view that these were Orientalists, tools of Western imperialism and hegemony who were forcing their categories on a resistant if somewhat beleaguered and helpless Chinese people. We're not talking about either of these stories anymore and at some very fundamental level that is really good news.

The young scholars you have listened to today

are people whose training reflects what has been

happening since the late 1970s in the history of China, science studies, social history, and the history of

medicine. All of these perspectives are shifting in ways that I think are enormously creative and exciting. For example, we are talking here about cultural exchange in terms of 'contact zones', which focus on how the interpretations of the various parties to a cultural exchange—through their speech, text, visuals, social interactions—are powerfully shaped by what each party brings to that exchange.

The papers in this conference have ranged from the 17th century to the mid-20th, and show how recent scholarship has historicized medicine and its relationship between China and the so-called 'West'. We see a moving target. We have been in the 17th century to look at the European tension between Galenic humoral notions of the body and anatomical physiological views. We have queried concepts of the body-mind relationship and have asked whether dualistic views were articulated in both Chinese and European versions of what passed as science in the 17th c. We have been to the early 19th century to see what were the conditions of missionary medical practice in the 1830s and 1840s. We have been exposed to mid 19th century aesthetic and ethical beliefs shaping Western medical doctrines. Then, although we did not deal with this very directly, we were made aware of the early 20th century triumphalism of germ theory and its reductionistic concepts of disease and contagion. In all these ways we have looked at the history of medicine as moving through time, profoundly shaped by shifting intellectual and political assumptions about what the best knowledge and practice is supposed to be.

As a specialist on Chinese medicine, I also think that this conference begins to take into account the extraordinary adaptability of Chinese medicine as it has survived and reinvented itself over the course of the 20th century. It has both resisted and made

adjustments to biomedical hegemony so that today it

is a fast growing complementary/alternative medicine. All of these papers contribute to this emerging story, and all of them bear witness to the fact that medicine is a uniquely hybrid and malleable sort of science

and social practice. The cultural habits, the social expectations, the political priorities, the power relations and the economic resources available in a given time and place all shape what individuals in societies expect both as individuals and on the institutional level.

However we understand the progress of medicine as a science, these papers show that all therapeutic practice is local. We heard from Bridie Andrews Minehan about how the most successful 19th and 20th century missionary clinics inside China were the ones that accommodated everything from the food preferences to family dynamics to the spatial living relationships that people in China were comfortable with. Gender relations, understandings of drug action—all of these things had to be negotiated locally. We heard the same sorts of things from Hugh Shapiro as he told us about the confusions and struggles that in the 1930s surrounded the relationship between

biomedical, psychiatrically trained doctors who thought in terms of physiological psychology, and the cultural performances of insanity among inmates in the Beijing asylum. Similarly Michelle Renshaw suggests to us how conditions of local practice in Peter Parker's clinic in the 1830s improved survival rates, making for a surgical success story exceeding that found for similar operations performed in the United States in the same years.

I want now to go back in time and pick up a couple of particular themes illustrating the problematics of 'contact zones', using anatomy as an example. Why is it that in the 16th-18th centuries Western medicine was less transportable than the astronomical, calendrical, mathematical, and map making technologies that were brought by the Christian missionaries to the imperial court? I think Qiong Zhang's excellent paper shows similarities between morphological concepts of the body found in Chinese and in Western medicine. She tells us that Chinese doctors did care about wu zang [visceral systems of heart, lung, spleen-stomach, liver and kidney] seen as structures whose functions were not simply aspects of movements of qi. But she pointed out that Chinese doctors looking at Western accounts of the physiology of the heart were most focused on finding a morphological site for the more spiritual functions of consciousness and conscience. What was important about the heart's structure was the spaces it enclosed. This then can be compared to the agendas of the Jesuit anatomists who wanted their anatomy to reveal what they thought was self-evident—the intricate structure that is the sign of a divine and heavenly creator.

Daniel Asen actually provided us with a very

interesting perspective on why this 17th century anatomical exchange was a failure but I am going to phrase his analysis in a slightly different way. The issue here is why are we in the West, including this audience here today, so fixated on anatomy? What makes us think that anatomy has been the key to

biology's natural philosophy and to clinical understanding? If you look at the actual issues, I am not sure that you can show the clinical relevance of the anatomy taught by early Western missionaries and doctors. The lessons of anatomy that we took away from those 18th century pictures compiled for the imperial Manchu Anatomy, and from Larissa Heinrich's 19th and early 20th c. pictures were not particularly clinically relevant in teaching practitioners how to do their jobs. Here I think her points about visuality are central—

visual images create a kind of imagination of the body that then has a truth effect for us. Anatomy drawings are highly abstract, highly formal, and as Daniel Asen says, they involve pictorial conventions that must be learned. But anatomy has provided Western doctors with a visual vocabulary that claims mastery of the world of nature entitling them to mess around with our most desperate bodily problems. Chinese Confucian physicians as well as Western Renaissance physicians understood the cosmological power of their visual representations of the body, shown in charts of bodily meridians and acupuncture points

as well as Vesalian torsos. I think that today when doing the history of anatomy we still have to guard against the classic modernist assumption that we are seeing a clinically transparent representation of what science teaches us about the body.

Finally, let me talk about colonialism, nationalism, and public health. The papers' focus on missionary medical reformers highlights the stresses of colonialism and nationalism that combined with the importation of biomedicine into China in the late 19th and 20th c. to create a 'contact zone' complicated by sharply unequal power relations. I think our best insight into this was in Larissa Heinrich's discussion of visuality. She deals with a moment in cultural history when realism as a mode of visual communication became dominant, reinforced by the spread of photography, until this visual mode came to be associated with the truth effects of Western power. Her portraits of Peter Parker's medical patients created by Lam Qua, her Chinese paintings of victims of smallpox and the later missionary photos of 'the sick man of Asia' all show us how this kind of visuality is profoundly political. It represents a race of colonial subjects as backward peoples and as she points out, such images in this type of setting are dangerous.

Also connected to the history of 19th century colonialism and 20th century nationalism in China is the final topic addressed by our panelists, the

emergence of public health as a domain of medical modernity. For most of medical history before and even during the 19th century, if disease was not an inevitable aspect of human suffering, then health was the responsibility of the individual. Premodern

clinicians and experts talked about prevention, or else about prediction, and advised people how to be responsible for their own health and well being. Medicine was individual centered for both patient and doctor. What is radically new, particularly in the mid to late 19th century is public health—a legacy of the Enlightenment and the deployment of science in the service of public policy. In public health, biomedical knowledge was wedded to state power and politics with the goal of the collective protection of society. Among the crises that stimulated this kind of systems approach to medicine were the epidemics of the 19th century, spread and publicized through the globalizing reach of modern colonial and international relations. Accordingly both colonial and nationalist ideologies encouraged power holders to seek legitimacy by organizing collective health policies as state mandates.

Many of our papers touched upon such public health matters. It is particularly interesting that they bore fruit in China not long after Europeans installed municipal water and sewage treatment plants in both home and colonial cities, and sponsored vast

vaccination and pest eradication campaigns

legitimized by germ theory. Here, I will end then by alluding to the papers which shift the focus to public health. David Luesink's translation project may not have been state directed but assisted a public health strategy of standardization. Looking at the 1930s, Tina Johnson discusses the reform of midwifery sponsored by Peking Union Medical Hospital, and Cristina Zaccarini shows how missionary clinics in rural areas cooperated with the state. Though neither said so, both authors are talking about projects that were expanded and developed by the Communists later as part of state socialism. By implication they point to the decline of medicine as a missionary enterprise in China, as more secular forms of medical modernity developed.

Regardless of our evaluation of this political socialization of medicine, I think that we China

historians have paid too much attention to personal, private, clinically oriented medicine and not enough attention to the enormous power of public health regimes to be instruments and legitimizers of the state, coercive and liberating at the same time in a very complicated way. Here it is ironical that traditional Chinese medicine thrives and adapts today because it keeps personal responsibility for health at the center of its practice, and as it critiques the scientific understanding of the body as narrowly physical and material. We value it for this, scarcely aware of how it echoes an older missionary ethos. But it is also for this reason that today we call Chinese medicine 'alternative'.

Chapter 35. Stability of Ricci Flow 1. Linear stability of Ricci ow 2. Analytic semigroups and maximal regularity theory 3. Dynamic stability results obtained using linearization 4. Dynamic stability results obtained by other methods. 129 132. 133 133 145 154 159 169. 171 171 178 185 192 193 194. 197 197 200 203 207 210 211. 213 214 219 226 237 254. 257 257 260. USF, Department of Psychology (Since 2000). Ph.D. Awarded, 2000 Jordan Litman. (Cognitive/Neural Sciences). Ph.D. Awarded, 2002 Deadrick Newsome (I/O Psychology).Â Mentorship to Young Investigators NIH Centers of Biomedical Research Excellence (COBRE) Mentor to Tania Roth, Ph.D. â€“ University of Delaware NIMH Predoctoral Fellowship to Dave McQueen - University of South Florida. Book Editor â€œThe Stressed Synapse: Synaptic Stress and Pathogenesis of Neuropsychiatric Disordersâ€, Expected Publication date: 2015 Edited by D.M. Diamond, G. Sanacora and M. Popoli. Ph.D. dissertations at the University of Michigan in Ann Arbor are awarded by the Rackham School of Graduate Studies. Recent Deposits. A campus-wide health communications campaign for COVID-19 ĩ»ĭ. Spitzley, Stephanie (2020-07). (1.2Mb). A Qualitative Case Study: Homeless Parents' Perceptions of School-Related Supplemental Services (McKinney-Vento) For Their School-Aged Children ĩ»ĭ. Heyward, Roberta Martin (2020).