Wang Qingren and the History of Chinese Anatomy

B.J. ANDREWS

Chinese medical doctors and historians have regarded Wang Qingren as a hero of Chinese medicine for almost a century now. His famous book, *Correcting the Errors of Medicine* was first published in 1831 and had been republished forty times by the time the Communist Party took power in China in 1949 - making it more popular than any other medical book over the same period.[1] In 1914 the famous Chinese reformer Liang Qichao praised Wang's 'revolutionary courage' and 'scientific spirit'.[2] As a reformer, Liang was interested in promoting the spread of modern scientific knowledge; Wang Qingren appealed to him as a Chinese role model. In fact, however, Wang never learned modern science; his book *Correcting the Errors of Medicine* describes human anatomy and physiology in terms unrecognisable to modern medicine. What the book *does* do is discredit the canons of traditional medicine (*The Inner Canon of the Yellow Emperor, The Canon of Difficult Issues)* on account of their inconsistent and self-contradictory descriptions of human anatomy. Wang claimed to base his conclusions on observations of real human organs. This is oe of the few extant records of such anatomical observations in China since AD 16, when Wang Mang had the dimensions of the organs of an executed criminal recorded for posterity.[3] Because Confucius' doctrines became official dogma during the later Han Dynasty (AD 25 - 220), mutilation of the body, even when dead, was regarded as unfilial behaviour and humiliating for the family and ancestors of the person concerned.

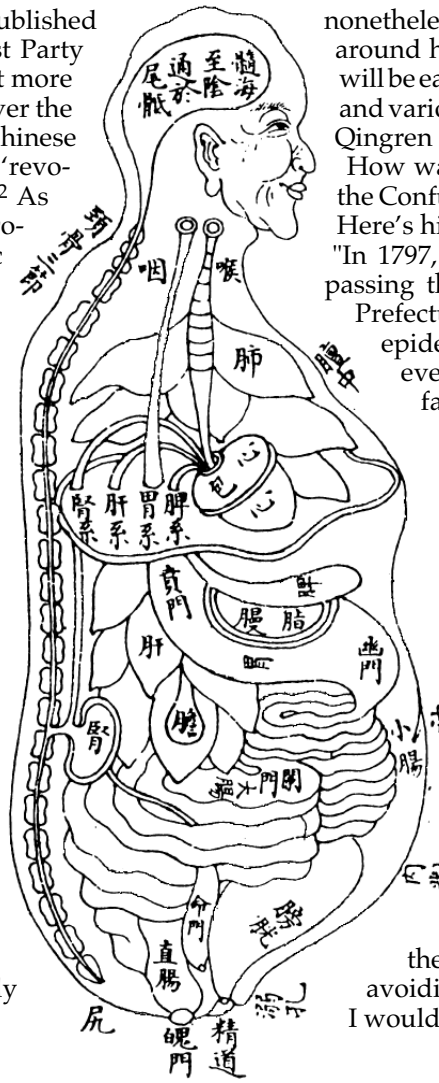

Fig. 1. The internal organs of classical Chinese medicine. From the *Lei Jing* by Zhang Jiebin, published in 1624, and based on the *Inner Canon of the Yellow Emperor.*

History, politics and *Correcting the Errors of Medicine*

In the modern age, with the tensions in China between traditional culture and the pressure for modernisation, Wang Qingren has been alternatively praised for his naturally scientific spirit and unique skepticism about traditional views, and blamed for his lack of scientific accuracy and his disrespect for Chinese cultural heritage. In this article I aim to sketch the medical and scholarly context of Wang's life and times. In this way, I hope to be able to show how his undoubted originality and creativity were nonetheless related to other events occurring around him at the time. Having done this, it will be easy to see the motives behind the many and various rhetorical interpretations of Wang Qingren and his work.

How was Wang Qingren able to get around the Confucian prohibition of body mutilation? Here's his account of how he did it:

"In 1797, when I was 29 years old ... I was passing through the town of Daodi in Luan Prefecture (modern Hebei). At the time an epidemic ... was killing eight or nine out of every ten of the children there. Poor families mostly used mats with which to bury the dead, the mats taking the place of coffins. The local custom was to bury the dead shallowly, so that dogs would eat them. The belief was that this would promote the live birth of the next child (of the same parents). Because of this, every day in each charity graveyard there would be a hundred or so children with their abdomens torn, exposing their entrails. Every day I would urge on my horse when passing such places, at first always covering my nose. However, later I reflected that the reason the ancients had erroneously described the organs was because they had never seen them with their own eyes, so instead of avoiding the pollution, every morning early I would go to a charity graveyard and examine in detail the children with exposed organs".

This examination of actual bodies is the 'scientific spirit' to which Liang Qichao referred, although Wang carefully avoided any mention of knives and dissection. Wang's 'revolutionary courage' is evident in the way he attacked the medical establishment of the time. He wrote:

"Among medical authors, there has never been even

one who was completely correct. This is because our forefathers in their medical writings were mistaken about the internal organs. ... If I were to write a medical work without understanding the internal organs, how could it be better than the ravings of an idiot? To treat sickness without understanding the internal organs is no better than a blind man groping in the dark!" [4]

Wang then went on to compare traditional depictions of the internal organs with his own findings. As figures 2 and 3 show, Wang corrects the idea that the lungs and the liver are divided into lobes, decides against the existence of a 'triple burner' or a 'gate of life', describes the pancreas, the "qi reservoir" (which he thinks of as the abdominal mesentery), and the position of the diaphragm. He then gives a careful description of the branches of the main blood vessels, which he calls "pipes", thus insisting on their physical existence. In Wang's physiology, there is no place for invisible 'tracts', 'channels' or organ interactions based on five-phase cosmology. As Nathan Sivin has indicated, Wang was perhaps the first Chinese to regard the organs as purely physical entities.[5]

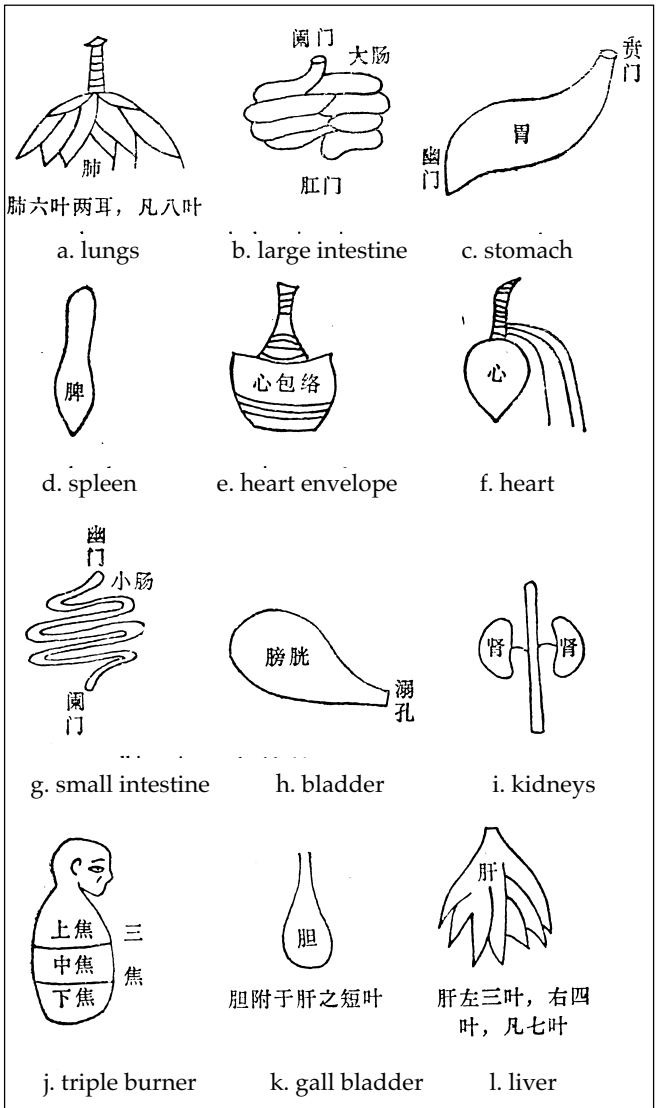

Fig. 2. The internal organs of classical Chinese medicine as depicted in chapter 2 of Wang Qingren's *Correcting the Errors of Medicine.*

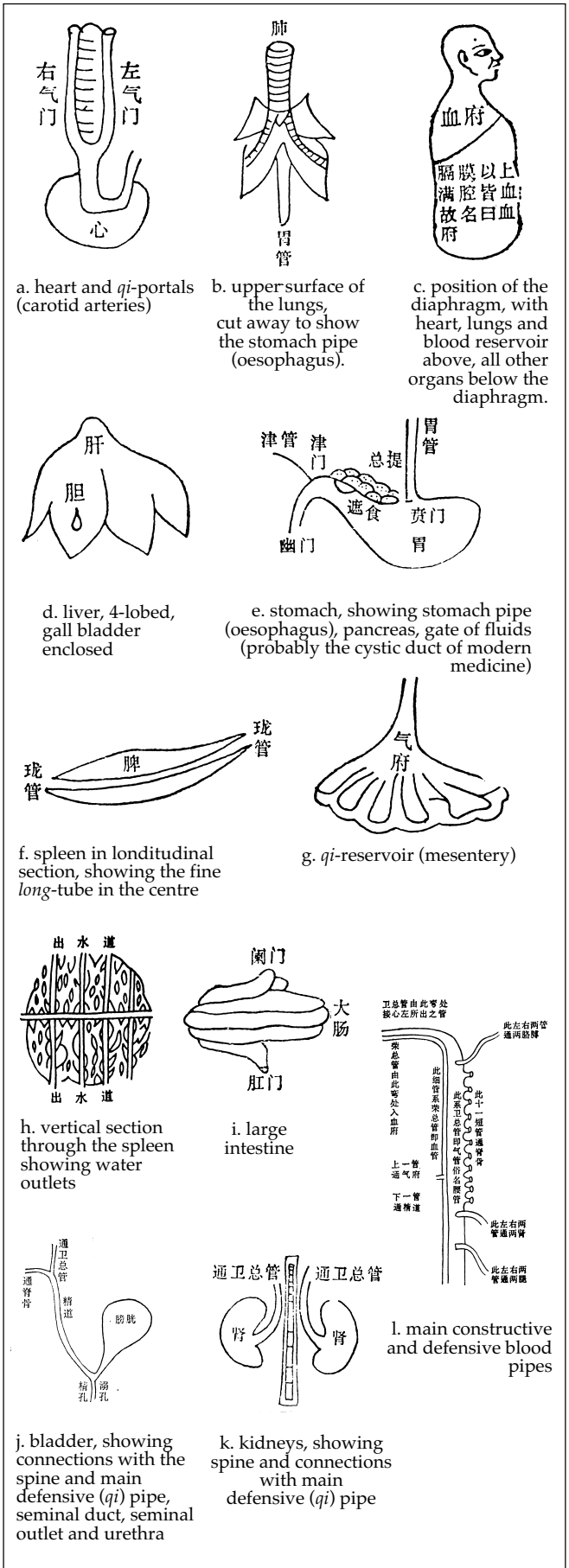

Fig. 3. The internal organs as described by Wang Qingren, based on his own observations.

However, by the standards of modern medicine, his diagrams are still woefully inadequate. He fails to connect the kidneys with the bladder, for example, and decides that urine 'seeps into the bladder'. The diagram of the kidneys appears to be upside-down: Wang's annotations clearly indicate that this was not just a printer's error. The drawing of the heart is, if anything, even less detailed than the traditional version, and Wang never provides his reader with a diagram of the whole contents of the trunk such as the one in figure 1.

Many people suggest that Wang Qingren was motivated to take a fresh look at actual human organs through contact with western medicine. The arguments for this lack hard evidence, however. More to the point, anyone who has looked at western anatomical diagrams will agree at once that Wang's drawing style is much more in keeping with his own, Chinese, tradition. However, his conclusions concerning human anatomy and physiology are very different from both the Chinese and Western traditions.

Why then is Wang Qingren so important in the history of Chinese medicine? It is no exaggeration to say that even today, at least one article a year is published about him in Chinese medical journals. I believe it is important to look at Wang's book both in the context of the academic and medical environment of the time, and also in the context of the subsequent arguments in China about the relative values of traditional Chinese and modern western medicine. As we know, these arguments still continue today.

Biographical details

Wang Qingren was born in 1768 and died in 1831, a year after first publishing his book *Correcting the Errors of Medicine.* He was an upper class Chinese. This is evident from the fact that after passing the first degree military examinations as a young man, he was able to buy himself the military rank of cavalry lieutenant.[6] (The sale of official posts was common government practice for raising revenue). Wang also writes about a high-ranking patient whom he is called to treat, which indicates that he moved in relatively high circles. His interest in medical literature is evident from the large number of references in his introduction (chapter 1). He refers to a selection of Chinese medical works from the Han period (206 BC - 220 AD) up to the late Ming (1368 - 1644 AD) to illustrate the widespread confusion concerning the physical nature of the internal organs. His introduction also shows that he first became interested in ancient medical texts at the age of about twenty, or in the mid-1790s.

Scholarly environment: the evidential research movement

At that time the radical 'evidential research' movement was at its height amongst Chinese scholars. This movement had started with the application of philological analysis to the canons of orthodox Confucianism, with the result that several key passages were shown to be forgeries. Careful reconstruction of ancient pronounciation and analysis of ancient word definitions had allowed one evidential research scholar, Yan Ruoju, to discredit the Old Text chapters of the *Documents Classic* in this way. His work caused a major sensation when it was published posthumously in 1745.[7] Similarly, Dai Zhen (1724 - 1777) used his book *Evidential Analysis of the Meanings of Terms in the 'Mencius'* to criticize Neo-Confucian orthodoxy. Since the Confucian classics with Song Dynasty Neo-Confucian commentaries constituted the examination texts for the entire Chinese civil service system, bringing their authenticity into question challenged the precepts upon which Chinese state authority was based. Chinese intellectuals became divided into those who still regarded the classics as virtually infallible sources of moral and political authority, and those who regarded them as historical documents to be analyzed and discussed.

Partly as a result of these critical studies of the classics, Chinese cosmology came into some disrepute. By 'Chinese cosmology' I mean the traditional organisation of the world into categories which corresponded to the five phases or to the six kinds of *qi* or another of the several alternative numerological systems of correspondence. John Henderson has written:

"Late-Ming and early Qing [Dynasty] cosmological critics condemned systems of correspondence based on the five phases for their 1. unclassical provenance, 2. numerological dissarray and 3. lack of accord with physical reality".[8]

The *Inner Canon of the Yellow Emperor* is one of the earliest texts to describe five-phase cosmology, and the first text to apply it as a system of correspondence to the organs of the body. Wang's contempt for the *Inner Canon*'s organ descriptions may therefore be seen as taking previous cosmological criticisms just one dramatic stage further.

Medical environment: the warmth factor school

At approximately the same time (17th - 18th century) a new trend in medical thinking was emerging; the warmth factor school. This trend took Wu Youxing's book *A Treatise on Warm-factor Epidemics* (1642) as its starting point. Wu Youxing thought that the traditional explanations of the sources of disease (cold damage, seasonal *qi* etc) were inadequate to explain major epidemics, and he therefore formulated the new concept of 'deviant *qi*' which he thought of as being specific to a particular time and place and entering the body through the nose and mouth. As a result, large numbers of people would fall ill at the same time. This idea has often been called the recognition of the infectious nature of epidemic diseases and praised by historians as one of the achievements of Chinese 'proto-science'. Wu Youxing also revived the slogan "Old remedies are inappropriate to modern ailments" which gave him an excuse to create new prescriptions. In fact, his 'new' prescriptions were squarely based on those from the famous Treatise on Cold Damage D*isorders* by Zhang Ji (usually known by his courtesy name, Zhang Zhongjing), who wrote in the 2nd century AD. Wu's main therapeutic innovation seems to have been to manipulate the relative quantities of the individual drugs in order to produce more dramatic effects.[9]

Wang Qingren admired both Wu Youxing and Zhang Ji. In the introduction to Wang's chapters on partial paralysis, he praises both men for writing books "without citing a single sentence from the ancient canons". Wu Youxing's T*reatise* is also one of only two works which Wang praises unconditionally: "its principles are adequate and its prescriptions effective." (The other was a state-sponsored medical compendium, *The Golden Mir-*

ror of Medicine, published in 1742. The chief editor of this project, Wu Jian, was also sympathetic towards the warmth factor school.) Wang's support for the principles of the warmth factor school therefore further enhanced his status with later generations as a Chinese 'proto-scientist'.

When Wang finished writing his book *Correcting the Errors of Medicine* in 1830, a healthy skepticism towards the authority of both the Confucian and medical canons of antiquity was already well-established. Wang was evidently influenced by both the warmth factor school and the evidential research movement, although his new prescriptions do not concern themselves specifically with warmth factor disorders, and his criticisms of the classics went a lot further than issues of dating and authenticity.

Wang's new anatomy and physiology

If we decide to believe Wang's story of how he managed to examine human internal organs, and bear in mind that he subsequently carried out experimental dissections on sheep and pigs, the following question arises: Why didn't Wang describe the body in terms more similar to western anatomy? Again, the answer must be found in his education and environment. Most modern students of western anatomy will agree that it is an acquired skill to see the details of an anatomical diagram in a dissected corpse, and that it is even more difficult to be able to create the same type of diagram with only the corpse for guidance. But western students of anatomy come fully equipped with their knowledge of the circulation of the blood and the relationship of the kidneys to the bladder, etc. Their anatomical diagrams naturally reflect that knowledge. In the same way, Wang Qingren brought with him his knowledge of classical Chinese physiology to inform his investigations. Let's have a look at some of the results.

It seems that the corpses Wang examined always had what we would call their arteries empty of blood. Wang had subsequently cut open sheep and pigs, and decided that the chest cavity above the diaphragm, which always seemed to him to be full of blood, was in fact an organ: the 'blood reservoir'. The reason the heart *seems* to hold blood, according to him, is that it is difficult to stop blood flowing from the blood reservoir and contaminating the heart. For Wang, the heart contains no blood because it is an organ which propels *qi;* breathing and the transmission of *qi* to the body do not need to involve the lungs at all. The carotid arteries of modern medicine are for him '*qi* portals' which open into the throat. On breathing in, *qi* enters these and passes into the heart, which transmits the *qi* on through the 'main defensive *qi* pipe' (the aorta) down to the abdominal cavity where it is stored in the folds of the '*qi* reservoir', or mesentery. This *qi* reservoir turns the *qi* of the inhaled air into physiologically active 'primordial *qi*' , which, for Wang, is responsible for the digestion of foodstuffs.

Now, according to the classical system, digestion replenishes the *qi* of the body. The qi produced from digested foodstuffs is of two complementary kinds: a pure, clear constructive (*ying*) *qi*, and a murky, defensive (*wei*) *qi*. Traditionally, both kinds of *qi* travel around the body, constructive *qi* in the vessels / channels, defensive *qi* travelling outside them.[10]

The classical system provides us with a key to Wang's interpretations. Although he is prepared to question every tenet of classical anatomy, Wang is still very much a traditional Chinese physician. Qi is as much an essential element of his physiology as is blood, and since his investigations have failed to reveal any tracts, channels, vessels or pipes which correspond to the acupuncturist's map of the body, his *qi* and blood will both have to travel in the only visible conduits available - the veins and arteries. Since Wang says he has never seen blood in arteries, these become '*qi* pipes' in his system. Blood is conducted through the veins to the muscles and organs. For Wang, it is *qi* rather than blood which flows through the heart, so blood is a stationary fluid which feeds into the veins from the 'blood reservoir' (chest cavity). Wang calls the main vein, our vena cava, the "main constructive pipe", so it seems that he has revised the traditional scenario to have both constructive and defensive *qi* travelling in real, physical pipes; the blood shares the constructive pipe with constructive *qi* and is invigorated by it.[11] By allowing only visible pipes to exist in his system, Wang hopes to have clarified the question of the nature of the vessels and channels in Chinese medicine. As we know, however, the nature of the acupuncture 'vessels' or 'tracts' was, and remains, a much-debated issue.

In "On the Brain", Wang says that intelligence and memory do not reside in the heart but in the brain. In this, again, he contradicts the medical classics, although the idea had previously appeared in several other medical works of the late Ming and early Qing, apparently as a result of contact with Jesuit missionaries in the 16th century.[12] Since the idea coincides with western medical theory, it added to Wang's reputation as a 'proto-scientist'. Wang's reasoning is his own, however:

> "*Qi* enters and leaves through the heart, and this being the case, how can the heart produce intelligence and store memory?"

The idea of the 'blood reservoir' in the upper chest cavity also helps explain Wang's therapeutics. In chapter 10, "Description of Symptoms Treated with 'Decoction for Dispelling Stasis in the Blood Reservoir", we learn that the bodies of the children Wang examined often had large blood clots in their chest cavities. Wang concluded that when the blood stagnates to such an extent that *qi* is unable to pass through it, the person suffocates to death. Now blood stasis is a standard pathological condition in Chinese medicine; there are plenty of prescriptions for treating it. Wang's innovation was to link it to *qi* depletion. He says:

> "Irrespective of whether [a disorder is of] external or internal origin, the parts which are damaged are blood and *qi*." And: "If primordial *qi* is deficient, then it will be unable to reach the blood pipes. If the blood pipes have no *qi* in them, then [blood] is bound to stagnate and coagulate".[13]

As a result of this scenario, all of the prescriptions Wang developed have as their aim the invigoration of blood, the dispelling of stasis and the replenishment of *qi.* It is precisely this aspect of Wang Qingren's original system which persisted, and which is now fully incorporated into standard 'traditional' medical practice.

The continuing debate

Opinion about Wang's book *Correcting the Errors of Medicine* has always been divided. Early on, in 1844, Chen Dingtai wrote his *Discussions Which Teach the Truth in*

Medicine. Using Wang's book, a cursory visit to a westerner's missionary clinic and a look at the doctor's anatomy textbook, he concluded that the ancient Chinese medical texts were indeed untrustworthy, and claimed that western anatomy supported Wang Qingren's conclusions. Although he didn't manage to publish until 1875, thereafter his story did a great deal to enhance Wang's reputation.[14]

From 1861 - 1895, after China's defeat by the British in the Opium Wars of 1839-42 and 1860, China engaged in the so-called 'Self-Strengthening Movement' to defend herself from the encroaching westerners by importing western science and military technology. The Chinese still considered their culture and institutions superior, however, and resisted foreign suggestions that, for instance, their governmental and administrative systems needed change. In this environment, a famous Shanghai physician called Lu Maoxiu published in 1884 the following criticism of Wang's book:

"It teaches people to study medicine from rotting corpses in cemeteries and execution grounds. ...If the *qi* has already ceased, how can you know that something is the 'gate of *qi*'? If the water has already run off, how can you know what is the 'water outlet'? How can one determine the number [of organs] from dog-eaten corpses and executed remains? If you grasp the liver or lungs in the hand, how can you determine their position in the body? Even if you are able to get at the [contents of] the head and body of corpses, and examine them one by one, you will still certainly never be able to peel off the skin and flesh of living people and compare them!"[15]

Lu was here speaking for many traditional physicians who, in 1884, could still see no relevance of lifeless anatomy to therapy, and who considered poking about inside other people's bodies to be morally as well as physically repugnant.

In 1895, China was defeated at war by the Japanese, who had always been regarded as a vassal state by the Chinese. Japan had also been importing western science and technology, but to a much greater extent. This defeat at the hands of the 'dwarf barbarian' Japanese caused, in the words of the reformer Liang Qichao, "nation-wide consternation", so that "assertive young men bitterly and determinedly talked of 'Renovation and Reform'." Liang says of himself and of the group of reformers associated with him, that they absorbed themselves with "the hope of founding a new school of learning which would be 'neither Chinese nor Western but in fact both Chinese and Western'".[16] It is easy from this to see how Wang Qingren would have appealed as an example of a native scientist and cultural reformer. His example was used to soften Chinese resistance to the adoption of western science and medicine.[17] Hence Liang's praise for his "revolutionary courage and scientific spirit".

During the epidemics of bubonic plague which raged periodically across Southern China at the end of the 19th century, one of Wang's prescriptions became popular and gained the reputation of having saved many.[18] His reputation at this stage was obviously great.

But Wang was also criticized by Chinese who had studied western medicine: in the June 1918 edition of the new *Journal for Chinese and Western Medicine*, Chen Zupei complained that "the more [he] corrected, the more errors he made". And in the scientistic 1930s, Yan Derun published an article called "Errors upon Errors in *Correcting the Errors of Medicine*".[19] This was the era of widespread intellectual opposition to Chinese medicine; the nationalist government of the Republic of China (founded 1912, overthrown by the Communists in 1949) had by this time recognised only modern western medicine in its medical licensing system, and there was widespread debate about whether Chinese medicine should not be abandoned altogether.[20] For these critics of Wang Qingren, a 'scientific spirit' was clearly not scientific enough.

After the Communist take-over in 1949, traditional medicine became an integral part of the official Chinese health care system. (It had of course never ceased as a private occupation.) Repeated efforts to realise the old ideal of a school of learning 'neither western nor Chinese but in fact both Chinese and Western' have meant that the debate about the nature of an ideal Chinese medicine has continued. In 1961 and 1962, the *Fujian Journal of Chinese Medicine* published a remarkable series of three articles, two of which were written under obvious pseudonyms, in which the status of Wang Qingren's contribution to medicine was hotly debated. The first was entitled: "Learning from Mr Wang Qingren's scholarly attitude of seeking the truth from the facts, and from his courageously creative and revolutionary spirit". The author praises Wang Qingren as an exemplary model. The second, in contrast, was more cautious: "Concerning the merits and faults of Wang Qingren". In the name of a more objective approach, the author criticises Wang (and the culturally iconoclastic environment of the time) for excessively despising his ancient forebears, forming unsound and subjective judgements and for being arrogantly sure of himself. The very next issue carries a rebuttal by a third author, accusing the second of 'conservative thinking': "Now that the age of 'a hundred schools of thought contending' is just starting in academic circles, he (the author of the second article) represents an obstruction to progress." One can't help wondering what became of them all during the Cultural Revolution.

Wang and modern Chinese medicine

Every practical manual of traditional Chinese medicine today will include one or more of Wang's prescriptions; they are so much part of standard practice now that it is no longer necessary to state their origin. My 1987 handbook of traditional Chinese prescriptions lists them in the section on 'invigorating the blood and dispelling stasis'. The English-language Journal of Chinese Medicine of May 1989 describes Wang's method in chapter xi of "A Course in Herbal Medicine" (Part Six, pp 29-33). A recent article on Wang Qingren says that:

"His method of 'invigorating the blood and dispelling stasis' ... has opened up a new line of therapy for all kinds of disorder, particularly in the treatment of cancer. We know that it can improve the microcirculation, decrease the resistance of the blood vessels, decrease the heart rate, ...improve the solubility of fibrous proteins, ... It also has anti-cancer, antibiotic and anti-viral properties, as well as being able to alleviate pain, regulate internal body secretions and boost the body's immune system."[21]

It is interesting that in order to justify the popularity of Wang's therapeutic method in China today, it is now necessary to analyse its effects in terms recognisable to any modern physician. In effect, this process of reinter-

preting traditional medical concepts into modern medical terms is what has been occurring in China over the last 50 years under the banner of the 'unification of Chinese and Western medicine'. Significantly, it is also the same strategy which Wang tried to employ to promote his ideas, though unsuccessfully. He reinterpreted the traditional physiology and redefined classical terms according to his own system. Ironically, modern Chinese medicine has employed exactly the same method - of reinterpreting old concepts according to new and different criteria - on Wang Qingren's own ideas.

One final point will help illustrate Wang Qingren's abiding interest for historians of medicine in China. In 1851, western medical missionaries in China who were attempting to convince the Chinese of the superiority of western medicine (and of western values and western goods), decided that they were reaching too narrow a cross-section of the population from their clinics. In order to reach a more learned audience, the English medical missionary Benjamin Hobson undertook the translation of basic western medical texts into Chinese with the help of a Chinese assistant, Chen Xiutang. They decided to increase the interest value of the first of their translations, *A New Treatise of Anatomy* (1851), by publishing and distributing it together with Wang Qingren's controversial book, *Correcting the Errors of Medicine.* [22] One of the earliest Chinese authors to try to reconcile Chinese and western medicine, Luo Dingchang, did so on the basis of these two books.[23] Wang thus became an emblem for the reconciliation of western and Chinese medical thought right at the beginning of their encounter.

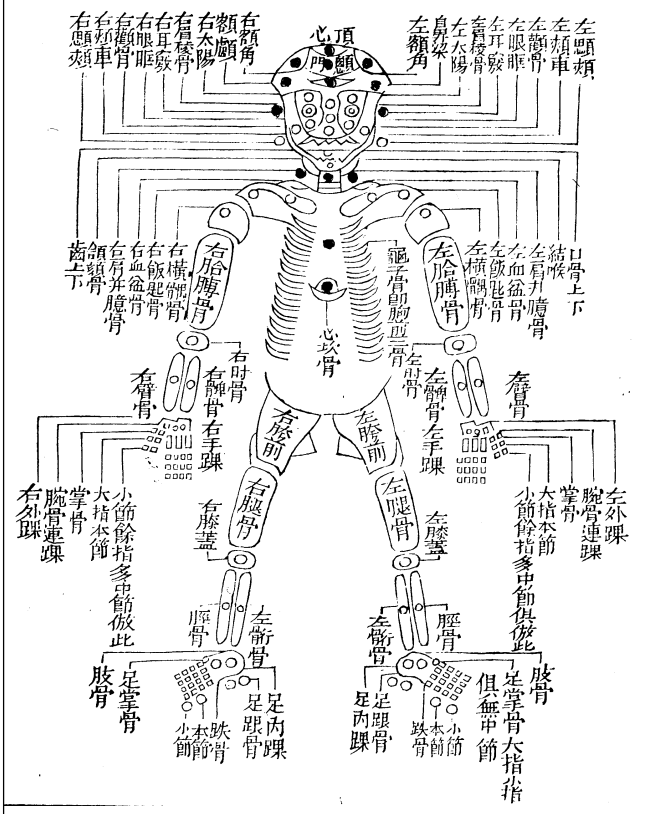

Fig. 4. Diagram of the skeleton from an 1847 edition of *The Washing Away of Wrongs.* Solid circles indicate points where fatal blows may be inflicted.

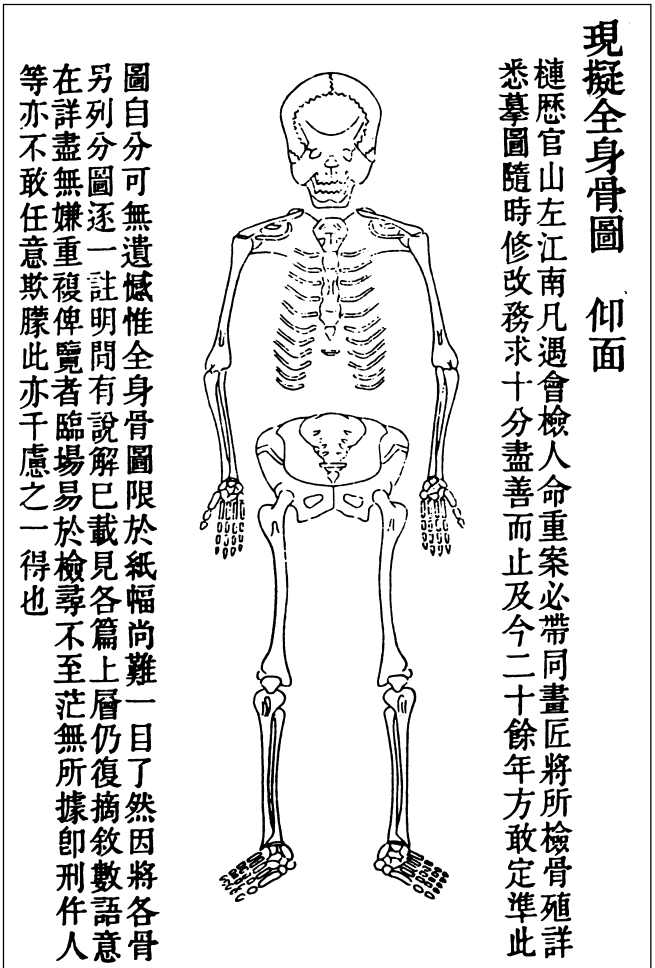

Fig. 5. Diagram of the skeleton from an 1854 edition of *The Washing Away of Wrongs* showing the influence of western anatomical translations. The diagram is marked "modern drawing of the skeleton".

The success of the co-publication can be seen from comparing Figures 4 and 5. Figure 4 is from Wen Sheng's 1847 compilation of an ancient handbook of forensic medicine, *'The Washing Away of Wrongs'.* Figure 5 is from a different compilation of the same text, this time by a Mr. Xu, with a preface dated 1854. Although Xu says that he has spent more than twenty years investigating bone structures before producing his "modern drawings of the skeleton", it seems more likely that the dramatic difference in the style of drawing between these two editions has more to do with Hobson's diagrams of 1851 than with one man's leap in conceptualisation of the human skeleton. Significantly, modern anatomy is one of the components of western medical theory that Chinese medicine has embraced in its own process of modernisation. Although the physical nature of the acupuncture channels is still a matter of some debate, their location is nowadays always taught in modern anatomical terms.

It is an appropriate irony that although many scholars have suggested that Wang owed his originality to ideas from the West, in fact western medicine partly owes its rapid dissemination in nineteenth-century China to the originality of Wang Qingren and the influence of his book, *Correcting the Errors of Medicine.*

My thanks are due to Ma Kanwen, Li Jingwei and Teng Weiping for sending material on Wang Qingren, and to Andrew Cunningham, Marta Hanson and Arne Hessenbruch for their comments on earlier versions of this article.

1 Zhao Hongjun: *A Modern History of the Polemics between Chinese and Western Medicine.* [Chinese]. 1982. Shijiazhuang. p 49.

2 Liang Qichao: *Intellectual History of China in the Last 300 Years.* [Chinese]. First published 1914. In *Collected Writings from the Ice-Drinker's Studio. 1932.* China Publishing Bureau. pp 355 - 356.

3 Yamada Keiji, in an paper delivered to the 6th International Congress for the History of Science, Technology and Medicine, Cambridge 1990, argued that the sections of the *Inner Canon* and of the *Canon of Difficult Issues* which describe the dimensions of the internal organs are all drawn from the results of this one dissection directed by Wang Mang. The original account survives in incomplete form in the "Biography of Wang Mang" chapter of the *History of the Former Han Dynasty.*

4 *Correcting the Errors of Medicine*, chapter 1.

5 Nathan Sivin: *Traditional Medicine in Contemporary China: A Partial Translation of Revised Outline of Chinese Medicine (1972) with an Introductory Study ...* 1987. Ann Arbor. p 140.

6 Guo Aichun: *Records of Chinese Medical Works [in Local Gazetteers], Arranged by Province.* [Chinese]. Vol. 1, 1983. Tianjin. p 59.

7 Benjamin A Elman: *From Philosophy to Philology: Intellectual and Social Aspects of Change in Late Imperial China.* 1984. Cambridge, Mass. p 30.

8 John B Henderson: *The development and Decline of Chinese Cosmology.* 1984. New York. p 183.

9 Marta Hanson: "External chaos, internal disorder: Chinese medical conceptions of epidemics in the Qing". (University of Pennsylvania dissertation in progress). Unpublished manuscript, 1991.

10 This description of *qi* circulation appears several times in the canonical literature. See, for example, *The Inner Canon of the Yellow Emperor, Spiritual Pivot* chapter 18: "Production and Conjunction of Constructive and Defensive [*Qi*]"

11 See Chapter 6:"On Blood and *Qi* Sharing the Vessels".

12 Wang cites three people who have held this view of brain function in "On the Brain" (chapter 5). They are: 1. Li Shizhen, from his *Systematic Materia Medica*, published in 1590; 2. Jin Sheng. Jin lived 1598-1645, and according to Fan Xingzhun, he was friend of some of the Jesuits at the Ming court in the 16th century and a convert to Roman Catholicism. 3. Wang Ang, born 1615. Wang Ang came from the same village as Jin Sheng, knew him personally, and relates Jin's views on the brain in his (Wang's) *Essential Materia Medica,* published 1694.

13 Chapter 15: "Infantile 'Wind' Convulsions are not [caused by] Wind."

14 Ma Kanwen: "An Outstanding Physician of Qing Dynasty China - Wang Qingren". In *Journal for the History of Science* [Chinese]. 1963 (6): pp 68 - 74. See also Fan Xingchun:*op.cit.*,*juan* 1 p 34B.

15 Quoted in Fan Xingzhun: *The Transmission of the Medicine of the Enlightenment from the West.* [Chinese]. Beijing. 1944. *Juan* 9 p 38A.

16 Liang Qichao: *Intellectual Trends in the Ch'ing Period.* Translated by Immanuel C Y Hsü. Cambridge, Mass. 1959. p 113.

17 Zhao Hongjun, 1989. *op. cit.* See his chapter 2.1: 'The Status of Wang Qingren in the History of Medicine.'

18 Ma, 1963. *op. cit.* p 71. Ma quotes from *A Brief Volume on Plague*, [Chinese], edited by Zheng Xiaoyan and published in 1901. The prescription is called "decoction to dispel poison and invigorate blood" (*jiedu huoxue tang)* and contains large amounts of safflower (*Flos Carthami*) and peach seeds (*Semen Persicae*).

19 *Ibid.,* p 73.

20 K C Wong and Wu Lien-teh: *A History of Chinese Medicine.* 1936. Shanghai. p 600. Zhao Hongjun: *op. cit.,* p 95.

21 Xu Jiqun et al (ed): *Pharmaceutics (for University-level courses in Chinese medicine and pharmacy)* [Chinese]. Shanghai. 1987. pp 146 - 155.

22 Wang Yuxi: "Wang Qingren and *Correcting the Errors of Physicians*". In *The Journal of Chinese Medicine and Pharmacy.* [Chinese]. 1980 (11): pp. 42 - 44.

23 Fan Xingchun: *op. cit., juan* 9 p. 7B; Zhao Hongjun: *op. cit.,* pp. 64 - 65.

24 Luo's book was called *The Essence of Chinese and Western Medicine*, published 1893. See Zhao Hongjun: *op. cit.*, pp 78-79.