THE SONG DISCONTINUITY: RAPID INNOVATION IN NORTHERN SONG DYNASTY MEDICINE

ASAF GOLDSCHMIDT

Abstract

The theoretical basis and the therapeutic practices of medicine in China changed dramatically during the Northern Song dynasty (960–1127 CE). Government activism, personal involvement of emperors, and changes in patterns of epidemics created a new realm of medicine. Basic notions of disease and conceptions of the body changed due to the reprinting of ancient medical canons previously inaccessible to the majority of physicians. This article describes the change focusing on several issues such as the revision of books, the standardisation of acu-moxa therapy, the interest of emperors in medicine, expansion of drug therapy, the systematisation of medical education, and the establishment of medical institutions such as the Imperial Pharmacy. It concludes that following the changes introduced by the government, physicians adapted their medical theory and practice by integrating ancient doctrines with contemporary practices to create a new and comprehensive medical system that lasted with no major changes to the present.

Chinese medicine in 1127 CE was strikingly different from Chinese medicine in 960 CE. A profound transformation had reshaped medical theory, practice, and training during the course of the Northern Song dynasty (960–1127 CE). Some aspects are obvious to the modern observer. For example, during this period, the number of medical books published increased greatly. While technological advances in printing account for some of this increase, there was also a growing interest in medicine arising from both imperial sponsorship and expanding medical education. Another factor was the revival of ancient medical theories and doctrines and associated practices that had fallen out of use since the Han period centuries before. Exactly why these doctrines reappeared during the Northern Song cannot be explained by the mere ‘internal’ evolution of context-free ideas. The theoretical was driven by—and itself, recursively, drove—changes in practice, teaching, and professional definition.

A second oft-noted change is that the number of drugs recorded in *materia medica* literature (*bencao* 本草) doubled during the Northern Song dynasty. The *Tang Materia Medica* (*Tang bencao* 唐本草, also known as the *Newly Revised Materia Medica—Xinxiu bencao* 新修本草, compiled in 659 CE) recorded 850 drugs, whereas the *Zhenghe Reign Newly Revised Materia Medica for Urgent Use, Classified and Verified from the Classics and Histories* (*Zhenghe xinxiu jing shi zhenglei beiyong bencao* 政和新修經史證類備本草, for short, *Zhenghe Materia Medica*, compiled in 1116 CE) recorded 1,748 drugs.¹ This phenomenon is tied to a demographic shift to the South,² which set the stage for a series of changes in theory and practice.

One such change—again, quite evident from the historical record—concerns clinical practice. Medicinal ‘formulas,’ the most potent and widely used treatment in traditional Chinese medicine, changed not only their components but also their dosages during this era, as Saburo Miyashita’s research has shown.³ Miyashita analysed the recommended treatment for a selected group of diseases, such as malaria, jaundice, goitre, diabetes mellitus, dysentery, insanity, and even the common cold. For each disease he compared the recommended medications or medicinal herbal formulas as listed in a number of formularies dating from the third to the nineteenth century. He paid special attention to the ingredients of each formula or medication, the hierarchy of the ingredients, and their dosage.

Miyashita’s findings are quite telling. He discovered that the medications prescribed for these disorders changed only *once* in the course of sixteen centuries. Both the ingredients and dosages of the formulas remained almost unchanged from the earliest extant formularies until those of the Northern Song dynasty. Then, for each disorder he examined, the constituents and dosages of the recorded medications underwent significant change. Subsequently, they remain, once again, almost unchanged through to the most recent formula-

¹ Shang Zhijun et al. 1989, p. 219. Quantitative changes were not the only changes as Frédéric Obringer argues. He presents an innovation in pharmacotherapy, more specifically in the use of arsenic during the Song dynasty (2001, pp. 192–213).

² For further discussion see Asaf Goldschmidt, ‘Documented Vs. Practical Knowledge—The *Bencao* (*Materia Medica*) Literature during the Northern Song Dynasty (960–1127),’ (in preparation).

³ Miyasita Saburo 1976, pp. 239–43; Miyasita Saburo 1977, pp. 283–300; Miyasita Saburo 1979, pp. 90–112; and Miyasita Saburo 1980, pp. 17–25.

ries. What happened during the Northern Song that caused such a unique rupture in traditional pharmacological practice?

This question is part of a larger one about the underlying causes of a transformation that encompassed medical discourse, theory, and practice. In this article, I claim that several interrelated factors are implicated. First, imperial interest—extending even to personal involvement in medical theory and practice—led in part to the resurrection of ancient medical knowledge, stimulating a renewed interest of literati and officials in medicine. This official interest soon took on institutional garb, leading to the establishment of a medical education system to spread this ancient knowledge. Second, social, economic, and demographic changes in Song China created a new epidemiological ‘frontier’ that compelled the imperial government to provide relief. Many imperial officials, including Song emperors themselves, turned to the ‘lost’ medical classics. The publication of these texts challenged officials and physicians to rethink and reshape medical practice and theory.

A thorough survey of all the confluent changes that occurred in medicine during the Song dynasty is impossible in the space of this brief article. I will emphasise throughout this article the role of the imperial government in shaping medicine. The reader should note that I have chosen not to discuss some important changes in the field of non-government sponsored private writing, the most important of which is the launching of specialised writing for example in paediatrics.⁴

Setting the stage: demographic, economic, and social changes during the Northern Song dynasty

Before we discuss changes in medicine *per se*, we describe the larger social and environmental context. One of the most striking features of Song China was the sharp increase in population. Between the eighth and eleventh centuries, China’s population nearly doubled. At the end of the Northern Song, it stood at over one hundred million people, having peaked at approximately 50 to 60 million during the

⁴ It is important to note that by specialised writing I do not imply specialisation of the modern kind in practice. This topic is open for further research.

preceding Tang dynasty.⁵ This was a change not only of magnitude but also of physical location. During the Northern Song, the main concentration of China's population shifted from the North—the traditional heartland of Chinese civilisation—to the South, where, by the end of the Northern Song period, approximately 60 to 65 per cent of the population lived.⁶ This demographic shift prompted (and necessitated) a sharp increase in staple food production (i.e. rice in the south). These demographic changes created a new epidemiological frontier as the increasing (and increasingly Southern) population encountered organisms less beneficial than rice.

Additionally, the 'Southward shift' stimulated the first significant large-scale and long-distance trade as well as the emergence of large, commercial cities.⁷ The dispersion of China's population, and the geographic separation of the empire's economic and political centres, also created the necessity of feeding the capital, which was still in the North, from a significant distance. This increased intra- and inter-regional trade, which in turn provided new pathways for epidemic disease.

The expansion of population and trade provoked major social change. Not only was there the unprecedented growth of cities, but there was also a proliferation of smaller 'market-centres' throughout the countryside. G.W. Skinner has argued that the unprecedented level of urbanisation reached in the Song was most likely not exceeded until the late nineteenth or early twentieth centuries.⁸ The growing network of cities, countryside markets, and food production centres enabled secondary industries to spring up or, where already in existence, to grow enormously to serve the urban and rural markets. Travelling with traders and taking root in the growing cities were pathogens with an epidemic potential that was soon realised.

Concurrent with these demographic and economic changes was the emergence of one of the most distinctive features of Chinese civilisation, the scholar-official class certified through competitive lit-

⁵ Ho 1967, pp. 33–53. The increase in population resulted from advances in agricultural technology and the introduction of new strains of rice, the Champa rice imported from Vietnam being the most prominent one.

⁶ Elvin 1973, pp. 204–209; Bielenstein 1987, pp. 1–288; and Hartwell 1982, pp. 365–442.

⁷ Hartwell 1982, pp. 365–442.

⁸ Skinner 1977, pp. 3–26.

erary examinations, a meritocratic elite unlike that of any other major civilisation before the nineteenth century. It differed from its predecessors in several regards. The ancient aristocracy of 'great clans' gave way to a much broader, more fluid class. The examination system, used only on a small scale in the Sui (589–618 CE) and Tang (618–907 CE) dynasties, played a central role in the fashioning of this new elite. To prevent the domination of the government by military men from the old, aristocratic class, the early Song emperors greatly expanded the civil service examination and the government school systems.⁹ The number of those passing the highest examinations soon averaged four to five times the number during the Tang. The material covered in the generalist examinations consisted mostly of Confucian classics, for the Song emperors' ambitions stimulated a renaissance-like approach to all knowledge, from philosophy to the sciences and to medicine, which focused on revising and rethinking the classics.¹⁰

Advances in printing techniques, especially the introduction of the movable type, facilitated the spread of knowledge as books could be published in greater quantities and at a lower cost. During the second half of the Northern Song we see, for the first time, the emergence of a true book-publishing industry. At first, most publications were government-sponsored reproductions of classical texts. But once private publishers became established, books on a great variety of topics—such as agriculture, medicine, astronomy, divination, and geography—were published and disseminated on an unprecedented scale.¹¹

According to some scholars these radical transformations brought Song China to the verge of an industrial revolution.¹² They also defined the context in which medicine was transformed.

⁹ Worthy 1976, especially his introduction and chapter 1.

¹⁰ For works on the examination and education system as well as on the new society of the Song see Chaffee 1995, Hymes 1986, Hymes and Schirokauer 1993, and Bol 1992.

¹¹ See Goodrich 1963, pp. 36–43; Ji Shaofu 1991; Cherniack 1994, pp. 5–125; Chia 1996, pp. 10–48; and Chia 2002, pp. 65–99.

¹² See Elvin 1973.

The Song emperors' personal interest in medicine

Medicine was not considered a worthy occupation for the nobility, let alone for emperors prior to the Song dynasty. Physicians had low social status, and were often associated with sorcerers or fortune-tellers.¹³ Perceptions changed with the ascent to the throne of the founding emperor of the Song dynasty, Zhao Kuangyin 趙匡胤 (r. 960–76), better known by his posthumous title Taizu 太祖. Zhao Kuangyin was especially fond of medicine. It is unclear whether he received training in medicine, but he evidently possessed some therapeutic skills. When his brother, the heir apparent Zhao Guangyi 趙光義, posthumously referred to as Taizong 太宗, became ill, Taizu returned to the capital to treat his brother using the technique of 'moxibustion'.¹⁴ The records also mention that after cauterising his brother, Taizu treated himself as well.¹⁵ This was not the only manifestation of Taizu's interest in medicine. He also collected information about popular medical knowledge and healing techniques. For example, during his campaigns of conquest in south China, he questioned commoners about the drugs they used, and their effects. When he conquered Guangzhou, he summoned local medical officials to inquire whether statements about local Guangzhou practices in an early compendium of *materia medica* collections were accurate.¹⁶

If the first Song emperor was proficient in acu-moxa therapy,¹⁷ his brother, Taizong, seems to have 'specialised' in drug therapy. Before Taizong ascended the throne in 976 CE (r. until 997 CE), he personally collected medicinal formulas. According to his own account, when he served as an official in remote regions, he collected local

¹³ Hymes 1987, pp. 9–11, 61–6; Needham et al. 2000, pp. 38–42; and Chao Yuan-ling 2000, pp. 66–70.

¹⁴ Moxibustion is based on burning tinder made of Chinese Mugwort (*Artemisia Argyi* or *Artemisia Vulgaris*) next to a specific acupuncture locus or on it.

¹⁵ *Song shi*, 3.50.

¹⁶ The information of the *Kaibao Materia Medica* is included in the *Classified Materia Medica* under each drug—Jin xie 金屑, Ying tian 景天. See Shang Zhijun et al. 1989, pp. 104, 205 respectively.

¹⁷ The term 'acu-moxa therapy' refers to a group of traditional Chinese clinical techniques designed to stimulate specific loci on the human body in order to obtain a desired therapeutic effect. Acupuncture and moxibustion are the most popular, but not the only, techniques in this therapeutic approach. Acupuncture is based on inserting needles of various gauges and lengths into the skin at specific loci. Moxibustion is defined above. For comprehensive discussion of acu-moxa techniques and doctrines see Lu and Needham 1980, pp. 69–153, 170–84, and Sivin 1987, pp. 258–64.

medicinal formulas. His private collection of over a thousand formulas eventually found its way into a government-sponsored formulary.¹⁸ The Song emperors' interest in medicine persisted after Taizu and Taizong. Renzong 仁宗, the fourth Song emperor (r. 1023–1063 CE), was proficient in acu-moxa therapy, although he preferred acupuncture. It is recorded that:

In the year 1056 CE, Renzong became ill and was confined to bed. [He] himself inserted needles [into a location] on the back of his head. As soon as the needles were removed, he opened his eyes and said, 'it is good to be clear-headed [*xingxing* 惺惺]'. The following day, the emperor felt well. He decided to name the acu-point he needed 'head-clearing' or *xingxing*.¹⁹

The fact that three out of the first four Song emperors shared a deep interest in medicine raised the social status of that field. Medicine was no longer a lowly art.²⁰ A later Song emperor, Huizong (r. 1101–1126), also took an interest in medicine. He compiled an innovative medical book and promoted public health as discussed below.

Reviving medical literature; disseminating medical knowledge

As already mentioned, one major feature of imperial involvement in medicine was the collection, revision and publication of medical books. I would like to explore the causes and effects of these activities in more detail in this section. The long decades of disintegration experienced by China during the second half of the Tang dynasty (755–906 CE, following An Lushan's rebellion 755–757 CE), followed

¹⁸ See *Song shi*, 461.13507, the biography of Wang Huaiyin; *Yu hai*, 63.20b–21a; and *Junzhai dushu zhi*, chapter 2. See also preface to *Imperial Grace Formulary* in *Song yiqian yiji kao*, pp. 714–5.

¹⁹ *Songren yishi huibian* 宋人軼事彙編, 1.27. See also Qian Yuanming et al. 1986, p. 271. According to Shi Xuemin and Zhang Mengchen 1998 (p. 511), *Xingxing* is another name for a point on the Superintendent tract (*dumai*), *feng fu* 風府 (GV16). The point is indeed located at the back of the head one inch above the middle of the natural hairline. The location of the point makes the testimony of Renzong needling himself somewhat questionable. It may well be an attempt to promote the status of acupuncture by attributing its usage to the emperor.

²⁰ Zhang Ruixian 1990 provides a comprehensive analysis of the changes in the status of medicine and its place in society, especially among the scholar-officials. Chen Yuanpeng 1997 also discusses this issue extensively, especially pp. 162–206.

by the disunity of the Five Dynasties era (906–960 CE), greatly depleted the imperial libraries and archives. A contemporary scholar commented:

Following the Five Dynasties era, definitive editions of texts were damaged and [the surviving ones] contained errors. [The books were] scattered all over [the empire] and [the imperial archives were] nearly emptied. During the first three years of the Song, the Three Institutes collected [existing] books, adding up to 10,000 chapters [*juan*].²¹

Given the state of the imperial archives, it is safe to assume that very few medical texts survived.

Public health hit a low point during the second half of the Tang and Five Dynasties era; this also, paradoxically, helped drive interest in medicine and the republication of classic texts. Decades of civil unrest had led to the devastation of the North, which was followed by the relocation, voluntary or coerced, of large parts of the population to the South. Exhausted and stressed people who had fled from the volatile North encountered indigenous pathogens preadapted to take advantage of depressed immune systems unfamiliar with them. Once the empire reunited under the Song dynasty, the provision of medical relief was among the most important issues on the government's agenda.

Taizu, the first Song emperor, considered the lack of books and structured education as one of the major reasons for the decline and fall of the Tang dynasty.²² Consequently, he and his successors stressed the importance of education. In 1060 CE, the fourth Song emperor, Renzong 任宗, described Taizu as follows: 'Once he pacified and established order in the land, he turned his attention to collecting books and literary works'.²³ Being especially fond of medicine, and faced with large-scale public health problems, it is not surprising that Taizu promoted the collection of medical knowledge from local practitioners. In 971 CE he is recorded as saying:

²¹ *Song da zhaoling ji*, 158.596. For comparison, the first formulary published by the Song government included no less than 100 chapters.

The Three Institutes is a collective reference to the Historiography Institute, the Institute for the Glorification of Literature, and the Academy of Scholarly Worthies. In aggregate these institutions constituted what was called the Academy of Veneration of Literature. See Hucker 1985, p. 398.

²² See Haeger 1975, pp. 3–6.

²³ *Song da zhaoling ji*, 158.596.

Every time I manage the affairs of the state I need to model my actions on the ancient kings. I long to obtain the skills of Wu Xian²⁴ to fill the posts in the office of the Imperial Physician. [Towards that end,] I order the provinces and states to search for those who are superior in the medical arts and record their names. Additionally, [officials should] estimate the amount of travel expenses they need, the [cost] of lodging them, and additional [daily] living expenses. [Provide these expenses and] send them quickly to the palace.²⁵

Prior to the Song, only a small fraction of medical knowledge had been transmitted through imperial compilations and included in the palace education system. Most clinical knowledge passed among rank-and-file practitioners, never reaching government officials. For example, a prominent Tang physician complained that some medical practitioners in the South possessed medical knowledge they were not willing to pass on to others, including himself.²⁶

Once the initial project of book collection had been concluded, the Imperial Court ordered officials to edit and publish medical books. The first emperor, Taizu, ordered the compilation of a drug manual, *Bencao*, translated here as *materia medica*.²⁷ This was the first government initiative to compile such a collection since the middle of the Tang dynasty. A first attempt was pronounced a failure by the emperor, but a year later, satisfied with the result, he personally wrote the preface for the drug manual, 'In carefully examining [other] explanations and considering the forms and characteristics [of the drugs], the book adds critical remarks that correct errors. These are labelled with the words 'contemporary annotations'.'²⁸ The book was published and distributed in 974 CE under the title *Re-Determined Materia Medica of the Kaibao Reign* (*Kaibao chongding bencao* 開寶重定本草).

²⁴ A legendary official god who is also proficient in medicine.

²⁵ *Song da zhaoling ji*, 219.842.

²⁶ The Tang dynasty physician Sun Simiao 孫思邈 (581–682 CE) stated in the preface to his *Essential Prescriptions Worth a Thousand* (*Qian jin yao fang* 千金要方) that 'in Jiangnan [a region in south China] there are various masters who conceal Zhang Ji's essential formulary and do not transmit it.'

²⁷ For centuries drug therapy literature had been divided into two distinct genres, collections and formularies. *Materia medica* or *Bencao* collections were encyclopedic compilations recording singular drugs, originating from plants, animals, or minerals, in use in Chinese medicine. They described the morphology of each drug for identification purposes. They also delineated the inner traits of drugs such as their *sapor wei* 味 and their toxicity (or medicinal effectiveness) *du* 毒. The first *materia medica* collection was published some time during the first two centuries CE.

²⁸ *Song yiqian yiji kao*, p. 1211.

Taizong, the second Song emperor, continued Taizu's initiatives.²⁹ In 981 CE, he began a project of collecting medical books that used incentives to encourage commoners and officials to donate their books to the court. The imperial edict read:

As for the formularies of the Imperial Medical Service, what matters most is their completeness. As for the drugs listed in the *Divine Husbandman's Materia Medica*, they are classified according to three ranks.³⁰ Discussions of this topic over previous dynasties are indeed numerous. Saving people's lives depends on correct understanding of this topic. Before [the government] decreed to collate and compile [formularies], many had shortcomings. Accordingly, it was fitting to utilise collected and purchased literature [to correct the errors]. In order to express our intention regarding public health care, it is appropriate to order the Fiscal Commission officials of various circuits to travel through all the prefectures governed by their office. They should cause officials' and commoners' households which possess ancient medical texts to be permitted to visit the imperial court and donate their texts. If the donated texts are over two hundred chapters, those who do not serve in an official post will be granted one. If they already serve they will be promoted. If the texts they donate include less than two hundred chapters, they will be generously rewarded in cash. If people go to the palace for the purpose of donating medical books, they are permitted the use of the imperial courier stations [to stable or change horses]. Furthermore, I order the districts [in which these people] stay *en route* to supply food to them.³¹

The majority of the collected texts were formularies. These served as the foundation for government-sponsored compilations.³²

In 981 CE, the imperial court issued an order to compile the first government-sponsored formulary. Work on this book lasted five years.

²⁹ Taizong instructed officials to draw up lists of missing books based on comparison of books currently stored in the imperial archives with records of the imperial library from the Tang dynasty (713–741 CE). Next he offered generous compensation for whoever submitted their books to the imperial archives.

³⁰ For discussion on the three ranks as well as translation of relevant sections from the *Divine Husbandman's Materia Medica*, the first *materia medica* collection in China, see Sivin 1987, pp. 181–2 and Unschuld 1986, pp. 5–21.

³¹ *Song da zhaoling ji*, 219.842.

³² Formularies, in contrast to *Bencao* literature—see note 26, recorded proven remedies or prescriptions, namely a combination of several singular drugs. According to Chinese physicians, individual drugs were combined into prescriptions to enhance their therapeutic effects and to lessen their adverse side effects. These prescriptions were handed down from a master to his disciple throughout history. Many formularies existed, but only a limited audience read them prior to the Song dynasty.

In 986 CE, the editors completed a gigantic manuscript entitled *The Divine Doctor's Formulary for Universal Relief* (*Shenyi pujiu fang* 神醫普救方). This enormous work consisted of one thousand substantive chapters, the table of contents alone comprising ten chapters. Here again, Taizong himself wrote the preface to the text, indicating once more the court's high regard for medicine. However, for unknown reasons, in spite of this work's magnitude, it was not printed, and the manuscript did not survive for long.

In 982 CE, emperor Taizong issued a decree instructing Wang Huaiyin, who was a medical official of the Hanlin Academy and the Chief Steward of the Palace Medical Service 尚藥奉御, to compile a new formulary.³³ After ten long years, in 992 CE, Wang and his associates completed work on what had become one of the largest government-sponsored medical compilation projects, the *Imperial Grace Formulary of the Great Peace and Prosperity Reign period* (*Taiping sheng hui fang* 太平聖惠方; hereafter, the *Imperial Grace Formulary*). It consisted of one hundred chapters and included 16,834 different formulas. Again Taizong wrote the preface to the book, which included his own personal collection of formulas.

During the first six decades of Song rule, it seems that drug therapy was the focal point of medicine, since the imperial court published only *materia medica* collections and formularies. In this there was no major theoretical or practical deviation from earlier Tang-dynasty medicine. Perhaps this collection and dissemination of contemporary medical knowledge was motivated by the need to provide relief to the populace. The extant medical practice can be classified, in contrast to the classical approach, as 'eclectic'.³⁴ Government officials, whether intentionally or not, ignored the doctrines and practices of classical medicine, failing to publish even a single text belonging to this genre.³⁵

³³ See *Yu hai*, 63.20b–21a.

³⁴ The 'Eclectic Practice', or pragmatic symptom-centred medicine, is an umbrella term embracing diverse medical practices. These practices relied mainly on the application of formulas or drugs to lessen the effect of symptoms without classical doctrines aimed toward correcting the imbalance causing the symptoms.

³⁵ The 'Classical Medicine' or 'Classical Approach' is represented by the great medical canons of the Han dynasty, especially the *Yellow Emperor's Inner Canon* (*Huangdi neijing* 黃帝內經) and the *Canon of Problems* (*Nan jing* 難經). Classical Medicine should be and often is called 'Systems of Correspondence Medicine.' This medical approach, or patient-centered medicine, explains the working of the human body in terms of

No significant private (i.e. non-government-sponsored) medical compilations were published during this period. Perhaps the intensive effort by the government to collect existing medical texts, and then reconstitute and republish them, was so successful that it drained private holdings of medical texts, but also obviated the need for privately sponsored publications.

A medical renaissance: shifting the focus of contemporary Chinese medicine to acu-moxa therapy and classical canons

The reign of Renzong, which lasted for forty years (1023–1063 CE), was one of the turning points in the history of Chinese medicine. Renzong revived the classical approach. During the first years of his reign he ensured that acu-moxa therapy regained its prominence by commissioning a work to standardise the location of acu-points and the course of the circulation tracts (*jingluo* 經絡). Almost concurrently, he ordered the revision of three ancient canons. During the latter years of his reign he instituted the Bureau for Revising Medical Texts (*Jiaozheng yishu ju* 校正醫書局), which published some ancient medical canons hitherto unpublished under government auspices.

The civil service examination system, which was closely aligned with an Imperial education system stressing the study of the Confucian classics, also achieved unprecedented size and sophistication. For the education of physicians, there had not been an analogous focus on the classical approach and the canonical medical works were not widely available. Emperor Renzong searched for ways to resolve this problem:

Before this [the fourth month of the year 1027 CE] the emperor [Renzong] said to his Grand Councillor: ‘These days there are no excellent physicians. That is why so many people die before their time, which I find very regrettable.’

Zhang Zhibai 張知白 replied: ‘Although some of the old formulae have survived, on the whole they are badly corrupt, containing errors and mistakes. Furthermore, students of medicine throughout the realm are unable to see them all.’

concepts derived from Chinese cosmology and philosophy and attempts to pinpoint where and how the balance of functions in the patient was disturbed. The preferred treatment technique of classical medicine before the Song was acu-moxa.

The emperor then ordered the Medical Institute to collate and prepare a definitive edition of the *Plain Questions* 素問 of the *Yellow Emperor's Inner Canon*, the *Canon of Problems* 難經, and the *Origins and Symptoms of Medical Disorders* 諸病源候論. [These manuscripts] were then to be sent to officials of the academies and institutes for close examination. On sexagenary day 32 乙未 [2 June], the emperor decreed that the Directorate of Education prepare the blocks, print [the books], and distribute them [when they were ready and approved]. He also ordered the Hanlin Academician Song Shou 宋綬 to write a preface for the *Origins and Symptoms*.³⁶

Renzong appointed Wang Weiyi 王惟一 (ca. 987–1067 CE), a distinguished Hanlin medical official who also served as a physician of the Court, to head a group of scholars assigned to revise the three canons mentioned above.³⁷ In 1023 CE, Renzong also commissioned Wang Weiyi to prepare a monumental work to standardise acu-moxa therapy. It seems that Wang's two projects were interrelated since the canonical works of classical medicine provide the doctrinal background to the practice of acu-moxa. In 1035 CE, emperor Renzong ordered a second revision of the *Basic Questions*.³⁸

Renzong wanted Wang Weiyi's manual of acu-moxa therapy to serve as the standard for locating acu-points and as guidelines for therapy. The project lasted four years, concluding with the publication of the *Illustrated Canon Explaining Acu-moxa Therapy Using the Bronze Figure and its Acu-points* (Tongren yuxue zhenjiu tujing 銅人腧穴針灸圖經;

³⁶ Xu zizhi tongjian changbian, 105.5B–6A. I thank the anonymous referee for his/her comments on this translation.

³⁷ See Huang Longxiang 1996, pp. 216–7; Li Yun 1988, p. 68. Some historical records disagree about the full name of Wang. In some records it appears as Wang Weiyi and in other as Wang Weide 王惟得. For additional discussion see Huang Longxiang 1996, pp. 216–7. I use the former following the convention adopted in most historical works. The specific dates of Wang's life are also not clear. It is unknown where he is from and his dates of birth and death are approximations. The dates provided above are suggested by various secondary sources such as Fu Weikang et al. 1991, p. 133, and Li Jingwei et al. 1995, p. 163. Li Yun 1988, p. 68, proposes other dates, namely 981–1067 CE.

³⁸ Yu hai, 63.22A. It seems strange that only the *Basic Questions* volume of the *Inner Canon* was revised and the other volume, the *Divine Pivot*, was not. Even more puzzling is the fact that contemporary scholars have assessed that Wang Weiyi had access to the *Divine Pivot* when he compiled his *Illustrated Canon of Acu-moxa* (see Huang Longxiang 1996, pp. 224–225). Unfortunately, we have no record that sheds light on this issue. We do know that the government ordered the Bureau to revise the *Divine Pivot* in 1057, but one of the editors, Lin Yi, commented that the book was already lost. The *Divine Pivot* was eventually revised and published in 1155 CE by Shi Song 史崧 (see Ma Jixing 1990, pp. 82–3).

hereafter, *Illustrated Canon of Acu-moxa*) in 1026 CE.³⁹ Wang's compilation was so highly regarded that in 1029 CE the emperor ordered it to be carved on stone tablets in an attempt to immortalise its contents.⁴⁰

Xia Song 夏竦, an official who wrote the preface to the *Illustrated Canon of Acu-moxa*, described one important reason why such a thorough compilation was needed:

Ever since the age of the sages, the study [of acupuncture and moxibustion] has gradually become more and more difficult to master. Even though [acu-points] have been listed in the medical classics and circulation channels have been depicted in illustrations, characters have been copied incorrectly and the ink can easily be smudged. Therefore, [contemporary] physicians sometimes [erroneously] prescribe moxibustion that could injure the liver, and [erroneously] insert needles in locations that could injure the stomach.

Common people who have received injuries [from incorrect treatment] or those who did not find relief [for their disorders], turn to quacks and mediums who apply false [regimens of treatment] and have no medical knowledge.⁴¹

The *Illustrated Canon of Acu-moxa* represents an attempt to satisfy a basic educational need at the practitioner level: the problem of accurately locating acu-points. The book not only served as the standard reference manual for practitioners, but was also used as a teaching and examination tool for students of the imperial medical school.

In 1026 CE, Renzong ordered Wang to cast a bronze model of a human figure to complement Wang's book and to serve as the standard reference for the location of acu-points. A year later in 1027 CE, Wang finished casting two copies of the model.⁴² The following quotation from an imperial order suggests that the models were cast to remedy the difficulties experienced in locating acu-points accurately from textual description. The imperial edict stated:

Once the Medical Institute had cast the two bronze human acupuncture models, the Court ordered one to be located at the Medical

³⁹ The edition of the *Illustrated Canon of Acu-moxa* I have used is the one appearing in Huang Longxiang 1996. For further discussion of the topic see Goldschmidt 2001.

⁴⁰ The stone tablets were immured in the Beijing city wall around 1445 CE and were only brought to light in our time. See Lu and Needham 1980, p. 134.

⁴¹ *Song yiqian yiji kao*, pp. 248–9.

⁴² *Xu zizhi tongjian changbian*, 105.17.B. The two identical bronze figures were located in two imperial offices; see Lu and Needham 1980, p. 131.

Institute 醫官院 and one at the Xiangguo Temple 相國寺 [in Kaifang]. In earlier times, the superior method of needling was not uniform, the location of the acu-points was not identical, and sometimes [needling] harmed people. Therefore, [emperor Renzong] ordered Wang Weiyi to study the *Mingtang* texts⁴³ in order to understand the association of *qi*, acupuncture loci, and circulation tracts. [Based on that] he was to cast a human model from bronze [detailing the acu-points]. He also compiled the *Illustrated Canon of Acu-moxa* incorporating ancient texts and correcting their errors.⁴⁴

The bronze model's size is not specified but a similar model dating to the Ming dynasty (1368–1644 CE), presented below in Figure 1, is recorded as being approximately 1.6 metres (four *chi* 尺) tall.⁴⁵ The Song model, unlike those from other dynasties, was made of a few detachable pieces. Inside were representations of internal organs, and on the outer shell the channels were carved with all the corresponding acu-points.⁴⁶ The metal walls were pierced with small holes corresponding to the 354 acu-points listed in the *Illustrated Canon of Acu-moxa*.

Interestingly, the model was the basis for a new hands-on method of examining medical students. The student was asked to assess a case presented by the examiner and to perform acupuncture on the bronze model, as the following quotation describes:

Once I heard my maternal uncle, Zhang Shugong 章叔恭, say that formerly, when he was a Sub-Prefect in Xiangzhou, he had gotten hold of a bronze figure for testing [proficiency with] acu-moxa therapy. The figure was made of fine bronze, and the viscera were complete. The names of the acu-points were inlaid in gold beside each locus. The figure was made in two halves, front and back, which could be fitted together to make a whole body.

It seems that in the old capital this was used to examine medical practitioners; the body was covered with yellow wax and the inside filled up with water, so that they could learn how to find the location by measurement and attempt to insert the needle at the [correct] locus. When a needle was put in exactly at the acu-point, the water poured out. If there was even a slight mistake, the needle could not penetrate. This was indeed an ingenious apparatus.

⁴³ This is a general term for acupuncture texts during this era.

⁴⁴ *Xu zizhi tongjian changbian*, 105.17.B.

⁴⁵ For more information regarding dates and earlier records of attempts to cast acu-moxa models see Lin Zhaogeng and Yan Liang 1995, pp. 202–207.

⁴⁶ None of the surviving bronze models has bronze viscera inside it similar to Wang's models. See Lu and Needham 1980, pp. 131–3 and Fu Weikang et al. 1991, pp. 135–9.

Figure 1. Bronze model dating to the fifteenth century.⁴⁷

⁴⁷ Taken from Lu and Needham 1980, p. 130.

Afterwards Zhao Nanzhong 趙南仲 returned the figure to the Palace Storehouse. My uncle, Zhang Shugung, made two diagrams [of the model], and had them carved on wood blocks so that they could be circulated. For this reason, I have appended [this note] here.⁴⁸

This type of rigorous examination technique exemplifies the level of proficiency required by the medical students of that period. Equally important was the model's function as a standard for locating acupoints on the body. Apparently, one of the two models travelled throughout the empire serving as a blueprint to make master copies. This can be considered an early system of standardising the art of acu-moxa therapy and disseminating medical knowledge through a non-textual method.

Medical education follows the shift back to the classics

As the previous discussion of the acu-moxa model demonstrates, the Song-dynasty imperial medical education system eventually became more systematic. This increased rationalisation of imperial education was indeed typical of the Song. However, at first it lagged somewhat behind other fields, still largely resembling its state during the Tang dynasty. The low status of medicine, which for so long had been considered an unworthy career for a scholar-official, probably accounts for this. That medical education eventually caught up with the rest of imperial education is due in large part to a change in key government personnel.

In 1043 CE, Fan Zhongyan 範仲淹 (989–1052) became Vice Grand Councillor in the imperial court. Fan was especially attentive to public health needs. Realising that 'at the present, the capital's population stands at one million, but only a thousand doctors can be counted', Fan took action to alleviate this dire shortage of what he considered to be qualified physicians.⁴⁹ He encouraged candidates for the civil service who failed their exams to pursue a medical

⁴⁸ The quotation is taken from *Qidong yeyu*, 14.175. 'Appended' in the translation refers to the fact that this passage ends a series of anecdotes about the wondrous powers of acupuncture.

⁴⁹ *Fan wenzheng ji*, *Zouyi* 奏議, 2.40a.

career; 'If you cannot serve as a good minister, then serve as a good physician' was Fan's motto.⁵⁰

The reconstruction and improvement of imperial medical education during the Song began in 1044 CE. In this year, Renzong adopted a proposal made by Fan to establish a bureau to concentrate solely on medical education. In consequence, the government established the Imperial Medical Service (*Taiyi ju* 太醫局), under the authority of the Court of Imperial Sacrifices (*Taizhang si* 太常寺).⁵¹ Prominent medical practitioners, including the Chief Stewards of the Palace Medical Service (*Shangyao fengyu* 尚藥奉御), lectured there. The total number of students was approximately two hundred over a ten-year period.⁵²

Starting in 1060 CE the government took action toward further rationalising the medical education and examination systems. First, the number of students attending classes at the Imperial Medical Service, hitherto unrestricted, was limited to 120. Second, prospective students had to go through an application process. Each applicant, who had to be at least sixteen years old, filled in registration forms including details about his family. He then had to obtain a recommendation from an official serving in a medical position. Third, before commencing studies at the Imperial Medical Service, students had to attend a year of general education at the Court of Imperial Sacrifices, and then to pass an exam.⁵³ Concurrently, the government extended medical education and examination to the local level.⁵⁴ These measures expanded the number of physicians with systematic medical knowledge and ensured that these new physicians were dispersed throughout China. The new regulations added prestige to medical education and actually increased the number of candidates pursuing medical education.⁵⁵

⁵⁰ *Nenggai zhai manlu*, 13.332.

⁵¹ The Imperial Medical Service replaced the existing Imperial Medical Office, which was a remnant from the Tang dynasty. The *Song huiyao* includes a reference claiming that the change in name and designation occurred as early as 992 CE (*Song huiyao jigao*, Zhiguan, 36.22). However, recent studies agree that it must be an error if we compare it to other available records. See Zhang Ruixian and Yuan Xiurong 1993, Liang Jun 1995, and Zhang Ruixian 1988.

⁵² See Zhang Ruixian 1988, pp. 12–13.

⁵³ *Song huiyao jigao*: Zhiguan, 22.36A.

⁵⁴ *Song huiyao jigao*: Chongru, 3.17–18. It is unclear whether local officials implemented the imperial decrees and established medical schools at the local level. Further research is needed to clarify this point.

⁵⁵ See Gong Chun 1955, p. 170.

Once admitted to the Imperial Medical Service, the students were divided into nine different fields of study within medicine. The vast majority, however, concentrated on studying general medicine.⁵⁶ The curriculum of the Imperial Medical Service stressed *classical* medicine. It was compulsory for all students to study the *Inner Canon* and the *Canon of Problems*. In addition, the core curriculum included the *Imperial Grace Formulary* and the *Origins and Symptoms of Medical Disorders*. Once the students began specialising, additional textbooks, such as *materia medica* collections, were assigned.⁵⁷

The next significant change in medical education came during another period of major political reforms, the reign of emperor Shenzong (r. 1068–1085 CE), who appointed the reformer Wang Anshi as his Prime Minister.⁵⁸ In 1076 CE, the Imperial Medical Service became an independent office—and gained independent authority. It was no longer under the auspices of the Court of Imperial Sacrifices. This independence, however, did not last long, since within a few years, it came under the authority of the Ritual Academy (*Taichang liyuan* 太常禮院).⁵⁹ During this transformation, the number of students increased to three hundred, and acu-moxa therapy was introduced as a separate, specialised field of study.

During the same year (1076 CE) Wang Anshi reorganised the Imperial Medical Service in a novel fashion. In order to recruit desirable students to the medical education system, he implemented the ‘Three Hall System’ (*San she fa* 三舍法), which was already in use at the Imperial University. In this system, the Imperial University—and later schools at all levels in the empire—were divided into three grades or ‘halls’. Promotion from grade to grade depended upon periodic examinations. By introducing the Three Hall System into medical education, the government was attempting to align medical education with the rest of the imperial education system, thus making

⁵⁶ The Information is based on the *Song huiyao jigao*: Zhiguan, 22.36A. For detailed discussion of the changes in medical education during the mid and later Northern Song, see Gong Chun 1955.

⁵⁷ *Song huiyao jigao*: Zhiguan, 22.36A.

⁵⁸ Wang Anshi (1021–1086 CE), who served as Prime Minister during the years 1069–1074 CE and 1075–1076 CE, instituted wide-ranging reforms of the state’s structure. These reforms, later known by historians as the New Policies of Wang Anshi, shaped the political and economic landscape of the Northern Song dynasty until its demise. For further information on Wang Anshi, see Teng 1989, pp. 545–566 and Liu 1959.

⁵⁹ *Song shi*, 157.3689 and *Song huiyao jigao*: Zhiguan, 22.37.

it more attractive to civil service candidates. This continuing process of raising the status of medicine through integrating medical education with the rest of imperial education culminated during the reign of the last Song emperor, Huizong. Huizong raised the standards of his own newly established medical school so that it was equal in prestige to the other imperial schools.

Throughout most of the eleventh century, as noted above, the Imperial Medical Service was under the authority of the Court of Imperial Sacrifices, unlike the Imperial University (*Taixue* 太學), the Law School (*Liixue* 律學), and the Military School (*Wuxue* 武學), which were under the Directorate of Education (*Guozijian* 國子監). This bureaucratic association reflected power relationships and relative status. When candidates chose their course of education, it was clear that medicine was not equal to other fields of education. Thus, the prospect of obtaining a significant imperial post was slim for medical students. Emperor Huizong brings up this topic as one of the reasons for establishing an entirely new Medical School to educate physicians outside of the Imperial Medical Service.

The social status [of the doctors] is not high. Scholars consider medicine to be a disgraceful [occupation]. Therefore, no top scholars choose to avoid politics and study this matter [medicine]. At the present I desire to establish a different school, the Medical School, to educate and raise High physicians [namely, well-trained high-status ones].⁶⁰

This new Medical School (*Yixue* 醫學), set up in 1103 CE, was intended to make medicine even more attractive to the talent pool from which candidates for the civil service were selected through examination. In structure and organisation, it purposely imitated the Imperial University.

Establishing a new, more prestigious medical school was not Huizong's only tactic. Keen on attracting the best talent, and mindful of the role status plays in career decisions, he coined a new term—the 'literati physician' (*ruyi* 儒醫).⁶¹ This new title for physicians who had been educated within the new imperial medical education system signified a new era during which medicine began

⁶⁰ *Song huiyao jigao*: Chongru, 3.11–3.12.

⁶¹ The first time this term appears is in the years 1104 and 1109. See *Song da zhaoling ji*, chapter 186 and *Song huiyao jigao*: Chongru, 3.14, respectively. For further discussion see Zhang Ruixian 1990, and Chen Yuanpeng 1997, pp. 179–224.

gradually to attract candidates from the elite. This trend became even more significant during the Southern Song and the Yuan dynasties.⁶²

Training in the Medical School was rigorous and demanding. Besides extensive theoretical studies, an important aspect of education was gaining clinical experience by treating patients. Each medical student was required to treat sick students from the other three schools of the directorates (i.e., Military, Law, and the Imperial University). The medical students had to report their cases in detail and were judged by their rate of success. In effect, students from the other three schools were material for the medical students' clinical education.⁶³

The effect of epidemics on medical theory and practice

By the middle of the eleventh century, the government had already revised and printed medical literature on both 'eclectic' therapy (namely, *materia medica* collections and formularies) and classical medicine (namely, the medical classics and acu-moxa manuals). The government had ordered the distribution of these books to prefectural offices, but their impact on public health had been limited. It took a drastic external event to compel the government to implement a radically new policy that was eventually to reinvent Chinese medicine.

Historical analysis of the pattern of epidemics during the Northern Song shows a noticeable increase in the number of epidemics from the tenth to the twelfth centuries. Over a span of fifteen years (1045–1060 CE), eight major epidemics struck China. This wave of epidemics came following a nearly epidemic-free period of twenty-seven years (1018–1044 CE), in which only one epidemic was recorded. Moreover, the number of epidemics recorded in the fifteen-year period was equal to that of the previous sixty years combined.⁶⁴

⁶² Hymes 1987, pp. 57–66, and Zhang Ruixian 1990, pp. 23–24.

⁶³ *Song shi* 157.3885; *Song huiyao jigao*: Chongru, 3.13b.

⁶⁴ See Goldschmidt 1999, chapter 1. In my analysis of epidemics during the Northern Song, I used only the most general terms denoting usually large-scale epidemics in Chinese, namely *yi* 疫, *wen* 瘟, or *wenyi* 瘟疫, thus avoiding specific disease names and uncertainty regarding the Song dynasty author's diagnostic qualifications. By focusing on these terms I decided to concentrate on those large-scale epidemics that presumably greatly affected the course of life in the Empire. The main primary source I used is the *History of the Song* (*Song shi*). I cross-referenced

Clearly, the rise in the number of epidemics during the 1040s and 1050s CE was striking. It forced a reaction, if only a self-interested one, from the emperor, since the concept of the Mandate of Heaven associated portents such as epidemics with misgovernment.⁶⁵ The Court reacted to the epidemics in several ways. For example, in 1051 CE, the government 'ordered prefectural and district administrators to provide [free] prescriptions (*fangji* 方劑) and to distribute them to alleviate the people's diseases'.⁶⁶ In another instance, in 1057 CE, the imperial government ordered an annual disbursement of funds to every prefecture and district in order to fight epidemics. Furthermore, the government 'ordered [local] administrators to appoint officials to mix medical formulas and use them to help the people's diseases'.⁶⁷

In 1057 CE, in reaction to the wave of epidemics and in an attempt to expand existing medical literature, the government established a special bureau, the Bureau for Revising Medical Texts (*Jiaozheng yishu ju* 校正醫書局, hereafter, 'the Bureau'). The initial edict specified the books the Court deemed essential for coping with epidemics. Once the imperial officials of the Bureau, who by and large were not physicians, began working on the project, they realised that the books were not suitable for the task in hand. In their search for other more relevant sources, and under the pressure of recurring southern epidemics, they turned to the imperial archive which possessed many medical texts, including rare texts given as tribute to the throne, most of which were unknown to mainstream contemporary medicine. Perhaps it was the officials' lack of medical knowledge, hence lack of prejudice, that left them open to unfamil-

the relevant occurrences with the privately compiled *Long Draft of the Continued Comprehensive Mirror for Aid in Government* (*Xu zizhi tongjian changbian*). I consulted additional Song dynasty sources. In a recent Ph.D. dissertation, Hinrichs 2003 raises criticism regarding the authenticity of a couple of the epidemic records. Even if we accept this criticism, it does not change the fact that the empire experienced a significant number of epidemics over a relatively short span of time, triggering the reaction of the imperial government (p. 140, note 33).

⁶⁵ According to Chinese culture, an emperor and a dynasty could rule only as long as they retained heaven's favour, or the mandate of heaven. If an emperor neglected his sacred duties and acted tyrannically, heaven would display its displeasure by sending down ominous portents and natural disasters. If the emperor failed to heed such warnings, heaven would withdraw its mandate, disorder would increase, the political and social order would fall into chaos, and heaven would eventually select someone else upon whom to bestow a new mandate to rule.

⁶⁶ *Song shi*, 12.231.

⁶⁷ *Song shi*, 12.245.

iar medical ideas, doctrines, and practices. In their desperate search, they stumbled upon a long-forgotten book compiled in the third century CE, the *Treatise on Cold Damage Disorders* (*Shanghan lun* 傷寒論, hereafter, 'the *Treatise*'). The author, Zhang Ji 張機 (150–219 CE), discussed the treatment of contagious diseases and epidemics—'cold damage disorders,' in his words—concentrating especially on southern epidemics. The Bureau editors chose to republish this text even though it was outside the theoretical and practical scope of contemporary medicine. This choice—again, by government officials and not by physicians—reshaped medicine in China. In the following decades, physicians had to integrate a revived ancient approach not only with their existing practices but also with Classical Medicine and its doctrine of systematic correspondence.

Between the years 1057 CE and 1069 CE, the Bureau published ten medical books. Nine of them were revisions of ancient medical treatises.⁶⁸ These publications opened up a new path for future generations of physicians to pursue since the Bureau's books were added to the curriculum of the medical education system.⁶⁹ The government also distributed copies of these books to local prefectural offices, further extending the readership to government officials and maybe even local physicians. Once printed and distributed in a smaller less expensive format, the Bureau widened the scope of dissemination of these books even further.⁷⁰

It is important to note that the selection of books the Bureau published was completely unconventional, in terms of contemporary medical theory and practice. It includes three versions of the *Treatise*, a

⁶⁸ The Bureau published the following books: *Yellow Emperor's Inner Canon—Basic Questions*, *Canon of the Pulse*, *A-B Canon of Acupuncture*, *Essential Prescriptions Worth a Thousand*, *Arcane Essentials from the Imperial Library*, *Jiayou Materia Medica*, *Illustrated Materia Medica*, *Treatise on Cold Damage Disorders*, *Essential Discussions of Prescriptions in the Golden Casket*, *Canon of the Golden Casket and Jade Cases*. The latter three books were in essence three different versions of the *Treatise*. Actually the Bureau published eleven texts, but two of those are the two versions of the *Essential Prescriptions Worth a Thousand* (*Qian jin yao fang*). Some scholars also attribute the publication of three additional books, the *Ling shu*, *Tai su*, and *Guangji fang*, to the Bureau. However, this seems to be incorrect. The editors of the Bureau meticulously added a preface to each of the books they published. Such a preface, compiled by the Bureau's editors, does not appear in the extant editions of the above three books. Thus, we must conclude that these texts were edited at some other period. For additional information on this controversy see Zhen Zhiya 1994, p. 214 and Wan Fang 1982.

⁶⁹ *Song huiyao jigao*: Zhiguan, 22.36A.

⁷⁰ *Song yiqian yiji kao*, p. 129.

book nobody valued prior to the crisis of the epidemics. (For example, during the first decade of the Song dynasty, despite the defeat of the Later Zhou dynasty (951–960 CE) by the Song in 960 CE, one of the latter's military commanders, Gao Jichong 高繼沖, retained his position under the new regime.⁷¹ In gratitude, Gao submitted as a gift to the Song emperor, Taizu, an edition of the *Treatise*. Given Emperor Taizu's interest in medicine, one would have expected that government officials would have welcomed Gao's edition of the *Treatise*. However, they simply stored it away without further study).

The list of texts the Bureau published indicates the political and medical need to combat the southern epidemics. Six out of the ten texts focused on cold damage disorders: three versions of the *Treatise* and the three formularies, which devoted chapters to treating this type of disorder. As the preface of the Song version of the *Treatise* claims, 'of all diseases, none is as pressing as cold damage disorders'.⁷² This emphasis reinforces the assertion that the topic of battling epidemics was high on the Bureau's agenda. It also suggests that during this era of epidemic (and, thus, political) crisis, imperial bureaucrats, not physicians, decided which course medicine should take and how to shape medical theory and practice. Indeed, bureaucrats with little or no medical training determined the future course of Chinese medicine by choosing to edit and publish texts on cold damage disorders, an ancient medical concept. Their decision was shaped by current needs, especially those arising from the developing south, whence at least a few of the bureaucrat-editors probably originated. Whatever the agenda of these few men, their decisions opened new theoretical and practical avenues for practising physicians to pursue.

During the eight decades following the publication of the Song version of the *Treatise* in 1065 CE, scholar-officials and physicians had to cope with two major issues. The first was the growing frequency of southern epidemics that further compelled them to understand and assimilate the information included in the *Treatise*. The

⁷¹ The Zhou dynasty was one of five dynasties making the Five Dynasties era. For complete biographical details of Gao see Chang Bide et al. 1974, vol. 3, pp. 1768–1769 and Zang Lihe 1921, p. 893. Ma Jixing (1990, p. 123) claims that Gao was a last ruler (*Mozhu* 末主) of Jingnan State (*Jinnan guo* 荆南國), but I have found no support for this claim.

⁷² *Song yiqian yiji kao*, pp. 352–3.

second was the fact that both physicians and scholar-officials had to struggle with doctrines and practices in the newly revised and published ancient medical classics that contradicted contemporary medical theory and practice. The imperial government did not actively impose the practices suggested in the *Treatise*. However, in Chinese culture, once the government had revised a text and labelled it as a classic, physicians, especially the educated ones who also served as officials, and people who had passed the imperial civil service examination, were expected by their patients to show knowledge in the field and apply the recommended treatments.

Changes in *materia medica* collections

The Northern Song government sponsored the editing and printing of five different *materia medica* collections, more than any other government in the history of China. The first two Song *materia medica* collections mostly reflect ancient knowledge, with only a slight increase in the number of recorded drugs, added from contemporary practice.⁷³ The establishment of the Bureau for Revising Medical Texts turned this upside down. In 1062 CE, the Bureau published an innovative book, the *Illustrated Materia Medica* (*Bencao tuijing* 本草圖經), which included 933 illustrations of drugs. The editors relied on *contemporary* knowledge gathered from around the empire rather than on ancient compilations.⁷⁴ The goal of the project was to standardise information from this 'eclectic' tradition.

The editors of the *Illustrated Materia Medica* recorded the origin of each drug, its habitat, specific season and month of collection, and clinical applications of the drug. They also recorded methods of processing and preparation.⁷⁵ Drugs originating from different localities but bearing the same name were not recorded twice, as in some previous *materia medica* collections, thus adding to the standardisation

⁷³ These were the *Re-Determined Materia Medica of the Kaibao Reign* (*Kaibao chongding bencao* 開寶重定本草, for short, *Kaibao Materia Medica*) and the *Jiayou Reign Period Supplemented and Annotated Divine Husbandman's Materia Medica* (*Jiayou buzhu shennong bencao* 嘉祐補注神農本草, for short, *Jiayou Materia Medica*).

⁷⁴ *Song yiqian yiji kao*, p. 1217.

⁷⁵ For detailed analysis of the organisation of *Illustrated Materia Medica*, see Shang Zhijun et al. 1989, pp. 210–4.

of drug records. In addition, the editors attempted to avoid multiple references to the same drug under variant names as had often occurred in past *materia medica* collections. Once the editors determined, often by means of comparing a sample of the drug, that multiple references pointed to an identical drug, they placed these descriptions under one drawing of the drug, duly noting its different origins and different effects if there were any. From its publication onward, the information included in the *Illustrated Materia Medica* served as a benchmark or a standard for identifying drugs. The visual information on drugs provided by the *Illustrated Materia Medica* is comparable to the visual representation of the acu-moxa tracts and loci on the bronze model discussed earlier. It seems that both served as means of disseminating standardised medical knowledge throughout the empire.

As I mentioned earlier, during the Northern Song dynasty the number of recorded drugs doubled. The physician who actually made this happen was Tang Shenwei 唐慎微, a native of Sichuan. In 1098 CE, he completed his mammoth manuscript, the *Materia Medica for Urgent Need, Classified and Verified from the Classics and Histories* (*Jing shi zhenglei beiji bencao* 經史證類備急本草, hereafter, '*Classified Materia Medica*').⁷⁶ Tang unfortunately did not live to see his work come to print; he died before he could write a preface for it.⁷⁷ Several editions of the book, two of which were under imperial auspices, were later printed, the first one in 1108 CE.⁷⁸ When it finally came out, Tang's work recorded a total of 1,744 different drugs. The source that provided the majority of the 'new' drugs added by Tang—almost 500—was the *Gleanings of Materia Medica* (*Bencao shiyi* 本草拾遺), compiled by Chen Cangqi 陳藏器 during the eighth century. Chen hailed from the southern province of Siming 四明 (present-day Zhejiang). Accordingly, his collection reflected the drugs that were in use in South China during that period.⁷⁹ Given the demographic shift to the south,

⁷⁶ One source claims that Tang finished an initial version of the book in 1082 CE. However, the reliability of this source is questionable. Most historians attribute 1098 CE as the date Tang finished his work. For detailed discussion of the topic see Ma Jixing 1990, p. 276.

⁷⁷ For more information on Tang Shenwei's life see Shang Zhijun 1993, p. 5, and Li Yun 1988, p. 765.

⁷⁸ The uniqueness of Tang's book is that it was privately compiled and only later published by the government. This accounts for some of its characteristics outlined below. For detailed discussion see Shang Zhijun et al. 1989, pp. 49–51, 216–22; Zheng Jinsheng 1983, and Shang Zhijun 1993.

⁷⁹ For detailed discussion see Shang Zhijun et al. 1989, pp. 49–51, 216–222.

the fact that Tang relied so heavily on Chen's work probably indicates that he was keenly aware of the dire need for drugs which promised to combat the diseases endemic to the South.

The uniqueness of Tang's work is not limited only to the number of drugs he listed. It is also the first *materia medica* text to supply ample data on the processing of drugs.⁸⁰ Drug processing in Chinese medicine can affect clinical therapy, since it may change a drug's effects. That Tang presents this type of information may indicate that doctors during Tang's time desired better explanations for the clinical effects of drugs. Another intriguing innovation of Tang's is that he includes formulas that contain a specific drug within the discussion of that drug. By cross-referencing drugs and formulas in a rudimentary way, the *Classified Materia Medica* prepared the path for a new type of drug nomenclature.

Changes to the Imperial Pharmacy and other public health institutions

The Northern Song dynasty, especially its latter decades, can be characterised by increasing government intervention in medicine. It is unclear whether this was due to the southern epidemics or whether other factors were significant, but during the last five decades of its rule, the Northern Song government established an array of medical institutions, many of which focused on public health. The first institution was an Imperial Pharmacy.

The Pharmacy was established in 1076 CE. It was an elaborate institution serving various functions, including preparing drugs, packaging them, and selling them—all under strict supervision and according to the highest standards. First and foremost, the pharmacy served as an agency for preparing and stocking a large inventory of drugs, ready for dissemination at regulated pre-set prices. At the same time, it served as an imperial medical arsenal ready to dispense medication wherever and whenever large-scale epidemics erupted.⁸¹ Conceived

⁸⁰ Processing drugs (*shuyao* 熟藥) is a Chinese term meaning that certain preparation methods are applied to the crude or raw drugs in order to enhance their effects and improve their keeping qualities.

⁸¹ For example, during 1098 CE, based on instructions from the Imperial Physician,

as part of Wang Anshi's reforms, the Imperial Pharmacy, originally, started out as an attempt to impose imperial control over various contemporary private commercial monopolies. Thus, in its initial form, it was not primarily a medical institution but rather an economic one, designed to lower the prices of drugs and generate revenue for imperial coffers. The Pharmacy did indeed accomplish these goals. But it also served as an instrument in fighting epidemics by distributing free drugs during times of crisis. It may also have functioned as a means of standardising medicine in an attempt to squeeze out charlatans, who flourished during times of catastrophes.⁸²

Only a few decades after its establishment, the Pharmacy added to its primary economic mission by becoming a medical institution. In fact, it was the first imperial medical institution designed to serve the general public, and not solely the Court. The Pharmacy expanded its operations throughout the empire, opening many local branches, totalling more than seventy at one time.⁸³ This expansion in the Pharmacy's provision of pre-prepared prescriptions and drugs was one factor that triggered major changes in Chinese medicine. In fact, the transformation of the Pharmacy into a medical body and its role in fighting epidemics made it an important imperial institution. This enabled the Pharmacy to persist beyond the end of the Northern Song dynasty and all the way to the seventeenth century.

During the first decade of the twelfth century the Imperial Pharmacy published a manual titled the *Formulary of the Pharmacy Service for Benefiting the People in an Era of Great Peace* (*Taiping huimin hejiju fang* 太平惠民和劑局方). This book matched symptoms to prepared prescriptions sold at the Pharmacy. It represented a form of government support for eclectic practice since it enabled potential patients to purchase from the Pharmacy ready-made drugs to relieve their sufferings without consulting a physician. Furthermore, the formulary burst the professional boundaries of medicine: anyone could proclaim an ability to heal without having undergone the long process of becoming a doctor either via a master-disciple relationship or by studying at the imperial Medical School.

the Pharmacy dispensed drugs to treat massive sickness ravaging both military personnel and civilians in the Kaifeng prefecture. See *Song huiyao jigao*, Zhiguan, 59.41.

⁸² For further discussion of the Northern Song government policies to educate and reform popular customs, including consultation with spirit mediums or shamans, see Hinrichs 2003.

⁸³ Wan Fang and Lu Xichen 1987, pp. 32–5.

Along with the Imperial Pharmacy, the government sponsored and managed an array of establishments designed to promote public health. During the early decades of the twelfth century—the reign of emperor Huizong (r. 1101–1126 CE), the government established a public health system composed of poor houses, public hospitals, and paupers’ or public cemeteries. The first of the three was more of a charity organisation whereas the latter two promoted public health by providing medical services for the poor and burial for the indigent, as well as for travellers from faraway places with no family to care for them. These institutions also got the poor off the streets by providing relief for them. Moreover, it seems that emperor Huizong’s deep understanding of medicine, along with his perception that medical knowledge was part of the kingly Dao, enabled him to use his imperial authority to implement a public health system designed to prevent the outbreak of epidemics.⁸⁴

Emperor Huizong’s impact on medicine

As discussed above, early in the dynasty Song emperors promoted medicine during their reigns. Huizong (r. 1101–1126 CE) represents the culmination of this trend. From his ascent to the throne, medicine became a major focal point of his regime.⁸⁵ Huizong became deeply involved in the textual and theoretical side of medicine in addition to promoting various medical institutions and establishing a public health system. He wrote a primarily theoretical medical treatise and commissioned and, according to certain records, helped to compile a huge compendium of medicinal formulas.⁸⁶

By the last decades of the Northern Song period, the medical classics were widely available to officials and well integrated into the curriculum in the school of the Imperial Medical Service.⁸⁷ Yet Huizong was not satisfied:

⁸⁴ For further discussion of the topic, see Goldschmidt (forthcoming).

⁸⁵ Goldschmidt (forthcoming).

⁸⁶ *Sheng ji zong lu*, preface; *Song yiqian yiji kao*, pp. 797–98; Zhao Pushan 1984, pp. 56–7.

⁸⁷ Zhang Ruixian and Yuan Xiurong 1993, pp. 37–40.

Essential medical notions have not been passed down [through the ages]. The *Inner Canon* includes disease names but no one studies them; it also includes treatment methods but nobody learns them. If one pursues its subtleties to the limits then one can reach mastery of immortality [or understanding sageliness], yet no one understands it.⁸⁸

Thus, according to Huizong, contemporary physicians did not read or understand the *Inner Canon*, let alone apply its doctrines and therapies in clinical practice.⁸⁹ In a similar vein, in his preface to the *Canon of Sagely Benefaction*, Huizong presents a dismal picture of the state of medicine during his era, complaining that physicians in his day were as ignorant of the *Yellow Emperor's Inner Canon* as diviners were of the *Book of Changes*.⁹⁰

It was common in Song times for an emperor who wanted to endorse a field of learning to commission a book on the topic and then write a preface for it. The book would then be disseminated to all prefectures and at times even serve as a textbook in medical schools. By writing the preface, the emperor conveyed to officialdom as well as to the literate reader how important he considered the topic. Huizong made use of this convention to promote medicine and medical knowledge by supplying the preface to the largest and most comprehensive formulary of the Northern Song dynasty, the *Medical Encyclopedia: A Sagely Benefaction of the Zhenghe Reign Period* (*Zhenghe sheng ji zonglu* 政和聖濟總錄, hereafter, '*Medical Encyclopedia*' 1122 CE). By so doing, he ensured that this book received due attention from medical officials and physicians, subsequently joining the pantheon of medical textual authorities.

The *Medical Encyclopedia* includes information collected from contemporary practitioners as well as from both contemporary and ancient texts.⁹¹ Instead of just presenting the reader with the specific

⁸⁸ *Sheng ji zong lu*, preface; *Song yiqian yiji kao*, pp. 797–8.

⁸⁹ The *Inner Canon*, like other important medical classics that concentrated on discussing cosmological and medical doctrines, was compiled during the Han dynasty. However their circulation was very limited and accordingly only a small number of physicians were familiar with them. During the Tang dynasty, both Wang Bing 王冰 and Yang Shangshan 楊上善 revised a version of the *Inner Canon* but their editions were not widely circulated. It was not until the eleventh century, when the Song government sponsored the revision and publication of these canons, that these texts became more widely available. For further details on the various editions of the *Yellow Emperor's Inner Canon*, see Sivin 1993, pp. 196–215.

⁹⁰ *Sheng ji jing*, p. 8; *Song yiqian yiji kao*, pp. 797–98.

⁹¹ *Song da zhaoling ji* 219.843.

formula for treating a disorder, the text also provides a theoretical discussion as a background for the treatment. An important contribution of the *Medical Encyclopedia* was the incorporation of the 'Phase Energetics' (*yunqi* 運氣) doctrine. The *Medical Encyclopedia* is one of only a handful of medical works that discussed the doctrine of Phase Energetics during the Song dynasty. In the Chinese conception of the world, the microcosm and the macrocosm are interrelated and influence each other. Each cycle of seasons or hours shows individual characteristics in terms of meteorological phenomena as well as analogous changes in the body's activity. In order to maintain physiological order, the body has to be in concord with the cosmic order. 'Phase Energetics' designates a discipline concerned with the changes of *qi* 氣 configurations, both macrocosmic and microcosmic, during various intervals of time (*yun* 運). The term *yunqi* is actually a fusion of a longer term—*wuyun liuqi* 五運六氣, the Five Phases and the Six Climatic Configurations. This doctrine, which occupies the first two lengthy chapters of the *Medical Encyclopedia*, concerns the correspondence of changes in the world and the body based on the Five Phases and the six types of *qi*, namely wind, heat, dampness, fire, dryness, and coldness.⁹²

One of the most important characteristics of the *Medical Encyclopedia* is the fact that throughout the text classical doctrine is interwoven with the discussion of formulas. If we compare the *Medical Encyclopedia* to the *Imperial Grace Formulary*, which was published 125 years earlier, we see that in the latter the formulas are categorised according to symptoms.⁹³ In contrast, in the *Medical Encyclopedia* we see, in addition to the traditional categorisation, another categorisation according to visceral systems of functions. This structural integration with the rubric of classical doctrine can also be found at a lower level of textual organisation. In the discussion of each formula the authors meticulously added information about effects on the visceral systems of functions as well as about the Five Phases doctrine.

Commissioning and endorsing a massive and innovative formulary was not enough for Huizong. He did something that no emperor—

⁹² Porkert 1974, pp. 55–9 and Despeux 2001, pp. 121–165.

⁹³ The *Imperial Grace Formulary* was the most influential formulary of the early Northern Song. The complete title of this formulary, completed in 992 by a group of officials headed by Wang Huaiyin 王懷隱, is the *Imperial Grace Formulary of the Great Peace and Prosperous Reign Period* (*Taiping sheng hui fang* 太平聖惠方).

or, for that matter, no high ranking official—had ever done: he compiled a theoretical treatise on medicine, the *Canon of Sagely Benefaction* (*Sheng ji jing* 聖濟經 c. 1118 CE), aiming at nothing less than defining future medical discourse. This was a daring step, since Huizong risked being ridiculed by experts if his book seemed shallow or simplistic to them. From the prefaces that Huizong had written for the other two books—the *Medical Encyclopedia* and the *Canon of Sagely Benefaction*—it seems that he was motivated by a desire to remedy the sorry state of medical theory and practice. In compiling *this* book, Huizong attempted to reshape medical knowledge. He introduced contemporary Neo-Confucian cosmological doctrines and the doctrines of classical canons into a medical discourse that had revolved mostly around symptom-oriented drug therapy.

The *Canon of Sagely Benefaction* mostly discusses medical theory. There is little emphasis on clinical practice. This was one of the first attempts since the Han dynasty to compile a text devoted primarily to medical theory. Among the doctrines discussed are yin-yang and the Five Phases, the four seasons, microcosm and macrocosm, and the visceral systems of functions. The text analyses the relationships between these doctrines and shows how these doctrines explain health and illness.

While concentrating on theory, the book does not wholly ignore the more clinical aspects of medicine. It discusses diet, techniques for prolonging one's life, and drug therapy.⁹⁴ Yet the *Canon of Sagely Benefaction* is not a drug therapy text as modern scholars often categorise it.⁹⁵ In a unique and unprecedented way, it analyses classical cosmological and medical doctrines and shows how to apply them to clinical practice, such as drug therapy. This is the first book that attempts to imitate the classical canonical genre of the *Inner Canon* while discussing the relations of these doctrines to individual drugs as well as medicinal formulas.

⁹⁴ For further discussion of the clinical aspects of Huizong's canon, see the modern editor's introduction to the 1990 reprint of the *Sheng ji jing*, p. 2.

⁹⁵ For example the Okanishi Tameto's categorisation of texts in the *Song yiqian yiji kao*.

Conclusions

Given that the Northern Song dynasty was a period of many transformations in state, society, and economy, we would expect to find corresponding changes in medicine. Indeed, medicine did change in many ways. The changes, however, were not evenly distributed over the span of the Northern Song; most of them occurred during the second half of the dynasty.

The fact that the first Song emperors were interested in and even practised medicine had a major impact on the field. Concurring with the emperors' wishes and edicts, the government became increasingly involved in medicine, especially with regard to collecting, revising, and publishing ancient medical texts and collecting medicinal formulas. This was the first time in Chinese history that an imperial government took such an active role in shaping medicine. Nevertheless, this process by itself cannot account for the radical transformation in medicine during this era.

In addition to the general trend of collecting medical literature, we find a shift in emphasis. During the 1020s and 1030s CE, the government sponsored a few projects aimed at restoring the canons of classical medicine and the use of its therapeutic technique—acu-moxa therapy, and especially needling. In order to promote the use of acu-moxa, the government ordered the Chief Steward of the Palace Medical Service, Wang Weiyi, to cast a bronze model of the human body depicting all the acu-points and the circulation tracts. By setting a standard for the location of the acu-points, the government encouraged practitioners to use this clinical technique.

These developments, interesting and important as they are, stand in stark contrast to the far more radical transformations in medicine that occurred during the second half of the dynasty. Based on my findings, it seems that a wave of epidemics between the years 1045–1060 CE triggered a cascade of events that culminated during the early decades of the twelfth century with the integration of contemporary medical approaches with newly revived ancient medical doctrines and practices into a comprehensive system that changed the medical landscape for centuries to come.

By establishing, in 1057 CE, a dedicated imperial bureau for revising medical texts, staffed mostly by civil servants, the government empowered scholar-officials, not physicians, to decide which ancient medical texts should be revised and published. These officials, driven

by the need to address the wave of epidemics and not by presuppositions that depended on the current state of medical knowledge, chose to revise books concentrating on a particular medical approach that had been largely ignored for eight centuries—that of cold damage disorders. The Bureau's officials did not take the easy, well-trodden path of once more revising the accepted classics, as was the case in the past when physicians had headed revision projects. Instead, with untutored but open minds, they looked for books that contained specific information on treating epidemics. They found this information in a third-century text, the *Treatise on Cold Damage and Miscellaneous Disorders*.

In addition to publishing a newly revised set of medical classics, the government also revitalised and systematised medical education. One of the government's first measures was to include the Bureau's books in the curriculum of the Imperial Medical Service. Consequently, medical students were exposed to both widely accepted and largely forgotten medical knowledge. I believe that this exposure to the republished ancient medical classics, including the *Treatise*, drove physicians and scholar-officials to re-examine medicine and medical practice.

Toward the end of the dynasty (the early decades of the twelfth century), we find that physicians and scholar-officials began the process of merging these three approaches—Classical Medicine, the Eclectic Approach, and Cold Damage Disorders—into one comprehensive medical system. The goal of my article has been to describe the process that led to the integration of these three approaches and to explain the factors that facilitated it.

The integration process did not halt with the end of the Northern Song in 1127 CE. It continued in various forms during the following dynasties, right up to the present day. However, the process reached a significant milestone during the first few decades of the twelfth century with the publication of several books discussing, for the first time in Chinese history, classical doctrines in clinical drug-based manuals and clinical application of drugs and formulas in canonical compilations.

References

Primary sources

- Chongxiu Zhenghe xinxiu jing shi zheng lei beiyong bencao* 重修政和新修 經史證類備用 本草 [Revised Zhenghe Reign Materia Medica for Urgent Use, Classified and Verified from the Classics and Histories], edited by Zhang Cunhui 張存惠 1249 CE, Reprint—Beijing: Huaxia chubanshe, 1993.
- Junzhai dushu zhi* 郡齋讀書志 [Records of Reading at the Prefectural Studio], compiled by Chao Gongwu 晁公武 flourished, ?–1171 CE, Reprint—Taipei: Shangwu yinshu guan, 1978 (4 volumes).
- Fan wenzheng ji* 范文正集 [Collection of the Writings by Fan (Zhongyan)], compiled by Fan Zhongyan 范仲淹, 989–1052 CE, Reprint—Beijing: Zhonghua shuju, (Sibu congkan ed.).
- Nenggai zhai manlu* 能改齋漫錄 [Free Recollections], compiled by Wu Zeng 吳曾, 1157 CE, Reprint—Taipei: Taiwan shangwu yinshu guan, 1966. Volumes 122–124 in *Congshu jicheng jianbian* 叢書集成簡編 (Chief editor Wang Yunwu 王雲五).
- Qidong yeyu* 齊東野語 [Rustic Talks in Eastern Qi], compiled by Zhou Mi 周密, 1290 CE, Reprint—Changsha: Shangwu yinshuguan, 1939, Volumes 2779–2782 in *Congshu jixheng chubian* 叢書集成初編.
- Sheng ji jing* 聖濟經 [Canon of Sagely Benefaction], compiled by Emperor Huizong 徽宗 (Zhao Ji 趙佶) annotated by Wu Ti 吳禔, original preface 1118 CE, Reprint—edited by Liu Shuqing 劉淑清. Beijing: Renmin weisheng, 1990.
- Sheng ji zong lu* 聖濟總錄. See *Zhenghe sheng ji zong lu* 政和聖濟總錄.
- Song da zhaoling ji* 宋大詔令集 [Collection of the Grand Edicts of the Song]. Anonymous, edited between 1131–1162 CE, Reprint—Beijing: Zhonghua shuju chubanshe, 1962.
- Song huiyao jigao* 宋會要輯稿 [Collected Administrative Documents from the Song]. Compiled by various authors between the years 978–1243 CE, edited by Xu Song 徐松 flourished, 1781–1848 CE, Reprint—Taipei: Shijie, 1964.
- Song shi* 宋史 [History of the Song]. Tuo Tuo 脫脫 et al. 1313–1355 CE, Reprint—Beijing: Zhonghua shuju chubanshe, 1977 and Taipei: Yiwen yinshu guan, 1962.
- Song yiqian yi jikao*, see below under Okanishi Tameto 岡西爲人, 1969.
- Songren yishi huibian* 宋人軼事彙編 [A Compilation of Anecdotes of Sung Personalities], compiled by Ding Chuanjing 丁傳靖 flourished, 1870–1930 CE, Reprint—Beijing: Shangwu yinshu guan, 1958 (2 volumes).
- Xu zizhi tongjian changbian* 續資治通鑑長編 [Collected Data for a Continuation of the *Comprehensive Mirror for Aid in Government*], compiled by Li Tao 李燾, 1183 CE, Reprint—Taiwan: Shijie shuju, 1964.
- Yu hai* 玉海 [Sea of Jade Encyclopedia], edited by Wang Yinglin 王應麟 1223–1296 CE, Reprint—1806 re-cut block print edition by Kang Jitian 康基田.
- Zhenghe sheng ji zong lu* 政和聖濟總錄 [Medical Encyclopedia: A Sagely Benefaction [of the Zhenghe Reign Period], Author unknown, 1122 CE, Reprint—Beijing: Renmin weisheng, 1995 (fifth edition).

Secondary sources

- Bielenstein, Hans 1987 'Chinese historical demography AD 2—1982', *The Museum of Far Eastern Antiquities*, 59: 1–288.
- Bol, Peter K. 1992 *This Culture of Ours—Intellectual Transitions in T'ang and Sung China*, Stanford: Stanford University Press.
- Chaffee, John 1995, *The Thorny Gates of Learning in Sung China: A Social History of Examinations*, Albany, New York: State University of New York Press.

- Chang Bide, et al. 1974, *Songren zhuanji ziliao suoyin* [Index to biographical material of Sung figures] 宋人傳記資料索引, Taipei: Dingwen shuju (6 volumes).
- Chao Yuan-ling 2000, 'The ideal physician in late Imperial China: the question of Sanshi 三士', *East Asian Science Technology and Medicine*, 17: 66–93.
- Chen Yuanpeng 陳元朋 1997, *Liang Song de 'shang yi shiren' yu 'ru yi'* 兩宋的尚醫士人與儒醫 [Elites who Esteemed Medicine and 'Literati Physician' in the Northern and Southern Song dynasties], Taipei: Guoli Taiwan Daxue wenshi congkan.
- Cherniack, Susan 1994, 'Book culture and textual transmission in Sung China', *Harvard Journal of Asiatic Studies*, 54, 1: 5–125.
- Chia, Lucille 1996, 'The development of the Jianyang book trade, Song-Yuan', *Late Imperial China*, 17,1: 10–48.
- Chia, Lucille 2002, *Printing for Profit: the Commercial Publishers of Jianyang, Fujian (11th–17th centuries)*, Cambridge, Mass.: Harvard University Asia Center for Harvard-Yenching Institute (distributed by Harvard University Press).
- Despeux, Catherine 2001, 'The System of Five Circulatory Phases and the Six Seasonal Influences (*Wuyun liuqi*), A Source of Innovation in Medicine under the Song (960–1279 CE)', in Elisabeth Hsu (ed.) *Innovation in Chinese Medicine*, Cambridge: Cambridge University Press, 121–65.
- Elvin, Mark 1973, *The Pattern of the Chinese Past: A Social and Economic Interpretation*, Stanford: Stanford University Press.
- Fu Weikang 傅維康 et al. 1991, *Zhenjiu tuina xue shi* 針灸推拿學史 [History of acupunctu-moxa and tuina (massage) therapy], Shanghai: Shanghai guji chubanshe.
- Goldschmidt, Asaf 1999, 'The Transformations of Chinese Medicine during the Northern Song Dynasty (AD 960–1127)', Ph.D. Dissertation, University of Pennsylvania, Philadelphia.
- Goldschmidt, Asaf 2001, 'Changing standards: tracing changes in acu-moxa therapy during the transition from the Tang to the Song dynasties', *East Asian Science Technology and Medicine*, 18: 75–111.
- Goldschmidt, Asaf 'Huizong's Impact on Medicine', in Patricia Ebrey and Maggie Bickford (eds) *Huizong and the Culture of the Late Northern Song*, (Cambridge, Mass. Harvard University Press, forthcoming).
- Goldschmidt, Asaf 'Commercializing Medicine or Benefiting the People—The First Public Pharmacy in China', (forthcoming).
- Goldschmidt, Asaf 'Documented Vs. Practical Knowledge—The *Bencao* (Materia Medica) Literature during the Northern Song Dynasty (960–1127 CE)', (in preparation).
- Gong Chun 龔純 1955, 'Wang Anshi bianfa yu Beisong de yixue jiaoyu' 王安石變法與北宋的醫學教育 [Wang Anshi's reforms and medical education during the Northern Song], *Zhonghua yishi zazhi*, 3: 169–175.
- Goodrich, L. Carrington 1963, 'The Development of printing in China and its effects on the renaissance under the Sung Dynasty (960–1279 CE)', *The Hong Kong Branch of the Royal Asiatic Society*, 3: 36–43.
- Haeger, John Winthrop 1975, 'Introduction: Crisis and Prosperity in Sung China', in John Winthrop Haeger (ed.) *Crisis and Prosperity in Sung China*, Tucson, Arizona: The University of Arizona Press, 1–12.
- Hartwell, Robert 1982, 'Demographic, political and social transformations of China, 750–1550', *Harvard Journal of Asiatic Studies*, 42, 2: 365–442.
- Hinrichs, T.J. 2003, 'The Medical Transforming of Governance and Southern Customs in Song China (960–1279 CE)', Ph.D. Dissertation, Harvard University.
- Ho Ping-ti 1967, 'An Estimate of the Total Population of Sung-Chin China', in Francoise Aubin (ed.) *Etudes Song—Series I Histoire et Institutions* [Sung Studies—Series I in History and Institutions], Paris: Mouton & Co, 33–53.
- Huang Longxiang 黃龍祥 (chief editor) 1996, *Zhenjiu mingzhu jicheng* 針灸名著集成 [Collection of famous acu-moxa compilations], Beijing: Huaxia chubanshe.

- Hucker, Charles O. 1985, *A Dictionary of Official Titles In Imperial China*, Stanford: Stanford University Press.
- Hymes, Robert P. 1986, *Statesmen and Gentlemen: The Elite of Fu-chou, Chiang-hsi, in Northern and Southern Sung*, Cambridge: Cambridge University Press.
- Hymes, Robert P. 1987, 'Not quite a gentleman? Doctors in Sung and Yuan', *Chinese Science*, 8: 9–76.
- Hymes, Robert P. and Conrad Schirokauer (eds) 1993, *Ordering the World: Approaches to State and Society in Sung Dynasty China*, Berkeley: University of California Press.
- Liang Jun 梁峻 1995, *Zhongguo gudai yizheng shilue* 中國古代醫政史略 [A brief history of medicine and state policies in ancient China], Urumqi: Nei Menggu renmin.
- Ji Shaofu 吉少甫 1991, *Zhongguo chubanshi* 中國出版簡史 [A brief history of printing in China], Shanghai: Xuelin chubanshe.
- Li Jingwei 李經緯 et al. 1995, *Zhongyi da cidian* 中醫大辭典 [Dictionary of Chinese Medicine], Beijing: Renmen weisheng chubanshe.
- Li Yun 李云 (ed.) 1988, *Zhongyi renming cidian* 中醫人名辭典 [Biographical dictionary of Chinese medicine], Beijing: Guoji wenhua chubangongsi.
- Lin Zhaogeng 林昭庚 and Yan Liang 鄒良 1995, *Zhenjiu yixue shi* 針灸醫學史 [History of acu-moxa therapy and medicine], Beijing: Zhongguo zhongyiyao chubanshe.
- Liu, James T.C. 1959, *Reform in Sung China: Wang An-shih (1021–1086) and his New Policies*, Cambridge, Massachusetts: Harvard University Press.
- Lu Gwei-djen and Joseph Needham 1980, *Celestial Lancets: A History & Rationale of Acupuncture & Moxa*, Cambridge: Cambridge University Press.
- Ma Jixing 馬繼興 1990, *Zhongyi wenxian xue* 中醫文獻學 [A study of Chinese medical literature], Shanghai: Shanghai kexue jishu chubanshe.
- Miyasita Saburo 宮下三郎 1976, 'A historical study of Chinese drugs for the treatment of jaundice', *American Journal of Chinese Medicine*, 4, 3: 239–43.
- Miyasita Saburo 宮下三郎 1977, 'A historical analysis of Chinese formularies and prescriptions: three examples', *Nihon ishigaku zasshi*, 23, 2: 283–300.
- Miyasita Saburo 宮下三郎 1979, 'Malaria (Yao) in Chinese Medicine during the Chin and Yuan Periods', *Acta Asiatica*, 36: 90–112.
- Miyasita Saburo 宮下三郎 1980, 'An historical analysis of Chinese drugs in the treatment of Hormonal diseases, goitre, and diabetes mellitus', *American Journal of Chinese Medicine*, 8, 1: 17–25.
- Needham, Joseph et al. (edited by Nathan Sivin) 2000, *Science and Civilisation in China: Volume 6: Biology and Biological Technology: Part 6: Medicine*, Cambridge: Cambridge University Press.
- Obringer, Frédéric 2001, 'A Song Innovation in Pharmacology,' in Elisabeth Hsu (ed.), *Innovation in Chinese Medicine*, Cambridge: Cambridge University Press, 192–213.
- Okanishi Tameto 岡西爲人 1969, *Song yiqian yiji kao* 宋以前醫籍考 [Studies of Medical Books of the Song and Earlier], 4 volumes, Taipei, Taiwan: Ku T'ing Book House.
- Porkert, Manfred 1974, *The Theoretical Foundations of Chinese Medicine: Systems of Correspondence*. Boston: MIT Press.
- Qian Yuanming 錢遠銘 et al. 1986, *Jingshi baijia yilu* 經史百家醫錄 [Various medical records from the classics and the histories]. Guangdong: Guangdong keji chubanshe.
- Shang Zhijun 尙志鈞 1993, 'Zhenglei bencao wenxian yuanliu congkao' 證類本草文獻源流叢考 [A Supplementary Study on the Origin of the Documents Making the *Classified Materia Medica*]. Appears at the end of the reprint of the *Chongxiu Zhenghe xinxiu jing shi zheng lei beiyong bencao*, Beijing: Huanxia, 1–83.
- Shang Zhijun 尙志鈞 et al. 1989, *Lidai Zhongyao Wenxian Jinghua* 歷代中藥文獻精華 [Essentials of the literature of traditional Chinese drug therapy], Beijing: Kexue jishu wenxian chubanshe.

- Shi Xuemin 石學敏 and Zhang Mengchen 張孟辰 1998, *Han ying shuang jie zhen-jiu da cidian* 漢英雙解針灸大辭典 [Chinese-English dictionary of acupuncture and moxibustion], Beijing: Huaxia chubanshe.
- Sivin, Nathan 1987, *Traditional Medicine in Contemporary China*. Science, Medicine, & Technology in East Asia 2, Ann Arbor: Center for Chinese Studies, The University of Michigan.
- Sivin, Nathan 1993, 'Huang ti nei ching,' in Michel Loewe (ed.) *Early Chinese Texts*, Berkeley: Society for the Study of Early China, Institute of East Asian Studies, University of California, 196–215.
- Skinner, G. William 1977, 'Introduction: urban development in Imperial China', in G. William Skinner (ed.) *The City in Late Imperial China*, Stanford: Stanford University Press, 3–31.
- Teng Ssu-yu 1989, 'A Fresh Look at Wang An-shih's Reform Movement', in Kinugawa Tsuyoshi (ed.) *Collected Studies on Sung History Dedicated to Professor James T.C. Liu in Celebration of His Seventieth Birthday*, Kyoto: Dohosha., 545–66.
- Unschuld, Paul 1986, *Medicine in China: A History of Pharmaceuticals*. Berkeley: University of California Press.
- Wan Fang 萬方 1982, 'Guanyu Songdai Jiaozheng yishu ju de kaocha' 關於宋代校正醫書局的考察 [A study concerning the Bureau for Revising Medical Texts during the Song dynasty], *Zhongyiyao xuebao*, 1: 46–52.
- Wan Fang 萬方 and Lu Xichen 呂錫琛 1987, 'Songdai guanyaoju de kaocha' 宋代官藥局的考察 [A study of Song government pharmacies], *Shandong Zhongyi Xueyuan xuebao*, 11, 3: 32–5.
- Worthy, Edmund Henry 1976, 'The Founding of Song China, 960–1000: Integrative Changes in Military and Political Institutions', Ph.D. Dissertation, Princeton University, Princeton.
- Zang Lihe 臧勵蘇 (ed.) 1921, *Zhongguo renming da cidian* 中國人名大辭典. [Biographical Dictionary of China], Reprint, Shanghai shudian, 1980.
- Zhang Ruixian 張瑞賢 1988, 'Shilun beisong zhengfu yu yixue de guanxi' 試論北宋政府與醫學的關係 [Critical essay on the relations between Northern Song government and medicine], Ph.D. Dissertation, The China Academy of Traditional Chinese Medicine, Beijing.
- Zhang Ruixian 張瑞賢 1990, 'Rujia wenhua xiang yixue shentou de tujing zhiyi' 儒家文化向醫學滲透的途徑之一: 試論兩宋' 儒醫' 的產生 [One of the channels Confucian culture permeated to medicine: Exploring the rise of the term 'literate physician' during the two Song dynasties]. *Tianjin Zhongyi Xueyuan xuebao*, 2: 23–9.
- Zhang Ruixian 張瑞賢 1993, 'Fan Zhongyan yu Taiyi jun' 范仲淹與太醫局 [Fan Zhongyan and the Imperial Medical Service]. *Zhongyi jiaoyu*, 1: 37–40.
- Zhang Ruixian 張瑞賢 and Yuan Xiurong 袁秀榮 1993, 'Song Shensong shiqi Taiyi ju jiaoyu de fazhan' 宋神宗時期太醫局教育的發展 [The development of education at the Imperial Medical Service during the reign of the Song emperor Shenzong]. *Zhongyi jiaoyu*, 3: 33–4.
- Zhao Pushan 趙璞珊 1984, 'Taiping sheng hui fang, Sheng ji zong lu, Taiping huiming hejiju fang jieshao' 太平聖惠方, 聖濟總錄, 太平惠民和劑局方介紹 [An introduction to the *Imperial Grace Formulary*, the *Medical Encyclopedia*, and the *Formulary of the Imperial Pharmacy*], *Zhongyi zazhi*, December: 56–7.
- Zhen Zhiya 甄志亞 1994, *Zhongguo yixue shi* 中國醫學史 [History of medicine in China], Taipei: Zhiyin chubanshe.
- Zheng Jinsheng 鄭金生 1983, 'Zhongyao shuji ziliao de chazhao yu liyong' 中藥書籍資料的查找與利用 [The search and usage of literary material of Chinese drugs]. *Zhongyao cailiao ji*, 1983, 2: 40–41; 1983, 3: 38–41; 1983, 4: 36–38; 1983, 5: 29–31, 39; 1983, 6: 39–41; 1984, 1: 37–38, 41; 1983, 2: 42–43.