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Japanese Medical Texts in Chinese on *Kakké* in the Tokugawa and Early Meiji Periods

Angela Ki Che Leung

Introduction

The *kakké* disorder became a focus of medical interest in late Tokugawa and early Meiji Japan when the epidemic was observed in major cities and in the military and even began to affect the imperial household.¹ The main symptoms of the disease included swelling or emaciation, loss of sensation and strength in the legs, sometimes followed by fatal heart failure. It was seen by Japanese elites and authorities as a serious threat to the healthy growth of the rising nation, as the main victims appeared to be able-bodied males, especially young men in the army and navy.² The disorder provided a unique occasion for doctors of different medical traditions in Japan to prove the efficacy of their theories and therapeutics. *Kanpō* doctors, versed in Chinese classical medical texts, were the first to observe and comment on the *kakké* phenomenon in modern Japan.

Kakké is now commonly considered to be the equivalent of beriberi, which is defined in biomedicine as "a nutritional disorder due to deficiency of vitamin B₁ (thiamine) ... widespread in rice-eating communities in which the diet is based on polished rice, from which the thiamine-rich seed coat has been removed." The symptoms, including the weakness of the legs and the ultimately fatal heart condition, are the result of nervous degeneration caused by the

* This paper is based on research funded by the Research Grant Council of the Hong Kong government for my project "Medical Culture in the Canton-Hong Kong Region in the Long Nineteenth Century" (Project No. HKU 446909H, 2009–2012).

¹ *Kakké* moved to the center of attention during the Seinan civil war of 1877. Many of the troops fell sick with this disease, with a rate of affliction in the army of 11 percent in 1876, climbing to 14 percent in 1877 and 38 percent in 1878. Beginning in April 1876, the Japanese empress suffered from this disease; in 1877 the emperor's sister died from it. See Oberlander 2005, 15.

² See Bay 2006.

deficiency of thiamine.³ This interpretation of *kakké* was established and widely accepted only in the interwar period of the twentieth century, with the Nobel Prize in Medicine granted to the British chemist F. G. Hopkins and the Dutch physician C. Eijkman for their work leading to the discovery of vitamins. Eijkman's contribution was specifically the successful framing of beriberi as a deficiency disease caused by the exclusive consumption of polished white rice. The disease was basically unknown to European scientists before Eijkman published the findings of his experiments with chickens fed on white rice in the Dutch East Indies in the last decades of the nineteenth century.

Kakké 脚氣 is the Japanese pronunciation of the same Chinese word for an ailment described in early Chinese medical classics. The Chinese term, *jiaoqi* 脚氣, literally meaning "leg-qi," highlighted the effects on the legs, along with *qi*, perverse "Wind," as the supposed cause of the disease. Both the Chinese and Japanese terms are represented by the same Chinese characters. The term *jiaoqi* appeared in early Chinese medical classics not later than the fourth century and was discussed as a major disease category in medical texts thereafter, with a high point from the seventh to the early twelfth centuries.⁴ Recent research cautions against the simplistic translation of *jiaoqi* in classical Chinese medical texts, thus also of *kakké*, as the beriberi defined by modern biomedicine.⁵ The history of *jiaoqi/kakké* has been made opaque and impenetrable because malnutrition, a modern biomedical construct of the first decades of the twentieth century,⁶ increasingly has reduced the etiological complexity of beriberi to single, context-free biochemical factors.⁷ The deficiency explanation of beriberi, moreover, has left many features of modern *jiaoqi/kakké* (and even of beriberi) unexplained.⁸ In this paper I will attempt to partially restore

3 *The Bantam Medical Dictionary* 2000, 52.

4 See Smith 2008; Ryō 1936, 11–32.

5 Smith 2008; Liao 2001, 2011.

6 Worboys 1988; Arnold 1994; Kamminga and Cunningham 1995.

7 For example, in his 1961 book, Robert Williams promotes the enrichment of rice and bread with thiamine as a straightforward solution to eradicating beriberi; for a critique of such a position, see Scrinis 2008.

8 Features that remained unexplained included the seasonal factor (the epidemics were more acute in warm months) and gender differences (most patients were men). The white-rice theory also could not explain the prevalence of beriberi in nineteenth-century southern China, where most Chinese of the time could not afford expensive polished white rice, and their diet was rarely exclusively limited to rice. Questions on such issues raised in international forums such as the congresses of the Far Eastern Association of Tropical Medicine in the early twentieth century were never fully answered. See also Liao 2001.

the social and cultural context in which *kanpō* doctors observed and understood the *kakké* epidemic in modern Japan. I will do this by surveying explanations of the disorder in *kanpō* medical texts of the eighteenth and early nineteenth centuries prior to the domination of biomedicine in Japanese public health around the turn of the century.

The *kakké* epidemic observed in the late Tokugawa period was understood, analyzed, and debated with traditional *kanpō* categories. In the 1853 compilation by Taki Motokata 多紀元堅 (also known as Tanba Genken 丹波元堅, 1795–1857), *kakké* was given a comprehensive description based on old Chinese and *kanpō* texts: as a disease caused by the intrusion of the Wind toxin (*fūdoku* 風毒),⁹ *kakké* caused sluggishness in the legs, head, neck, or shoulder. Taki also described the "wet" and "dry" types of *kakké*, the former characterized by swollenness, the latter by emaciation and dryness of the skin and numbness in the lower abdomen. In keeping with classical Chinese explanations of the ailment, the toxin was said to enter the patient's body by penetrating the lower limbs and moving up. When it reached the Heart, the patient would die.¹⁰ The death caused by the toxin's finally attacking the Heart (*shōshin* 衝心) was the key feature of the clinical pattern of *kakké*, justifying the great public attention paid to the growing epidemic.

At the beginning of the eighteenth century, Japanese doctors began to notice an increase in the incidence of *kakké*, and between the 1710s and 1861, at least twenty-eight *kanpō* monographs on *kakké* were published.¹¹ Given that single-disease medical texts were rare in both classical Chinese and Japanese traditions, this figure is revealing. In his *On Recipes to Treat Kakké* (*Kakké hōron* 脚氣方論, 1748), Matsui Zaian 松井材庵 (also known as Matsui Etsushū 松井閔衆 and Matsui Shūsuke 松井眾甫) claimed that the prevalence of *kakké* had been noticeable for some thirty years, affecting the nobility as well as the common people, many of whom died of the disease.¹² Calling-the ailment *eyami* 瘟, Matsui appeared to consider the *kakké* of the early eighteenth century a contagious epidemic comparable to those that had been caused by the warm factor and had been prevalent in China since the mid-seventeenth

9 "Wind toxin" (*fengdu* 風毒 in Chinese) was already described as the cause of *jiaoqi* in *Handy Recipes for Urgent Situations* (*Zhou houbēiji fang* 肘後備急方), one of the earliest Chinese medical classics, by Ge Hong 葛洪 (283–343), that mentioned the ailment. Both Sun Simiao 孫思邈 (ca. 581–682) and Chao Yuanfang 巢元方 (active early seventh century) used the term to explain *jiaoqi* in their medical writings.

10 Taki (1853) 1983, 124–126.

11 Liao 2001, 125–126, quoting Fujii Naohisa 藤井尚久, *The History of Our Nation's Diseases* (*Honpō shippēi shi* 本邦疾病史).

12 Matsui 1766.

century.¹³ *Kakké* was managed as a particular public health threat only in the late nineteenth century when Nakano Yasuaki 淺田宗伯 (1813–1894), a leading *kanpō* doctor, set up the first *kanpō* hospital, the Hakusai byōin 博濟病院 (Hospital for General Relief), in 1878 to treat *kakké* patients. This hospital claimed a low mortality rate of 2 percent among these patients, competing favorably with the state *kakké* hospital that used both *Kanpō* and biomedicine. For *kanpō* doctors of this period, the *kakké* epidemic was an exceptional opportunity to redress the authority of *kanpō* medicine, now being seriously challenged by biomedical doctors.¹⁴

The discussions on the *kakké* epidemic by *kanpō* doctors were based essentially on Chinese medical classics produced in the medieval period from the Sui to the Song dynasties, roughly from the seventh to twelfth centuries, when *jiaoqi* was a much-discussed ailment.¹⁵ Late imperial medical experts, especially those after the fourteenth century, seem to have lost interest in studying the disease. A compilation of therapeutic recipes attributed to a high Qing scholar-official from Guangdong, He Mengyao 何夢瑤 (1693–1764), remained in manuscript form until 1918 and did not offer any new explanations on the ailment.¹⁶ A “revival” of interest in the disease only came about in the late nineteenth and early twentieth centuries, when He’s manuscript was finally published in Canton. A doctor from Guangdong, having worked in a Hong Kong charitable hospital, published a major new work in 1887 (see below). The relative lack of interest in *jiaoqi* in the eighteenth and earlier part of the nineteenth centuries in China contrasts intriguingly with the great importance attached to *kakké* by *kanpō* doctors and the Japanese authorities of the same period, who produced a much richer literature on the disease, with new interpretations of classical theories. This general Chinese disregard for the *jiaoqi* disorder was probably one main reason why the American doctor Duane Simmons, of the China Imperial Maritime Customs, believed, in the 1880s, that the

13 On epidemiology in late imperial China, see Hanson 2011, esp. chap. 1, on “warm diseases.”

14 Nakano and Asada (1879) 1993, preface, 1; postface, 46; “On the Hospital for General Relief,” 47–48; Pan and Fan 1994, 209.

15 There was even a monograph on the ailment published in the late eleventh century by Dong Ji 董汲 that is no longer extant but was partially retrieved from fragments during the early Ming. Parts of Dong Ji’s *Essentials of Jiaoqi Therapeutics* (*Jiaoqi zhifa zongyao* 腳氣治法總要), in two *juan*, are available in the early Ming encyclopedia *Yongle dadian* and reprinted in the 1924 Sansan Medical Collection (*Sansan yishu*) edited by Qiu Qingyuan.

16 He 1918.

beriberi/*kakké* then endemic in the Dutch East Indies and Japan did not exist in China.¹⁷

This essay will look at the discussions on *kakké* in *kanpō* texts of the late Tokugawa and early Meiji period (ca. 1748–1883) that were influential not only in Japan but also read and even published in China.¹⁸ I will analyze the nature and etiological construction of the ailment by *kanpō* authors, which were first based on traditional Chinese concepts of *jiaoqi* and later on additional, new anatomical knowledge introduced by Western experts, and I will show how such explanations made sense of the social and cultural problems generated by the urban lifestyle emerging in Japan. I will then briefly compare these explanations with late Qing Chinese medical texts on *jiaoqi* to highlight the particularities of the Japanese context of the modern *kakké* epidemic. I will try to show why, in the complex and rapidly changing political, social, and cultural environment of modern Asia where the *kakké/jiaoqi* epidemics were developing, it was difficult for doctors and patients in Japan and China to understand and accept a biochemical deficiency theory focusing on polished white rice as the sole cause.

Japanese *Kakké*: An Elusive and Changing Disease

One salient feature running through most of the *kanpō* texts in the period under study was the claim that the *kakké* observed in Japan then was the same as the *jiaoqi* disorder described in Chinese Tang and Song medical classics. This justified the authors’ use of these classics as basic references to check against popular recipes alleged to be effective therapeutics. *Kānpō* doctors often stressed the “authenticity” of knowledge on *kakké* as compared with the adulterated information on diseases bearing the same name described in the late imperial period. In one of the earlier texts, Minamoto Yasunori’s 源養德 *Recipes on Kakké* (*Kakké ruihō* 腳氣類方, 1763), the author wrote in the preface that “the discussion on *kakké* during the Tang/Song period is correct and standard; Yuan/Ming doctors’ discussions are mostly irrelevant, and one does not take them seriously. The book *Recipes Worth a Thousand Gold Pieces*¹⁹ [by Sun Simiao 孫思邈, 581–682] is the most essential and standard. As for the book by

17 Simmons 1880, 40.

18 All the texts cited in this essay are kept in major medical libraries in China and recorded in their catalogs.

19 *Beiji qianjin yaofang* 備急千金要方 (ca. 650–659).

Wang Tao 王燾 [670–755],²⁰ though thorough, it is too dense and thick, whereas the two collections of recipes [of the Song dynasty], *Shenghui* 聖惠 and *Shengji* 聖濟,²¹ do synthesize various theories, with tested, fine recipes.”²² With minor differences, *kanpō* doctors writing on *kakké* agreed on these classical texts as the core of the corpus for the study of the disease.

Taki Motokata, author of *Broad Essentials of Various Diseases* (*Zatsubyō kōyō* 雜病廣要, 1853), in keeping with Minamoto Yasunori’s analyses of *kakké*, was more specific. He reiterated the conviction that the *jiaoqi* described in Tang texts was the same as Japanese *kakké*, whereas the *jiaoqi* discussed after the Song was often confused with ordinary numbness and pain of the legs, very different from the *kakké* that would develop into fatal heart attacks (*shōshin*). The two Song imperial recipe collections cited by Minamoto Yasunori also served as basic references for *kanpō* authors on *kakké* therapeutics. In 1812, for example, Okamoto Shōan 岡本昌庵 published a monograph of recipes based on the *Recipes of the Imperial Grace during the Great Peace* (*Taiping shenghui fang* 太平聖惠方, 992).²³ An 1811 book by Maruyama Genshō 丸山元璋, however, shows that for some Tokugawa *kanpō* doctors of the early nineteenth century, the importance of *kakké* was still uncertain. He called the disease “a minor ailment” (*shōshitsu* 小疾), not worthy of the attention of great doctors, even though he already observed a growing number of patients falling sick between summer and autumn. Based also on Sun Simiao’s classic, Maruyama’s work reflected divided opinion on the seriousness of the epidemic in Japan even in the early nineteenth century despite the visible increase in prevalence, in contrast to the unquestionable consensus on its identification with *jiaoqi* as discussed in Chinese medieval classics.²⁴

Even though *kanpō* doctors took Chinese medieval medical classics as the ultimate authority on the *kakké* problem, they also emphasized the intangible character of the epidemic observed during their time. A second consensus among *kanpō* authors on *kakké* was that, despite the claimed affinity of the modern Japanese epidemic with early medieval Chinese *jiaoqi*, *kakké* was not exactly the same as *jiaoqi*, especially in terms of etiology, but was a “transformed” version of the old disease. In the late eighteenth century Minamoto

20 *Medical Secrets from the Royal Library* (*Waitai miyao fang* 外臺秘要, ca. 752).

21 By *Shenghui* 聖惠 he is referring to *Recipes of the Imperial Grace during the Great Peace* (*Taiping sheng hui fang* 太平聖惠方, 992). *Shengji* 聖濟 refers to *General Record of Imperial Charity* (*Shengji zonglu* 聖濟總錄, eleventh century).

22 Minamoto (1763) 1899, 4a.

23 Okamoto 1812.

24 Maruyama 1811, 1a.

had already characterized *kakké* as mutable in time and place: *kakké* in medieval times was not the same as that in the present, and that occurring in the north was different from that in the south.²⁵ Similarly, Taki Motokata later stressed the mutable character of *kakké* by highlighting the possibility that, just as modern *kakké* was similar to Tang and Song *jiaoqi* and different from the *jiaoqi* of the Yuan and Ming periods, *kakké* in the future might very well differ from the disorder they observed in their time, so that taking measures that corresponded to the situation at the time was key to the successful treatment of the epidemic.²⁶ Imamura Ryō 今村亮 (also known as Imamura Ryōan 今村了庵, 1841–1890), court physician of the Tokugawa family and an authority on *kakké*, wrote in his seminal book on the disease published in 1861, *Essentials on Kakké* (*Kakké kōyō* 脚氣鉤要), that experience suggested to him that ancient *kakké* might not be the same as the modern disease, which inspired him to modify old recipes to treat the modern.²⁷ As someone who lived in a rapidly changing era, he understandably stressed the mutability of all diseases: “All diseases under heaven are subject to change according to time and place. The changes are also infinite.” Therapeutics, therefore, had to be very flexible.²⁸

The mutability of *kakké* was further elaborated by Nakano Yasuaki 岡田昌春 and Asada Sōhaku 淺田惟常 (director of the Hospital for General Relief in 1878), who published the *General Treatise on Kakké* (*Kakké gairon* 脚氣概論) in 1879, where they developed the idea that *kakké* was an elusive disorder that changed with time and place. The reason for their compiling the book was that, despite the mentions of the disease in old Tang and Song classics and in old *kanpō* texts such as *Ishinpō* 醫心方 (tenth century) and *Man’anpō* 萬安方 (fourteenth century), the effectiveness of recipes and therapeutics depended on locality and customs, time and circumstances. The authors quoted old *kanpō* classics to prove that “in our country, the disease had existed for a thousand years.” However, “in later times, when the four seas were in great turmoil with incessant warfare, we rarely heard of the disease again. In recent years, [this illness] has reemerged. The clinical patterns are similar to those described in Jin and Tang medical classics. The analyses are also similar. This is due to changing times and customs. We are in a different era.”²⁹ The authors seemed to imply here that *kakké* was a disease of prosperity and peace. *Kakké* reappeared in peaceful and affluent Meiji Japan, real *jiaoqi* was endemic in

25 Minamoto (1763) 1899, 10a.

26 Taki (1853) 1983, 120.

27 Imamura 1861, *juan* 1, *hanrei* 凡例 (explanatory notes), 1a.

28 Imamura 1861, *juan* 1, 15b.

29 Nakano and Asada (1879) 1993, 5.

prosperous Tang China, and the disorder bearing the same name was likely to have been confused with other diseases in turbulent late imperial China. They went on to assert, under the section heading "On the Differences in Clinical Patterns between Old and Modern *Kakké* in This Nation," that modern *kakké* characterized by the fatal heart attack, as described in Han and Tang classics, was first observed in Japan only in the Hōreki 寶曆 era (1751–1764). Moreover, the *kakké* in modern Japan was also characterized by its prevalence in the warmer season, from summer to autumn, and affected mostly young and able-bodied males, features that were not analyzed in medieval Chinese classics on *jiaoqi*.³⁰

Imamura Ryō, in his later syncretic work on the disease, *New Treatise on Kakké* (*Kakké shinron* 脚氣新論, 1878), again summarized his views on the elusive nature of disease and the specificity of modern epidemics prevalent in urbanized and prosperous Meiji Japan: "Diseases are complex; their changes are multiple. There are modern diseases that did not exist in the past, such as cholera. And there are modern diseases that became more prominent than in the past, such as *kakké*."³¹ For Imamura and other *kanpō* doctors of the mid-nineteenth century, cholera and *kakké* marked Japan's modernity in significant ways: devastating mostly densely populated urban hubs and victimizing well-off and able-bodied young men in great numbers, the diseases seemed to be the by-products of development and prosperity. This idea was behind most of the discussions on the etiology of *kakké* by *kanpō* doctors.

The perception of a mutable *kakké* was articulated more and more clearly in major *kanpō* texts, a feature that was totally absent in contemporary Chinese medical texts. *Kanpō* writers since the early eighteenth century were aware that they were living in a rapidly changing time and experiencing "new" diseases with particular transmission patterns corresponding to new social contexts and mores. Such diseases were seen as necessary evils of an increasingly affluent, rapidly transforming, and urbanizing nation.

Causes of *Kakké*: Intangible Wind and Damp Toxins

Most *kanpō* writers maintained that the Wind toxin (*fūdoku* 風毒) was the main cause of *kakké*. The Chinese equivalent, *fengdu*, as in the title of the *jiaoqi* chapter in Sun Simiao's classic, was used as the collective term to include all external pathogens (Cold, Heat, Wind, Dampness) emerging from the ground. As one's legs were in constant and direct contact with the ground, they were

³⁰ Nakano and Asada (1879) 1993, 5–6.

³¹ Imamura 1878, preface, 2a.

the first part of the body to be affected by the toxin, thus the term *leg-qi*. The toxin would then move up the body and when it reached and attacked the Heart, the patient would die.³² This fatal development of *jiaoqi*, according to *kanpō* experts, distinguished real *jiaoqi*, or *kakké*, from other leg and foot ailments described in post-Song medical texts. Based on this classical definition of *fengdu*, *kanpō* experts further revised and elaborated the notion to accommodate their idea of an elusive *kakké*. While both Tachibana Genshu 橘元周 (also called Katakura Kakuryō 片倉鶴陵, 1751–1822), in his 1787 monograph on *kakké*,³³ and Taki Motokata adhered to Sun's explanations, considering the toxin to be the usual external pathogens, Imamura Ryō, in an effort to distinguish Japanese *kakké* from Chinese *jiaoqi*, constructed the concept of "Damp toxin" (*suidoku* 水毒), a toxin different from the usual external pathogens, emerging from the ground only in summer and autumn.³⁴ In his later synthesis of *kakké*, he provided a totally different interpretation of *fūdoku*: the disease was attributed to "Wind," or *ki*, not so much because of the importance of the implied external pathogens, but because the two terms defined the disease's elusive and mutative character. To him, the toxin that caused *kakké* was not just any external pathogen under the umbrella of *fūdoku* but a compressed severe toxin (*utsudoku* 鬱毒) buried deep underground,³⁵ an idea reminiscent of the *zqi* 雜氣 (malignant *qi*) concept that the late Ming doctor Wu Youxing 吳有性 used to explain the series of contemporary epidemics in Jiangnan.³⁶

The revised etiology of *kakké* as having roots in but different from that of the medieval Chinese *jiaoqi* corresponded to the doctors' understanding of the changing environment of a unique, modernizing, and urbanizing Japan. *kanpō* doctors seemed to be most impressed by the main victims of the disorder: formerly healthy and often well-off urban men. In his 1787 monograph on *kakké*, Tachibana Genshu had already noted that these main victims dwelled in luxury mansions and enjoyed a rich diet and a leisurely life. To explain this new and unusual phenomenon, however, he relied on the Chinese medical concept of fetal toxin (*taidoku*, *taidu* 胎毒), a poison introduced into the fetus during intercourse between sexual partners with excessive carnal passion.³⁷ What was implied here was obviously a perceived hedonistic lifestyle in urban Japan that

³² Sun (1307) 1955, *juan* 7, "Fengdu jiaoqi," 138–140.

³³ Tachibana 1787, preface, 1b.

³⁴ Imamura 1861, *juan* 2, 1a.

³⁵ Imamura 1878, 1b–2b.

³⁶ For a recent discussion on Wu Youxing and his impact, see Hanson 2011, chap. 5.

³⁷ The concept was a relatively late invention, appearing in the late Song and especially in the Yuan period, and was most often used to explain childhood diseases such as smallpox. See Chang 2000.

raised the level of fetal toxin in the body. Tachibana warned that excessive sex would unnecessarily boost the Blood and *ki* of the body, further intensifying this innate fetal toxin and making the body extremely receptive to external pathogens. For him fetal toxin was also the cause of other difficult illnesses of the leisurely class such as heat exhaustion, madness, and shoulder pain. The term "Wind toxin" (*fūdoku*), for him, suggested not ordinary external pathogens as stated by Sun Simiao but the extraordinary swiftness of the onslaught of *kakké* on the young and strong, like "galloping horses." The explanation for why fewer women got the disease was that menstruation regularly ridded the fetal toxin from their bodies.³⁸

Later *kanpō* doctors of the mid- and late nineteenth century, however, did not take up the fetal toxin explanation but provided new interpretations of the etiological principles of Tang classics. Taki, for example, in his 1853 text, elaborated on the external and internal causes developed by Song and Yuan doctors to explain why the well-to-do were more vulnerable. As the ailment was externally caused by dampness in the ground, Taki claimed that leisurely and immobile people, such as hardworking scholars who remained motionless for a long time on wet ground, and people who engaged in excessive sexual activities without covering their legs properly were the most vulnerable victims; whereas those who enjoyed rich foods and consumed excessive quantities of alcohol and dairy products would contract the disease internally because the intake of such hot and damp foods would provoke stagnation in the lower Burner (abdomen) and consequently swelling in the legs.³⁹ Two decades later, Imamura further elaborated on a moralizing etiological discourse that tried to make sense of Japan's modernization and urbanization. In his 1878 text, he noted the prevalence of the epidemic especially in metropolitan centers such as Edo, Kyoto, and Naniwa (Osaka). Agreeing with earlier doctors that the epidemic was the result of the hedonistic and decadent lifestyle of wealthy urbanites, he highlighted the internal cause to explain why the wealthy fell ill: excessive food and sex depleted the body of its primordial *ki* (*genki* 元氣), making it vulnerable to external pathogens.⁴⁰ Despite *kanpō* doctors' claim that their knowledge of *kakké* was based essentially on Tang and Song classics, Imamura's interpretation shows that they also inherited from Jin and Yuan doctors the reconstructed "internal" causes of diseases, implying the greater personal and moral responsibility of the patient for contracting the disease.⁴¹

38 Tachibana 1787, 1b–2b, 3b–4a. The menstruation theory was also used by late imperial Chinese doctors to explain why there were fewer female victims of leprosy.

39 Taki (1853) 1983, 121–122.

40 Imamura 1878, 3a–b.

41 See Liang 2002, 177–179.

Nakano and Asada explicitly quoted Li Gao 李杲 1180/81–1251/52, one of the four great Jin/Yuan doctors, in their etiological discussion: people who were accustomed to a rich diet of dairy products and alcohol (thus, northerners) would introduce excessive dampness into the body, causing *kakké*.⁴² Imamura pushed the "internal" cause argument further to highlight the moral aspect of *kakké* etiology. In modern Japan, he said, urban men in their prime indulging in excessive sex and a luxurious lifestyle were the most vulnerable to the disease, whereas women, children, and the elderly (those excluded from such a lifestyle) were rarely affected. He even provided some crude figures to prove his point: urban, well-to-do males made up 80–90 percent of *kakké* patients.⁴³

It was also Imamura who spelled out most clearly, in his 1878 work, why *kakké* was a disease of "modernity." In this book, he reinterpreted the notion of Wind toxin (the *fūdoku* of Sun Simiao) by evoking a new element, toxic air buried beneath urban ground: "wherever the land is lowly and damp, with dense populations and overwhelming human activities, where people do not even have enough space to stand on, the *ki* of the ground, not being able to dissipate freely, will cause this disease. Why then does it emerge only in the spring and summer? It is because [during this season] the *ki* of the ground is on the rise, and as it gets blocked [by human masses and activities on the ground], the obstructed steaming process produces a toxic *ki*."⁴⁴ Here, the hedonistic lifestyle of urbanites becomes a secondary cause of *kakké*. Imamura's association of the toxic *ki* with coastal, low-lying, crowded urban settings showed his sensitivity to the changing, modern Japanese context of a "mutable" disease bearing an old name, though the introduction of the miasma in Japan in the early nineteenth century by Dutch doctors probably helped to inspire this reinterpretation.⁴⁵

42 Nakano and Asada (1879) 1993, 6. For Li Gao, the main difference was between northern and southern diet and customs. The food and drink of northerners were so rich that there could be accumulation of fluid and heat internally that would slowly descend to the lower limbs, causing *jiaoqi*, whereas southerners would contract the same disease by external pathogens, mainly by the intrusion of external dampness and heat into their bodies.

43 Imamura 1878, 3b–4a. Imamura also stressed that roughly half of the victims (50–60 percent) were attacked by *kakké* while suffering from other diseases: complications from other diseases such as Wind Attack by Cold Damage, fever, distension of the abdomen, diarrhea, lower-abdomen pain with Mold toxin, and postnatal complications for women patients. See Imamura 1861, *juan* 1, 1b.

44 Imamura 1878, 3a.

45 Anthonius F. Baudouin (1822–1885) was one such Dutch doctor. Satomi Giichiro considered miasma a kind of "mold" (*baishu*), a concept close to Imamura's.

Clinical Patterns

Compared with the changing concepts of the origin and causes of *kakké*, the clinical patterns of the disorder remained relatively stable or unchanged. All *kanpō* authors referred to Sun Simiao's classic on the main patterns: "At the beginning, the legs are weak and cannot move easily. Or before anything else, the head, neck, arms, and shoulder suffer, or the heart and abdomen feel sluggish. One may have nausea seeing food and hate the smell of food. There is perhaps diarrhea or constipation and difficulty in urination, unusual throbbing of the heart, the fear of light, or lethargy, forgetfulness, delirium, fever, and headache, coldness and cramping of the body, the ankles may become swollen, legs may feel numb ... numbness also of the lower abdomen." The final and fatal phase of *jiaoqi* was sudden death caused by the malignant *qi* (*shōshin*) attacking the Heart. In his 1861 text, Imamura called for great attentiveness to the slightest symptoms, as they were difficult to detect, especially changes in breathing and urination. Shortness of breath and reddish urine reflected a serious accumulation of internal toxin, whereas unprovoked perspiration and vomiting might indicate the imminence of sudden death.⁴⁶

Using new Western anatomical concepts, Imamura later revised his descriptions of *kakké*. After having worked with biomedical doctors in the state *kakké* hospital, he put aside the Damp-toxin idea and elaborated on the internal "blockage" narrative using Western anatomical categories in his *New Treatise on Kakké* of 1878:⁴⁷ for him, the toxin emerging from the ground entered the body first through the legs and then penetrated into liquid blood in blood vessels (i.e., not Blood in the traditional Blood-*ki* duo but the physical, liquid blood of Western anatomy). He also used new anatomical concepts to describe the process of toxin penetration: it first penetrated the skin, then the nerves, the muscles, and, finally and fatally, the viscera. When the toxin entered the heart and the lung via nerve number five, he explained, the case became critical and often terminal. For him, this explained why the fundamental clinical patterns of *kakké* consisted of urinary and breathing abnormalities. The former was a manifestation of the toxin "blocking blood vessels," while the latter was the symptom of the toxin entering the brain and consequently interfering with

46 Imamura 1861, *juan* 1, 2a–3a.

47 Imamura 1878, 6b–7b. By this time Imamura, together with Toda Choan 遠田澄庵, had been in contact with his biomedical colleagues, including Kobayashi Tan 小林恒 (1847–1894), Sasaki Toyo 佐佐木東洋 (1838–1918), Ikeda Kensai 池田謙齋 (1841–1918), and Miyake Hiizu 三宅秀 (1848–1938). All of them worked together at the national *kakké* hospital, the Hospital for General Relief, founded by Nagayo Sensai 長與專齋 (1838–1902). See Oberlander 2005, 16–17.

the normal contraction of the heart, leading to lung dysfunction, as the heart and the lungs were interdependent. The fatal and final *shōshin* symptom of *kakké* was, therefore, not "heart attack" but "suffocation" as a result of lung failure.⁴⁸ New Western anatomical knowledge, instead of being an effective tool for unseating the explanations and analyses in the *kanpō* classics, provided Imamura, on the contrary, with a new and useful body map with which to consolidate, using a new, modernized vocabulary, the old description of the disease's clinical pattern as established in the classics.

Therapeutics

Kanpō doctors reiterated the difficulty of treating *kakké* because of the deadliness of the toxin.⁴⁹ All repeated Sun Simiao's guiding principle that the art of the cure was in maintaining the delicate balance between purging and replenishment, as the illness was caused by both the internal accumulation of toxic matters, blocking the circulation of *ki*, and the depletion of primordial *ki*. Imamura Ryō elaborated on the principle of the dual treatment of "replenish and purge" (*hosha* 補瀉). As "purging accelerated death, and replenishment shortened life," the art was to achieve the perfect balance in the implementation of the two methods. Imamura reminded readers that Chinese medieval classics prioritized purging over replenishment, as most patients died of severe internal stagnation of the toxic *ki*, while purgatives rarely killed.⁵⁰ *Kanpō* doctors nonetheless had varied views on the method for purging and regulating *ki*. Earlier doctors such as Minamoto Yasunori, in keeping with the conviction that the disease had been best understood by Sun Simiao, stressed the importance of acupuncture as an essential treatment, especially at the beginning of illness when the patient felt weakness in the legs.⁵¹ He recommended supplementing acupuncture with life-nurturing exercise, *dōin* 導引.⁵² Bathing of the legs and applying hot pads to the feet were considered harmful and were generally prohibited.⁵³

48 Imamura 1878, 7a–b. Imamura also applied the anatomical notions of nerves and muscles in his "new" explanation of *kakké*. Since he stressed the importance of abnormal urination as a major feature of the clinical pattern, he recommended that patients have a urine test.

49 Imamura 1878, postface.

50 Imamura 1861, *juan* 1, 8b–9b.

51 Sun (1307) 1955, 140.

52 Minamoto (1763) 1899, *hanrei* 凡例, *furoku* 附錄 (appendix), 6a–10b.

53 Nakano and Asada (1879) 1993, *hanrei*, 2.

Most *kanpō* doctors in the nineteenth century, however, simply summarized the acupunctural principles of Sun Simiao and Wang Tao without further comment, but they elaborated greatly on drug therapy, as did mainstream doctors in late imperial China. Imamura considered acupuncture “not a method to deal with [the disease’s] fundamental causes” but still useful for the removal of obstruction.⁵⁴ He stressed the superiority of *kanpō* herbal formulas in treating the Japanese body, especially when compared with Western therapeutics, which he considered to be too abrasive. *kanpō* recipes, he explained, offered patients with made-to-order, composite herbal prescriptions that could target every single symptom of the complicated *kakké* clinical pattern like a well-organized regiment.⁵⁵ Here he highlighted the adaptability of therapeutics for patients of different localities and customs. More important still, following the moralizing etiology of *kakké*, *kanpō* doctors prescribed strict bodily discipline as a preventive measure and as a cure, strongly advising against rich diets and overindulgence in sex and alcohol. Imamura recommended unsalted and simple foods, regulated sex, and the control of extreme emotions. Taki Motokata basically advised against alcohol and all meats and vegetables with strong tastes and recommended certain cereals, milk, and chestnuts. While restraining from excessive sex, one must also have moderate exercise, especially walking. Idleness and lying in bed all the time were considered a dangerous lifestyle.⁵⁶

Despite *kanpō* doctors’ receptiveness to Western miasmatic theory, most seemed skeptical of Western doctors’ advice to remove patients from the place where they had contracted the disease (*tenchi* 轉地, “to change location”). The American doctor Duane Simmons, working in Yokohama in the late nineteenth century, was a typical supporter of such a treatment. He suggested in 1880, “An early removal of the patient beyond the influence of the poison is the best means of treatment,” given “no drug has been discovered possessing specific properties in this disease.”⁵⁷ This method had apparently become one of the most common practices used by Western doctors to treat *kakké* patients in Japan as well as in other parts of colonized Asia,⁵⁸ but it was considered with great skepticism by *kanpō* doctors. Tōyama Chinkichi 遠山椿吉 pointed out in 1913 that moving patients to the seaside and low ground, much recom-

54 Imamura 1861, *juan* 2, 33a.

55 Imamura 1878, 8a.

56 Imamura 1861, *juan* 1, 2b–3a and the section on “food restrictions” (9b–10a). Nakano and Asada ([1879] 1993, *hanrei*, 2) advised patients to strictly respect taboos and life-nurturing principles; see also Taki (1853) 1983, 143–144.

57 Simmons 1880, 75–76.

58 The immediate removal of patients from the place where they contracted beriberi was also common practice in colonies such as Hong Kong and the Malay states.

mended by Western doctors, would not do any good but would only accelerate the fatal *shōshin* because these places were too damp. He suggested moving patients to high and dry ground if relocation was done at all.⁵⁹ The fear of cold damp *ki* and of the toxin buried under city ground, main causes of the disease in classical Chinese and *kanpō* medicine, was behind reservations about moving patients from the place of disease contraction.

Kakké as a Distinct Disease of the Modern Japanese Nation

Kanpō specialists on *kakké* of the eighteenth and nineteenth centuries persistently saw the disease as specific to Japan at that time, a Japan that was characterized by new wealth and accompanying moral corruption. Shortly before the Meiji era, *kanpō* doctors were already seeing *kakké* as a unique, new “old” disease in Japan. Asada Sōhaku, in the postface adorning Imamura’s 1861 text, explained the particularity of Japanese *kakké*: “the name [of the ailment] is the same throughout the ages, yet the ailment itself is different; the Japanese and the Chinese descriptions of the clinical patterns are the same and yet the causes are different.”⁶⁰ Such a perception influenced even some nineteenth-century Western medical specialists who were beginning to take closer looks at what they considered a new disease unknown in the West. In Simmons’s 1880 report on the disease for the China Imperial Maritime Customs, he regretted that the name *kakké* was used by all the foreign physicians observing the disease in Japan, “as it is likely to lead to confusion by implying that it is a distinct malady; whereas its identity with beriberi has never been really disputed by anyone but Dr Hoffman.”⁶¹

Actually, not only Hoffman but also the Dutch doctor Pompe van Meerdervort (1829–1908), teacher of Sasaki Toyō (1838–1918) of the government *kakké* hospital, described the Japanese “variation” of beriberi.⁶² Simmons himself was contradictory about the specificity of the Japanese *kakké* in relation to beriberi: he conceded that Western doctors, who first observed beriberi in India, understood the disease as being provoked by anemia or malaria and thus treated patients with iron supplements and quinine, killing many Japanese *kakké* patients in the process. He admitted that Japanese doctors’ treatment by

59 Tōyama 1913, 61.

60 Imamura 1861, postface.

61 Simmons 1880, 39. According to Simmons, the said Dr. Hoffman was misled by his ignorance of Indian beriberi. Simmons believed that beriberi was the same as *kakké*.

62 Oberlander 2005, 18.

"rapid depletion and evacuation of the enormous collections of serous fluid," on the contrary, saved a lot of lives.⁶³ *Kanpō* etiology and therapeutics of *kakké* obviously enjoyed considerable success and influence in Japan in the late nineteenth century, drawing attention even from foreign biomedical doctors and contributing to the perception of *kakké* as a distinctly Japanese disease.

The claim that *kakké* was a "national" disease of modern Japan can also be appreciated in the sense that the Japanese were among the first to notice the emergence of a new epidemic that needed to be studied seriously. The outbreak of beriberi in the Dutch East Indies was observed and researched by Western biomedical experts only in the last decades of the nineteenth century.⁶⁴ The modern *jiaoqi* epidemic in China, on the other hand, remained largely obscure until the early twentieth century. As late as 1905, the government bacteriologist in Hong Kong, like Simmons two decades earlier, reported, "There is no strong proof that the disease is endemic either in Hong Kong or in China as a whole."⁶⁵ The reality was that the *jiaoqi* illness had been observed and managed only by Chinese doctors in Chinese institutions up to this point. Like *kanpō* writers, Chinese doctors were seeing the reemerging *jiaoqi* endemic as a new, modern phenomenon in a changing world order. But their articulation of the "modern" character of the *jiaoqi* phenomenon was very different from that of *kanpō* writers. In the rest of this essay, I will briefly describe the explanations for the nineteenth-century *jiaoqi* epidemics in southern China that were given in Chinese medical texts, for the purpose of contrasting them with those given in the *kanpō* texts.

Jiaoqi in Nineteenth-Century Chinese Medical Texts

As already mentioned, *jiaoqi* was not a much-discussed disease in the late imperial period until the last two to three decades of the Qing dynasty. The only book worth mentioning is *Secret Jiaoqi Recipes* (*Jiaoqi mifang* 腳氣秘方), attributed to the famous Cantonese scholar-physician He Mengyao 何夢瑤 (1693–1754, *jinshi* 1730). This text was said to be in manuscript form and was not published until 1918. Unlike contemporary *kanpō* texts, this book, citing principles and recipes from medical classics on the disease, did not discuss *jiaoqi* in any contemporary social context. But similar to *kanpō* texts, and unlike most of the post-Song descriptions of *jiaoqi*, the treatise emphasized the terminal

63 Simmons 1880, 50.

64 Carpenter 2000, chap. 1; Heidhues 1992, 61–65.

65 Hunter 1905, 130.

chongxin "assault on the heart" caused by internal obstruction and did not confuse the disorder with various pains or numbness of the foot or leg. The published version of this text nonetheless contains a hint that suggests a possible epidemic situation in Guangdong in the early nineteenth century. In the postscript dated 1819, Huang Peifang 黃培芳 (early nineteenth century), another eminent Cantonese scholar, told the reader that the manuscript was given to him by monks in the White Cloud Monastery in Canton, who were famous for their expertise in treating *jiaoqi* and had successfully treated Huang himself.⁶⁶ By 1918, when the manuscript was finally printed for the first time, *jiaoqi* was clearly epidemic in Guangdong.

Three decades before the publication of He's book, the first modern Chinese medical book on *jiaoqi*, *Preliminary Words on Jiaoqi* (*Jiaoqi chuyan* 腳氣芻言), authored by a Cantonese doctor, Zeng Chaoran 曾超然, was published in 1887. The revival of Chinese medical writings on *jiaoqi* in the late Qing period seems to have happened at a particular conjuncture: rapidly growing emigration from southern China to various parts of the world, especially to Southeast Asia. Zeng observed many patients in the Tung Wah Hospital in Hong Kong, the first Chinese charitable hospital, which had been established in 1872 and where he had worked and taught since 1879. All ten medical cases of *jiaoqi* described in his book concerned young male patients, mostly intellectuals (students) or in clerical occupations in Hong Kong or overseas, with many being recent migrants from Guangdong.⁶⁷ Like *kanpō* doctors on *kakké*, Zeng perceived a leisurely lifestyle or one requiring little physical exertion to be a common feature of *jiaoqi* patients. Quoting major classical remedies, Zeng also mentioned more recent recipes using southern herbs or animals. The most revealing of all new therapeutics described in Zeng's text, however, is the Chinese version of *tenchi* 轉地 (*zhuandi*, "to change location"). Here *zhuandi* meant repatriating patients from their overseas workplace back to their native place, which was Canton for most patients in Zeng's text. Zeng claimed that most patients' conditions improved after being repatriated. Very different from the *kanpō* idea of moving the patient to dryer, high ground, the Chinese *zhuandi* therapy shows that *jiaoqi* was basically considered a migrant disease par excellence. In fact, the Tung Wah Hospital, where Zeng worked, was a key institution in the regular organization of transfers of overseas *jiaoqi* patients back to Canton. These repatriations began not later than 1903 and involved thousands of patients

66 He 1918, postscript, *juan* 4, 38.

67 Zeng 1887. Only one of the patients that he described was an agricultural worker.

every year being transported back to Canton from Southeast Asia, Latin America, and Hong Kong.⁶⁸

Zeng's book could perhaps be considered part of a growing popular and local medical literature that seemed to be flourishing in China at that time: the *yanfang* 驗方 ("recipes proven by experience" tradition, as opposed to "classical" recipes, 經方) literature on diseases observed to be regional endemics in the nineteenth century, such as *jiaoqi*, plague, cholera, diphtheria, fevers, swollenness, and so on in the Guangdong region.⁶⁹ These *yanfang* and more formal medical texts on new diseases seemed to inform each other from the late nineteenth century onward, gradually forming a corpus of local medical texts that reinforced the idea that endemics could be treated more efficiently by local doctors and remedies,⁷⁰ an idea that was also promoted by *kanpō* doctors for *kakké*. Just as *kakké* was thought to be a national disease of modern Japan, *jiaoqi* in China was often described as typically "southern."⁷¹ It is interesting to note that British doctors in Hong Kong, including Patrick Manson and James Cantlie of the tropical medicine school, were also informed by Chinese experts on such local diseases often unknown to Western doctors. They admitted that their first contact with beriberi patients was in the Alice Memorial Hospital, established in 1887 in Hong Kong as the first privately funded charitable Western hospital treating Chinese. The report on their first observations shows that they were essentially instructed by local Chinese doctors, possibly including

68 The Tung Wah Hospital partnered with the major charitable Chinese medical hospital in Canton, the Fangbian Hospital 方便醫院, to organize the repatriation of *jiaoqi* patients. At first, patients were transported to Canton via the West River; later in the twentieth century, they traveled on the Canton-Kowloon train. The Tung Wah Hospital, as a major charitable organization for Hong Kong and overseas Chinese since 1871, paid the Fangbian Hospital for accommodating patients repatriated by the Tung Wah. See Leung 2010.

69 Many of these popular texts were compiled and published by herbal stores in Canton, and some of these works had several editions. I have in hand an undated and anonymous text also called *Jiaoqi chuyan*, a short work that contains popular recipes. One very popular work, called *Record to Provide Relief to the Populace* (*Ji zhong lu* 濟眾錄), included short texts and recipes on plague, *jiaoqi*, cholera, fevers, and swollenness and a prayer to ask for rain. *Complete Records of the Xinggong Charitable Hall* (*Xinggong quanlu* 省躬全錄), a long manuscript on various "local" diseases published in 1914 by a Daoist charitable hall in Canton, contained pages of recipes on *jiaoqi*.

70 It is interesting to note that the recently published series of Cantonese medical texts of the late Qing and early Republican period reveal an emerging medicine with "Cantonese" characteristics. Many of the texts are on endemic diseases of the period. See Zheng 2009.

71 This point was emphasized in the reedition of Zeng's book by the Guangdong military in 1914.

Zeng, who was then employed as a doctor and teacher in the Tung Wah Hospital, on the clinical pattern, causes, and therapeutics of the disease.⁷²

The revival of interest in *jiaoqi* in China was also a consequence of a growing epidemic in Shanghai, a place that Chinese doctors described as an ideal breeding ground for *jiaoqi* because of its low topography and muggy climate. Shanghai was thus similar to those insalubrious Japanese coastal cities where *kakké* was rampant. Ding Fubao 丁福保 (1874–1952), well versed in traditional medicine but also a major translator of Japanese medical texts into Chinese since 1908, published the first compilation of classical texts on *jiaoqi* with translated Japanese texts on *kakké* in 1910.⁷³ Translated passages revealed competing biomedical theories on beriberi: toxins in the form of mold or in fish or spoiled foods, contagion, special lifestyles of men, immobility, miasma, low standard of living, shoes that don't fit, and so on. Toxin in rice as a result of bad storage rather than something intrinsic was also mentioned as a possible cause but was not given as much weight as miasma. White rice as a cause was viewed with skepticism. Ding himself considered toxin in spoiled rice an important cause, with bad local environment (*shuitu* 水土, "water/earth") a secondary cause. He was typically eclectic in his therapeutic recommendations: observing life-nurturing principles, restraint from sexual activity, avoidance of violent exercise, attention to food, transferring the patient to higher ground, and bloodletting to release the pressure on the heart. While Ding introduced Japanese and biomedical explanations of the disease in his book, his contemporary, a much-respected traditional practitioner, Zhou Xiaonong 周小農 (1876–1942), who practiced in Shanghai until 1911, provided us with concrete medical cases of the time. These cases illustrate the rapid urbanization of Shanghai as the background of the growing epidemic, as many of his patients were immigrants to Shanghai from other parts of China. Uninformed immigrants, especially young men seeking opportunities in this big city, were described as particularly vulnerable because they were unaccustomed to the unhealthy environment and unfamiliar with the symptoms and treatment when they contracted *jiaoqi*. Like Zeng, he recommended returning to their native place as one of the most reliable treatments.⁷⁴ Modern Chinese medical writers did not seem to question the stability of the old *jiaoqi* ailment and attributed more importance to external pathogens as the key cause of the disease, as did Tang classics. However, even though they did not formulate any

72 Gibson 1900.

73 Ding 1910.

74 Zhou 1971, 194–202. His patients were again all male; although employed in different businesses and institutions, they obviously belonged to a middle class.

notion of the “mutability” of *jiaoqi* as did *kanpō* authors, they had little problem situating the epidemic in the modern context.

Conclusion

While both *kanpō* authors and traditional Chinese doctors of the period understood and explained *kakké* and *jiaoqi* with the same classical vocabulary, the ailment was perceived as a modern phenomenon. *Kanpō* doctors increasingly depicted *kakké* as a distinct disease of modern, urbanized, and affluent Japan. It was, above all, a “changing” disease. Chinese doctors continued to view *jiaoqi* as the disease with the same name in the medieval period and highlighted its regional nature, yet they placed it in a totally modern context of global migration: the disease was observed to affect mainly immigrants in overseas tropical regions or in major southern cities in China. Japanese and Chinese doctors elaborated on both the external and the internal causes developed by medieval and Jin and Yuan masters to explain the respective patterns of the epidemics they were observing, and they similarly concluded that the disease affected mostly young urban males of respectable social status or men with rich diets or undisciplined lifestyles. While removal of patients to high and dry ground far from city centers was a modern *kanpō* therapeutic option, Chinese doctors recommended repatriation to the patient’s native place, both methods articulating clearly two different experiences and readings of the unsettling, globalizing modern world.

Kanpō and Chinese doctors made sense of the emerging world of the nineteenth century by viewing *kakké* and *jiaoqi* as a disease category that was multicausal, as taught by the old classics, but also socially, regionally, or even ethnically bounded, which sometimes explained its changeability and how it affected mostly an up-and-coming class of respectable young men entering a competitive, alienating, and globalizing world of opportunities and risks. For a long time it was considered a disease of the privileged, not of the deprived, as implied in classical texts. Western biomedical scientists, on the other hand, observed Asian beriberi patients among laborers and coolies in plantations, prisons, asylums, camps, orphanages, and schools in the colonies. They experimented with chicken, pigeons, and other animals, which provided them with data that inspired the construction of the nutrient deficiency theory focusing on a quintessentially Asian staple food—rice—leading ultimately to the discovery and study of vitamins, the cutting-edge biochemical research at the turn of the twentieth century. Viewing beriberi as a new, universal, specific, and uncausal disease victimizing impoverished and ignorant Asian

populations with a deficient diet consisting only of white rice was the way that nineteenth-century Western biomedical experts made sense of colonized Asia. This was completely different from *kanpō* and Chinese doctors’ worldview, which was based on their everyday experience and their knowledge of classical texts, which retained their explanatory power well into the twentieth century. It is thus understandable that the theory of malnutrition caused by a diet of white rice took a long time to have any real, albeit limited impact in Asia.⁷⁵

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⁷⁵ See Arnold 2009, 2010.

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