

## **Beriberi, Military Medicine, and Medical Authority in Prewar Japan**

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This article examines the development of Western medicine in Japan as reflected in the forty-year beriberi debate (1885–1925). Beriberi, a disease that we now know is caused by vitamin B1 deficiency, was a major public health problem that cut across social boundaries, even afflicting the Meiji Emperor. Outbreaks debilitated the military and thus threatened national security. The principal opponents in the were navy doctors on one side and army surgeons and Tokyo Imperial University on the other. Using medical statistics, navy deduced that the cause was a protein deficient diet, and treated the disease effectively by adding barley to navy rations. Army and university doctors believed that it was caused by a yet-to-be discovered bacillus and also maintained that only laboratory-based data, not statistics, could be regarded as legitimate scientific evidence. Moreover, they saw the use of barley as derivative of traditional medicine. Traditional medicine, or *kanpō*, used barley in tandem with herbal drug prescriptions to treat this disease, but *kanpō* was seen by the elite of the Western-trained medical community as an unscientific remnant of the feudal past that had no place in modern Japan. Yet in practice, it did. Meiji Japan was medically plural; cosmopolitan or scientific medicine existed alongside traditional medicine. Some doctors practicing Western medicine relied on *kanpō* practices to treat beriberi. Integration of traditional medicine and Western medicine was, however, highly contested, and resistance to it formed one of the bases of the beriberi debate.

**Keywords:** BERIBERI, MEDICINE, MEDICAL HISTORY, BARLEY, RICE BRAN, INTERNAL COLONIZATION, TAKAKI KANEHIRO, ISHIGURO TADANORI, MORI RINTARŌ, TSUZUKI JINNO SUKE, ŌMORI KENTA, TŌYAMA SHUNKICHI

In 1918, the executive members of the Internal Medicine Association of Japan, all of whom were Tokyo Imperial University professors, came under fire when a member of their own faculty, Tazawa Ryōji 田沢籙二 (1883–1967), was accused of allowing ideological bias

to skew the research findings he presented. When working in the laboratory of Professor Hayashi Haruo 林春雄 (1874–1952), Tazawa had argued, in line with the thinking of the professor, that rice bran extracts had no effect on those suffering from beriberi (vitamin B1 deficiency disease). But upon taking a position in the lab supervised by Irisawa Tatsukichi 入沢達吉 (1865–1938), Tazawa suddenly declared that rice bran extracts were effective.<sup>1</sup> His reversal of position made it appear that he had curried favor at the expense of scientific integrity, and it did not escape notice. The medical press reported that “there are countless people who question the consistency of Tazawa.” In the face of popular criticism, the Tokyo Imperial University coterie “tried to hide Tazawa and his shame in their sleeves.”<sup>2</sup>

The question of the effectiveness of rice bran extracts surfaced in the 1910s, but the larger debate over the role of diet and the etiology of beriberi dated back to the 1880s. On one side of the debate were the diet theorists who based their argument on clinical and empirical studies, and on the other side stood Army Medical Bureau physicians and Medical Department professors from Tokyo Imperial University who believed the disease was caused by a yet-to-be-discovered bacillus.<sup>3</sup> Historians of modern Japan assume that the adoption and adaptation of western science was one of the hallmarks of the Meiji “Civilization and Enlightenment” (*bunmei kaika* 文明開化) project, but this is an under-researched area of history.<sup>4</sup> In this article, I examine the transition between Edo period and Meiji era medical practices and ask: How did western science—in this case scientific medicine—function within the *bunmei kaika* enterprise of nation-building? How did the medical community adopt and adapt Western scientific medicine during the Meiji period? At this time, the etiology of beriberi was unknown. There were no accepted inoculation practices as with smallpox nor was there a case similar to the Broad Street pump incident, directly linking disease—in this case cholera—with a water-borne causal agent.<sup>5</sup> My research reveals how Western trained doctors, grappling with a disease of unknown origin, constructed their own medical knowledge in the Meiji and Taishō eras.

The so-called beriberi debate (*kakkeronsō* 脚気論争) manifested Japan’s participation in an international search for the cause and cure of this disease, which culminated with the discovery of vitamins in the interwar years.<sup>6</sup> The history of this debate is about more than the march towards the inevitable discovery of “the beriberi vitamin”—that is, vitamin B1, or thiamin.<sup>7</sup> It also exemplifies the rise of scientific medicine and the shift from the clinic to the laboratory.<sup>8</sup> My additions to the scholarship on this debate are two-fold. First, I argue that in the medically plural context of the Meiji period, doctors like Takaki Kanehiro 高木兼寛 (1849–1920) created a type of hybrid medicine, grafting traditional medical techniques onto Western medicine practices. In this manner, doctors who practiced hybrid medicine were constructing a distinctly Japanese form of modern medicine, one that was the product of a unique set of social and cultural circumstances.<sup>9</sup> Second, I focus on how this debate illuminates the nexus between medicine and power in modern Japan.<sup>10</sup> The beriberi debate reveals that the authority wielded by the medical elite at Tokyo Imperial University was “colonial” in nature.

From the early Meiji era, Tokyo Imperial University Medical Department was the center for the production of scientific knowledge as well as the verification of the data produced by non-affiliated researchers.<sup>11</sup> Effectively, the Medical Department colonized the field and community of Western medical practitioners through the control over the production and

evaluation of scientific knowledge. Through their department, Tokyo professors dominated the medical community.<sup>12</sup> The nature of Tokyo's power was colonial in the sense that, to borrow Jürgen Osterhammel's words, "the colonizers . . . [were] convinced of their own superiority and of their ordained mandate to rule," and they did so with little regard for their colonial subjects.<sup>13</sup> Work by David Arnold is also suggestive for us here; in his *Colonizing the Body*, he analyzes how the British inscribed their authority onto Indian bodies in an attempt to expand their control over the subcontinent.<sup>14</sup> I argue that we can refer to the power of Tokyo Imperial University doctors as colonial because in practice they controlled research in Japan and smothered any challenge to their authority. Critics called the hold that Tokyo doctors had over the medical establishment an "occupation," referring to the rest of the medical community as "colonial subjects."<sup>15</sup> Sabine Frühstück has written of the state's "colonization" of the sexual hygiene of the masses to support Japan's imperial expansion in the 1930s.<sup>16</sup> My examination of the beriberi debate, which takes a different approach from Frühstück's, has implications that go beyond the history of this specific disease, and it leads to the conclusion that Western medicine practiced by *all* government institutions in modern Japan was "colonial" in nature. For example, public health specialists working for the government colonized the bodies of the masses through contagious disease laws.<sup>17</sup> Military doctors colonized the bodies of soldiers/sailors through sanitary and dietary regulations.<sup>18</sup> The colonizing aspect of modern medicine, which Warwick Anderson refers to as imperial,<sup>19</sup> did not stop at the bodily level; instead, I argue that the medical community itself was colonized by the Tokyo Imperial University medical elite.

From the 1910s, research based on clinical data as well as human-based experiments tied white rice diets to disease etiology and rice bran extracts, referred to as vitamin treatments, to disease prevention. The bacteriological approach that had been championed by Tokyo professors such as Hayashi and Aoyama Tanemichi 青山胤通 (1859–1917) became harder and harder to defend, and consequently younger members of the Tokyo faculty such as Irisawa and Tazawa moved to take over the field of beriberi research. Protecting their privileged position at the top of the Internal Medicine Association, they could not endorse the diet theory and the use of rice bran extracts. To do so would have been tantamount to admitting that the Tokyo faction had been erroneous in their approach to this disease and their resistance to the diet theory had been wrongheaded since the 1880s. Instead, they assured their hold over elite medical associations by slowly confirming, through their own research, that indeed beriberi and diet were causally connected and that initial evidence suggested that rice bran treatments had some effect on disease progression.<sup>20</sup> This move by Irisawa and Tazawa was, so to speak, an act of recolonization.

Despite the fact that scientific evidence—medical statistics amassed during Japan's wars with China and Russia—supported the theory that beriberi stemmed from a certain diet deficiency, Army Medical Bureau physicians like Ishiguro Tadanori 石黒忠憲 (1845–1941) and medical professors at Tokyo such as Hayashi and Aoyama continued to deny the link between diet and disease.<sup>21</sup> In their search for the cause of beriberi, they were engaged in the production of both scientific knowledge and scientific non-knowledge concerning disease etiology. That is, these doctors deployed what agnotologists call "constructed ignorance" in order to counter the growing strength of the diet theory.<sup>22</sup> They analyzed data in ways emphasizing

the uncertainty surrounding the relationship between a certain diet deficiency and beriberi.<sup>23</sup> With their legitimacy and reputations at stake, they propagated ignorance in hopes that a causal bacillus would be found and their contagionist approach vindicated.

When the maintenance of doubt and uncertainty was no longer viable, the next generation of Tokyo doctors, like Irisawa, attempted to recolonize the upper echelons of the medical community by confirming the causal relation between a diet deficient in what was being called the B vitamin and beriberi. This attempt was quite transparent. Researchers at other institutes such as Keiō University began experimenting on themselves, to prove both that beriberi stemmed from a deficiency in the B vitamin and foods rich in this vitamin including rice bran extracts cured this disease.<sup>24</sup> By the time the Internal Medicine Department at Tokyo Imperial University appointed a diet theorist to the faculty in 1925, the vitamin revolution was over and the science of vitamins was being promoted in the medical and popular presses.<sup>25</sup>

### The Rise and Fall of Clinical Studies

Cutting across all social boundaries, beriberi (*kakke* 脚気), formed a major public health problem in modern Japan. Even the Meiji emperor suffered from it. In 1878, when the emperor fell ill, his advisers suggested building a detached palace at an elevated location where he could convalesce. Instead, the Emperor ordered the construction of a research clinic, housing both Chinese and Western medical practitioners, where a treatment for the masses could be developed.<sup>26</sup>

By July 1878, the emperor's vision, the Beriberi Hospital (Kakkebyōin 脚気病院), was up and running, employing two traditional medicine (*kanpō* 漢方, hereafter not italicized) doctors and two Western medicine doctors.<sup>27</sup> Kanpō practitioners treated beriberi using herbal drugs combined with dietary restrictions, such as eliminating white rice and in its place prescribing barley and red beans (*azuki* 小豆).<sup>28</sup> This form of treatment dated back to the Sui (581–618) and Tang (618–907) dynasties.<sup>29</sup> Western doctors treated the disease with diuretics and hearty diets consisting of meat, eggs, and lots of milk.<sup>30</sup>

It is interesting to note that both kanpō and Western medical discourse stressed the role of environment in disease etiology. Kanpō doctors stated that beriberi was a disease of damp, low-lying areas where the causal poison infiltrated the sufferers through their legs.<sup>31</sup> In the premodern capital of Edo, beriberi was known as the affliction of Edo (*Edo wazurai* 江戸煩い). Katsuki Gyūzan 香月牛山 (1656–1740) noted that this affliction was widespread among both the warrior and the commoner classes in 1699.

Now, when officials or merchants go to the Kanto region, they lose their spirit, their legs and knees get heavy, their faces puff up, and they lose their appetites. In the vernacular this is called *Edo wazurai*. Because either the water or soil doesn't agree with them, on the way back home, after they go over the Hakone pass, their symptoms naturally disappear. Those samurai from the west who are stationed at their lord's mansion in Edo all fall victim. . . . Those who don't get well should quickly return to their provincial homes, for if they pass over Hakone, they will be cured.<sup>32</sup>

Before the institutionalization of bacteriology as the central pillar of scientific medi-

cine, Western doctors used what public health historian George Rosen called “contained contagionism” to explain etiology. Disease had a single cause, yet environmental and social conditions had to be right, or insalubrious, for an outbreak to occur.<sup>33</sup> For example, William Anderson, a British doctor living in Yokohama, wrote that filth led to any number of epidemics, including cholera and beriberi.

*Bad drainage* is a conspicuous evil of every town in which *Kakké* is prevalent and especially in the low densely populated quarters. Refuse matter is conveyed away by means of open or imperfectly covered gutters, mere ditches without proper walls, which run along narrow streets immediately in front of the houses. . . . Then the sluggish or stagnant contents, foul and putrefying, poison the air by evaporation, and spread by soakage into the adjacent soil, loading it with organic matter, contaminating the surface water and that conveyed in permeable pipes, and converting the wells into receptacles for diluted sewage.<sup>34</sup>

Because beriberi became epidemic only in the summer, and then only in urban environments, the Western medicine community in Japan speculated that this disease was contagious. However, when Tokyo Imperial University doctors were writing the analysis reports for the Beriberi Hospital, they showed a large interest in how the environment and Japanese customs, both housing and diet, factored into the cause of this disease. In the 1879 report, they wrote,

First, [we want to know] the relation of the fluctuations of ground water in the various districts of Tokyo and the rates of disease outbreaks. Second, what are the relations of the customs and habits of eating and drinking throughout the country and the rates of disease outbreak and death. . . . Beriberi is a disease particular to Japan. There are no outbreaks in Europe or America. India is not the same. Nevertheless, there are no cases of beriberi among the foreigners living in Japan. . . . We can think of no other explanatory factors for this than the differences in food, clothing and personal hygiene. India and Japan are vegetarian countries; that is, meat eating is not prominent. Is beriberi prevalent because of a poor diet and crowded living quarters? If we encourage people to eat meat and stop the people from living in cramped quarters, would this be effective as a preventative measure? We hope this will be tested.<sup>35</sup>

This commentary reflects the general concern with environmental conditions and miasmatic emissions from the ground that were characteristic of the period before the heyday of bacteriology. While it may have been clear to those writing the analysis reports that social conditions deserved more scrutiny, the research agenda for these same doctors at Tokyo Imperial University was moving away from a focus on environment and miasma towards the isolation, in the laboratory, of a single disease-causing microbe.<sup>36</sup>

The leading public health officials shut down the Beriberi Hospital in 1882 and moved the beriberi project to the medical laboratory in Tokyo Imperial University's medical school.<sup>37</sup> As germ theories and practices were established at this elite medical institution, the idea that any breakthrough in beriberi research could only come from the lab also became entrenched. This process enabled Tokyo Imperial University doctors to establish their hold and in effect

colonize the field of beriberi research. Any new medical theory had to pass through the Medical Department laboratories, what Bruno Latour refers to as an “obligatory passage point,” before being recognized as legitimate scientific knowledge and this gave Tokyo professors hegemony over the medical community.<sup>38</sup>

Some of the classic works in the history of science have shown us that research goals and agendas are formulated and carried out within communities of doctors and scientists who share an understanding of how to go about practicing science. Ludwik Fleck calls these groups “thought-collectives,” and Thomas Kuhn terms their approach to science “paradigms.”<sup>39</sup> These groups also function according to accepted scientific theories and within research parameters. Ian Hacking refers to this as a “style of reasoning.”<sup>40</sup> He notes that a style of reasoning cannot operate independently; it needs institutional authority. Indeed, “a style of reasoning [is] inseparable from the institutions that deploy it.”<sup>41</sup> That is, once a way of thinking or a style of reasoning is institutionalized, it becomes wed to the authority of the supporting institution. Entrenched, a style of reasoning grows in certain directions, yet is closed off from other trajectories.<sup>42</sup>

The Western-trained doctors at the Beriberi Hospital provide an illustration of this. Intellectually and institutionally, they were wedded to the idea that the laboratory should be the center for the study of beriberi. First, they were trained by Europeans in the fundamentals of experimental medicine, especially as practiced and taught in Germany.<sup>43</sup> Second, the connection between Tokyo Imperial University and the army was continuously reinforced because the army recruited graduates from the University Medical School. It is important to emphasize that the leading doctors associated with Tokyo Imperial University, men who also managed and operated the Beriberi Hospital formed a “thought collective.” Their shared scientific beliefs—experimental medicine was the key to disease etiology—directed how the collective understood this disease and their institutional authority ensured that the contagion-theory would be viewed as the most legitimate approach to beriberi research.<sup>44</sup>

In the early 1880s, navy doctor Takaki Kanehiro began to search for the cause of the high incidence of beriberi in the navy. Working with medical surveys and clinical records, Takaki, trained in British-style social medicine, paid especially close attention to housing, bedding, clothing, barrack and ship conditions, and diet. Narrowing his focus to diet, he deduced that beriberi was a protein deficiency disease.<sup>45</sup> He based his hypothesis on European nutritional standards that stipulated that a healthy diet needed a 1 to 15 protein to carbohydrate ratio. His data that showed that the rations served by navy kitchens, which made white rice the staple, had on average a ratio of 1 to 28. In units where the protein content was the lowest, the numbers of beriberi sufferers were the highest, and in units where the protein content of the diet was ample, the numbers of beriberi sufferers were low.<sup>46</sup> He argued that the navy diet was harmful to the sailors’ health and therefore reformed the diet by westernizing the rations. The sailors, however, refused to eat meat and bread.

To maintain a high protein content, he switched his approach and added barley to the rice allocation in 1884.<sup>47</sup> As noted, within the *kanpō* tradition, barley and other foods like azuki beans were used in tandem with herbal drugs. Although his first impulse had been to westernize the galley, in the end, Takaki adapted traditional medical practices of dietary therapy to combat beriberi in the navy.<sup>48</sup> As Table 1 also shows, beriberi sufferers dropped dramatically after the new dietary regulations were put into practice. By 1886, Takaki could

claim that he had eradicated beriberi from the ranks of the navy, and by doing so, validate his discovery that a protein-deficient diet caused beriberi.

**Table 1.** Beriberi in the Navy, 1878–1886

Year	Navy personnel	Beriberi sufferers	Incidence rate	Number of deaths	Death rate
1878	4528	1485	32.79	32	2.15
1879	5081	1978	38.92	57	2.88
1880	4956	1725	34.81	27	1.57
1881	4641	1163	25.06	30	2.58
1882	4769	1929	40.45	51	2.64
1883	5346	1236	23.12	49	3.96
1884	5638	718	12.74	8	1.11
1885	6918	41	0.59	0	0.00
1886	8475	3	0.04	0	0.00

Source: Takaki Kanehiro, "Special Report of the Kakke Patients in the Imperial Japanese Navy from 1878 to 1886," in *Takaki Kenkan-sensei gyōsekishū*, ed. Matsuda Makoto (Jikeikai Ika Daigaku, 1993), p. 62.

### Putting the Lab at the Center

Four weeks after Takaki published his data, Dr. Ogata Masanori 緒方正規 (1853–1919), an Imperial University medical faculty member, announced that he had discovered the beriberi bacillus.<sup>49</sup> The popular press touted Ogata's findings. A jubilant letter to the editor of the *Yomiuri*, no doubt sent in by a doctor sympathetic to Ogata's position, praised Ogata and suggested that he be remunerated for his accomplishment.

Indeed, it must be said that it is our duty to direct Ogata's discovery towards Japan's public health policy. Also, it advances our medical [achievements] and should be announced to the world. [If] Ogata's discovery is factual, then Ogata or some else should uncover how this bacteria enters the body and how to protect against it. Then, Ogata's merit will increase greatly. Now, the government should assemble an appropriate team and repeat Ogata's experiments. If Ogata's discovery is true, then his achievements should be recognized and he should be given 10,000 yen for his work. It is our duty to announce this in order to extend Ogata's achievements to the people, and demand that all the gentlemen of the government and the people recognize [this discovery].<sup>50</sup>

While Ogata failed to reproduce his results and was criticized by Kitazato Shibasaburō 北里柴三郎 (1853–1931), Tokyo Imperial University doctors continued to pursue the bacteriological approach.<sup>51</sup> Takaki was under siege, and his theory was being undermined by laboratory science.

Army Medical Bureau doctors sided with the Imperial University approach, and did not recognize Takaki's discovery or the effectiveness of navy dietary reform. Future Surgeon General and Director of the Army Medical Bureau Ishiguro Tadanori took the lead in criticizing Takaki's work. He believed that beriberi was a contagious disease and in no way related etiologically to dietary practices. He also believed that white rice was perfectly healthy. Final-



ly, Ishiguro criticized Takaki's use of medical statistics, arguing that, "The theory that barley consumption reduces beriberi is based not on accumulated data on personnel and disease, but on the statistics for one year—and not even on a comparison of previous years. For this reason, I do not believe the theory (based on medical statistics) that barley either prevents against or is a cure for beriberi."<sup>52</sup>

For Ishiguro, the layout of military barracks contributed to the spread of disease. Barracks in the Japanese army afforded soldiers less air per-meter than did barracks in European countries.

The [air] capacity of the barracks in Japan is not inconsequential. While it may be hard to understand that air can spread disease, I hope that you will accept this, for it is my main point in this piece. In the [rural] homes of the soldiers, both in and outdoors, they can always breathe clean air, but when they enter the army, this changes. This is not to say that Western-style sanitation causes damage, just that compared to [a rural environment] the air in barracks is not good and I believe that this is the biggest factor in the spread of beriberi.<sup>53</sup>

As a preventative measure, he advocated aggressive reform in military housing.<sup>54</sup>

Another army doctor who had been schooled in Germany, Mori Rintarō 森林太郎 (1862–1922), also attacked Takaki's data. "Experimental induction, using microscope and microtome, is the highest art [for producing scientific knowledge]," he said.<sup>55</sup> Statistical data did not constitute a scientific fact. There could be no causal connection between Takaki's statistics and beriberi etiology, which Mori called a "post hoc ergo propter hoc" or after-the-fact argument.<sup>56</sup>

Mori also believed that rice was perfectly healthy, and he was the leading figure in upholding Japan's traditional fare against evaluations based on Western models. Takaki had argued that the white rice diet in the navy was deficient and contributed to the outbreak of beriberi, and had added barley to the navy diet as a form of disease prevention. Mori refused to recognize a causal relation between diet and disease, and joined the contagionist side of the beriberi debate. Mori did not attempt to discover a beriberi bacillus, but he attacked the premise that a traditional Japanese diet was nutritionally deficient. Challenging the hegemony of Western food, Mori mobilized both history and science to support his arguments.

Proposals to change old established customs are made with such abandon all over the land that a proper examination of the proposed changes often comes too late. We must never forget that customs and habits that have been accepted and maintained for centuries must have a solid core; otherwise they would never have lasted so long!<sup>57</sup>

Mori saw the long history of customary practices as a basis to justify them in a seemingly "scientific" way.<sup>58</sup> He argued, "Claims that the custom of eating rice in China or India, maintained for many thousands of years, enfeebles their national physiques are unfounded. Similarly, the claims that our rice diet, which Japan has had from our antiquity until the present, weakens our minds and bodies are ridiculous. *There is nothing that links diet to the progression towards civilization* (emphasis added)."<sup>59</sup> Historians of nutrition note that food has been a cornerstone in discussions of national physique.<sup>60</sup> Mori linked diet to national health as well,



refuting claims made by Westerners and some Japanese doctors that the traditional diet of white rice lacked enough nutrition to sustain the social body. To the contrary, he maintained the appropriateness of rice for soldiers and citizens alike.

Mori cited the work of Felix Hirschfeld (1842–99) on protein metabolism in the body to support his arguments.

Hirschfeld maintains that the relation between the inner workings of protein and the body's potential are this: Based on wisdom of recent times, and on theory and experimental [data], there is no evidence that the body's performance depends on eating an exceedingly large amount [of protein] (100–200 grams daily for an adult). Furthermore, there is no way that small amounts of protein will cause the melting away or removal of the protein that makes up the body.<sup>61</sup>

Mori, working with Kumagawa Muneo 隈川宗雄 (1859–1918), was also attracted to Max Rubner's work on food metabolism. Rubner (1854–1932), a student of Voit, formulated the "law of isodynamic equivalence," in which nutrition was calculated in terms of energy based on calories. Calories from proteins, fats and carbohydrates were interchangeable in the body. That is, any excess in one group could make up for deficiency in the other groups. According to the medical historians Harmke Kamminga and Andrew Cunningham, "For Rubner, calorific value was the prime criterion of nutritional value."<sup>62</sup> Using Rubner's law, Mori could argue that a high carbohydrate, low protein white rice diet was as healthy as a Western diet of similar caloric value.

We hold Hirschfeld's [and Rubner's] theory and experiments as the cornerstone [of nutrition]. . . . The value of the diet does not depend on the amount of protein, but on the fixed amount of energy. In thinking about maintaining the equilibrium of protein [in the body], why shouldn't this theory be acceptable?<sup>63</sup>

Relying on data concerning metabolism of Japanese and Western diets, Mori even argued that the protein in a white rice diet was better absorbed by the body. While a Western diet contained a larger amount of protein, the body absorbed the nitrogen in the Japanese diet more fully.<sup>64</sup>

Demonstrating this theory in tests on diet in the army, Mori analyzed the strengths and weaknesses of various diets. In a series of tests, Mori fed six men a rice diet, a barley diet, and a Western diet. Using the Liebig method for calculating the energy within the food fed to the test subjects, he determined that the average calorie count for each diet.<sup>65</sup> Mori not only examined the energy content, he also checked the nitrogen content of the test subjects' bodily wastes. His results, reproduced in Table 2, showed that the rice diet was highest in energy and it had the greatest amount of absorbable nitrogen.<sup>66</sup> He wrote,

In testing the human wastes for nitrogen, it is an indication that the body is losing the nitrogen it has stored up if there is a lot of nitrogen in the waste. As for the abundance of nitrogen in the body, this is generally indicated by little [nitrogen in the waste]. [A healthy] body stores up the consumed nitrogen. In the Table, a plus sign indicated that the body was storing up new nitrogen [thus little nitrogen in bodily wastes], and seen from the point of the rations, it is [a sign of] abundance. A minus sign indicates the burning up of nitrogen previously stored by the body, and

when used to analyze the rations, it reflects a scarcity [of protein].<sup>67</sup>

**Table 2.** Mori Rintarō's Nutritional Tests

	<u>Rice</u>	<u>Barley</u>	<u>Western diet</u>
Calorie count	2580.75	2227.5	2209.54
Nitrogen count	+2.29%	-1.43%	-2.88%

Source: Mori 1890, p. 136. This report was submitted on 31 March 1890.

While Mori did not address the effectiveness of barley rations as a prophylaxis against beriberi, he did produce scientific data suggesting that a white rice diet was healthy. Based on this data, Mori became the representative for the ideological and institutional stance of the Army Medical Bureau. Because rice did not damage health, from the standpoint of etiology, beriberi could not be tied to the traditional Japanese diet. Instead, and in-line with Ishiguro's theory, beriberi was considered a contagious disease. The power of the Army Medical Bureau gave Mori's data the authority of a fact within the army.

Both the army and the navy had the institutional authority and power to make recruits conform to certain sets of dietary standards—that is, to colonize their bodies. As David Arnold noted in his study of India, however, the body was not only a site for “colonial appropriation” but also “formed a site of contestation.”<sup>68</sup> In the Japanese navy, sailors reacted to additions of Western food by sneaking their bread out of the galley and throwing it overboard.<sup>69</sup> Similarly, the army was not completely successful in having the soldiers internalize its official medical policy. In a 1905 memoir, Ishiguro recounts a visit to the house of the famous kanpō doctor Tōta Chōan 遠田澄庵 (1818–1889), where he found ten non-commissioned officers undergoing treatment for beriberi. Shocked, and no doubt more than a little embarrassed, since the army's official stance barred traditional medicine, he immediately ordered them back to their barracks. Ishiguro lamented,

These young men, in the prime of their youth, for good or ill, were diligent yet reckless and we could not stop them. The Army Minister, General and Marquis Yamagata [Aritomo], who thought very highly of science, kindly listened to what the medical corps chiefs said and believed us [concerning beriberi]. Because the kanpō beriberi theory and the like were excluded, we [thought we] were assured [of being rid of Oriental medicine]. This was not the case, however, and kanpō was still very much embedded in [the army].<sup>70</sup>

The military maintained some of the most advanced Western hygiene standards in Japan in the 1890s, yet kanpō was still widely accepted as an intrinsic element of Japanese culture, and it had not been completely extirpated from army medical culture. Despite resistance, the army and navy institutionalized particular sets of dietary standards. The army relied on white rice and the navy used barley-rice rations. Statistics supported Takaki Kanehiro's dietary reforms, while Ishiguro Tadanori and Mori Rintarō mobilized theories from European doctors to defend army practice and to assail the navy data as unscientific.

It is important to note that Ishiguro and Mori reacted against any medical treatments that smacked of kanpō medicine. There can be no doubt that they saw Takaki's use of barley was borrowed from this tradition.<sup>71</sup> Ishiguro had worked at the Beriberi Hospital, and he maintained a personal relationship with Tōta Chōan, so he was quite familiar with the use

of barley.<sup>72</sup> In journal articles, Ishiguro alluded to Takaki's work as traditional medicine, and other army surgeons as well referred to barley treatments as traditional medicine-derived.<sup>73</sup> In 1895, using a pen name, Ishiguro argued that, "the army does not need traditional medicine, statistical speculation, or 1,860 year-old theories to solve its beriberi problems; it needs scientific knowledge based on experimental medicine."<sup>74</sup> Despite Takaki's use of what they thought was "Oriental" and therefore backward medicine, the navy remained free from beriberi (Table 3). The same, however, cannot be said of the army, and beriberi became an added cost of Japan's growing empire.

**Table 3.** Beriberi Incidence Rates in the Navy, 1878–1888

<u>Year</u>	<u>Cases</u>	<u>Incidence rate</u>	<u>Deaths</u>	<u>Death rate</u>
1878	1485	32.79	32	0.71
1879	1978	33.92	57	1.12
1880	1725	34.80	27	0.55
1881	1163	25.05	30	0.65
1882	1929	40.44	51	1.06
1883	1236	25.12	49	0.92
1884	718	12.73	8	0.14
1885	41	0.59	0	0
1886	3	0.04	0	0
1887	0	0	0	0
1888	0	0	0	0

Source: Takaki 1906, p. 1369.

### Beriberi, War and Empire

The contrasting institutionalized stances of the military services were put to test during Japan's wars for empire during the Meiji era. The campaign theatres in Korea, Manchuria, and the Japan Sea became huge Petri dishes for the military medical community. During the first Sino-Japanese War, Ishiguro, who not only oversaw hygiene but also supply and logistics, citing Mori's tests, dismissed suggestions to add barley to the white rice rations. The infantry suffered heavily from beriberi: Over 30,000 cases with close to 2000 deaths (Table 4).<sup>75</sup> The navy did not incur a single case of beriberi during this conflict. After defeating China in 1895, Japan took possession of Taiwan. There, the army's beriberi incidence rate reached 90%. In 1896, the army's chief medical officer on Taiwan, Dr. Toki Yorinori 土岐頼徳 (1843–1911), turned to the practice of adding barley to the rations which brought about a reduction in the incidence rate (Table 5).<sup>76</sup>

**Table 4.** Sino-Japanese War Disease Incidence Rates

<u>Disease</u>	<u>Cases</u>	<u>Deaths</u>	<u>Death rate</u>
Typhoid fever	3,805	1,125	30%
Cholera	8,481	5,211	61%
Malaria	10,511	542	5%
Dysentery	11,164	1,611	14%

<u>Disease</u>	<u>Cases</u>	<u>Deaths</u>	<u>Death rate</u>
Influenza	400	4	1%
Beriberi	30,126	1,860	6%
Acute gastric intestinal catarrh	11,631	1,595	13%
VD	2,416	8	0.30%

Source: Rikugun Eisei Jiseki Hensan Iinkai 1907, pp. 1–7; Rikugun Imukyoku 1909, pp. 40–41.

**Table 5.** Beriberi Incidence in Taiwan, 1895–1902

<u>Year</u>	<u>Cases</u>	<u>Deaths</u>	<u>Incidence rate</u>	<u>Death rate</u>
1895	21,087	2,104	90	9.97
1896	14,848	---	18.56	---
1897	2,697	82	17.5	0.5
1898	1,775	50	12.7	0.3
1899	1,249	33	11.3	0.29
1900	896	21	7.3	0.1
1901	111	1	0.9	0.008
1902	53	0	0.48	0

Source: “Taiwan rikugun eisei gaikyo,” *Taiwan rikugun gun'i bu* (March 1905), quoted in Yamashita 1988, p. 449; “Korera wa nai ga kakke ga ryuko,” *Yomiuri shinbun* (11 July 1895), p. 5; Iku 1896, p. 10; Rikugun Eisei Jiseki Hensan Iinkai 1907, pp. 1–7,

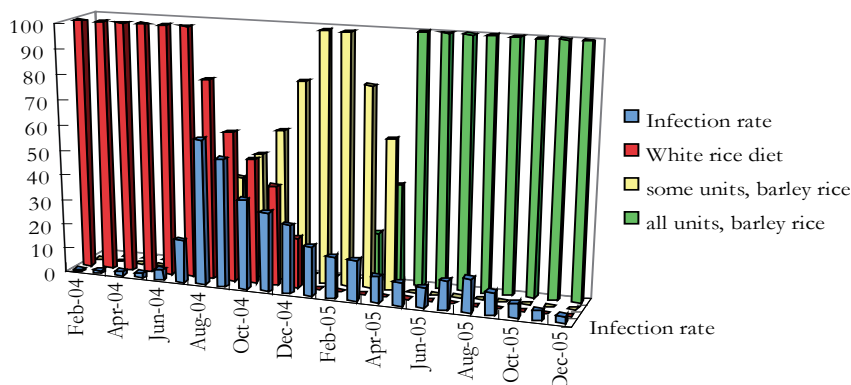
Ishiguro responded to Toki's order by issuing his own instruction about these rations.

It is difficult to determine the scientific appropriateness of the [new] diet for the Taiwan detachment. During the period that this science remains undecided, the appropriate diet for the soldiers of the empire will remain the existing diet of white rice, which has been proven through experiments at the Army Medical School to be second to none. So, until there is [another food] that is confirmed by science and experience [as superior to white rice], the main food for the Taiwan forces should not waver from white rice.<sup>77</sup>

Calling the barley method of prevention a biased practice used by only a few doctors, Ishiguro maintained that the scientific community has yet to recognize the science behind its use.

For those who refer to the efficacy of barley, they do not use an established method [of proving this] because there is no clear and esteemed value or scientific belief based on comparative statistics. Those who refer to the results [based on numerical data] cannot escape from speculation.<sup>78</sup>

In March of 1896, Toki responded to Ishiguro by reporting on the state of hygiene in Taiwan in the newspaper *Jiji shinpō*. More than forty thousand Japanese soldiers on the island, out of seventy or eighty thousand, suffered from disease. Close to fifteen thousand of them had beriberi; another fifteen thousand were hospitalized with dysentery, typhoid fever,

**Graph.** Overview of Beriberi Incidence Rate and Diet

Source: Fujii 1911, p. 39.

or malaria. Toki worried that if the plague struck Taiwan, the situation would be even worse. He valued actual experience, like the data taken from the navy, over theory.<sup>79</sup> After quoting the entirety of Ishiguro's "instruction," Toki wrote,

I am surprised by Ishiguro's order. The navy arrived at a preventative measure against beriberi in 1884, and has more than ten years of actual experience to back up the practice. If we compare this to the army, it is like night and day. There *are* comparative statistics that make this clear. Instead of acknowledging that barley rice is an appropriate [preventative] in the summer when the disease is prevalent, the army refers to Dr. Mori's medical school experiments from many years ago. Even if this data has value as science, to the contrary, many years of army medical experiences make clear that barley rice is a preventative against the symptoms of beriberi. . . . The responsibility of breaking down the stubbornness of the Army Hygiene Bureau authorities falls on the shoulders of those in Taiwan. They should by all means take care of their own hygiene and by their own choice employ barley as a preventative against this disease.<sup>80</sup>

Toki hoped that the importance of a healthy military for success in the occupation of Taiwan would justify his dietary reform and in effect force a break in the Bureau's hegemony, opening up new ways to think about beriberi prevention. He also thought that experiences with empire would reconstitute Japanese medical practice. This turned out not to be the case in the 1890s, and his critique of his superior officer's position was not without consequences. Because he was critical of Ishiguro's resistance to the use of barley as a preventative and because of his outspokenness, Toki's tenure as chief medical officer (*dai-ni gun gun'i buchō* 第二軍軍医部長) was erased from the official history of the army's medical corps in Taiwan.<sup>81</sup>

Despite the example of Taiwan, the Army Medical Bureau did not change its policy on military diet. Again in 1904 in the war with Russia, it refused to send barley to the front.<sup>82</sup> Subsequently, there were approximately 250,000 cases of beriberi with over 27,000 deaths.<sup>83</sup> Even when confronted with this crisis, the Army Medical Bureau did not rethink its stance on beriberi prevention and adopt the use of barley-rice. It took direct action by Minister of War

Terauchi Masatake 寺内正毅 (1852–1919) to bring about a change. Terauchi, who had been treated for beriberi by kanpō doctor Tōta Chōan as a young man and eaten barley thereafter, sidestepped the Bureau and ordered barley sent to the front.<sup>84</sup> Among the army surgeons at least, the beriberi epidemic made the relationship between foodstuffs and this disease very clear. Army doctor Fujii Yoshikazu 藤井善一 called this relationship “an undisputable fact,” based on data (reproduced in Table 6) that correlated the move towards diet-based prevention with falling incidence rates.<sup>85</sup>

After the war, the army began revamping the diet. In February 1906, the *Yomiuri* reported that “[i]n the army, research into rations has yet to advance and cannot escape from being inferior to that of the navy. A part of military reform after the war is the issue of re-thinking rations. The army has arrived at a solution by increasing the amount of meat as a form of beriberi prevention.”<sup>86</sup> Three years later, the army sanctioned the addition of protein high rations and bread to the army diet.<sup>87</sup>

The Army Medical Bureau’s insistence on defending white rice raises an important question: What exactly was the army’s investment in white rice? We know that one of the major ways that the army compensated for its compulsory military service was by stressing that recruits were given—for the first time in their lives, in many cases—as much white rice as they could eat.<sup>88</sup> Also, as Emiko Ohnuki-Tierney has shown, white rice was a part of symbolic nationalism from the Meiji period onwards.<sup>89</sup> At this point, however, further research is required before making a definitive conclusion about the connection between the state, the military, army doctors like Ishiguro and Mori, and their defense of white rice.

In a 1907 contribution to *Saikingaku zasshi* 細菌学雑誌 (Journal of Bacteriology), army doctor Tsuzuki Jinnosuke 都築甚之助 (1869–1933) described the stalemate between the diet theorists and the contagionists. After the Russo-Japanese War, the Army Medical Bureau revamped its stance concerning beriberi: It still held that the disease was contagious, but it conceded that barley, for various reasons, prevented affliction. As Tsuzuki wrote,

Referring to the fact that the world’s beriberi and rice eating areas are consistent, it is clear that rice and beriberi have a close relationship. The relationship is that rice, full of carbohydrates, helps the progress of the pathological agent, becoming material for the fermentation of lactic acid. Therefore, I believe that rice is the most important factor that contributes to the development of this disease.<sup>90</sup>

Tsuzuki did not go so far as to accept that barley prevented beriberi. Citing cases where army units used barley during the war yet still experienced new cases of the disease, he argued that barley was not a magic bullet. First, it did not cure beriberi; it only lowered the propensity for this disease. “Barley is only beneficial, I think, in prevention because it does not add to the basic factor of beriberi pathology.”<sup>91</sup> Combining the different approaches in the army and navy, Tsuzuki suggested that aggressive sanitation practices along with feeding barley rice to the soldiers were the most appropriate forms of disease prevention.<sup>92</sup>

We might expect that the Army Medical Bureau would have acknowledged that in general barley protected the soldiers from the effects of beriberi, especially during times of war, and would have aggressively pursued this line of research. It did not. Rather, as we will see, it continued to support the contagionist approach. The Army Medical Bureau wanted lab-based experimental data alone to be the basis for army hygiene. Navy doctors and numerous

army surgeons, to the contrary, were not troubled by similarities between the kanpō medical tradition and their own beriberi prevention policies. What was important was that barley actually worked. Why, in the face of both navy and army practice attesting to the contrary, did the bureau, headed by Ishiguro and Mori, continue to deny the link between diet and beriberi?

First, let us examine an interesting argument made by Yamashita Seizō. Army regulations limited the scope of action the bureau could take concerning diet. The Army Ministry, unlike the Navy Medical Bureau, made decisions about diet. Borrowing from earlier Tokugawa military practice, Army Minister Yamagata Aritomo made 6 *gō* (1 *gō* 合 equals 0.18 liters) of rice the official rations in 1873. Because Yamagata had played a major role in the construction of the modern army, his policies were not challenged. The Medical Bureau lacked political power, Yamashita writes, so “it could not reform the rations without the consent of the Ministry.”<sup>93</sup> This argument is not convincing. In discussing his relationship to Yamagata (see note 70), Ishiguro noted that the Army Minister was quite open to the suggestions from the Medical Bureau. Had Ishiguro mobilized the data from the units where barley was used, and presented this to Yamagata, noting the medical as well as financial benefits (barley was cheaper than rice), he might have been able at least to add barley to soldiers’ rations, if not to reform the entire army diet.

As early as 1884, Army Edict 4112, “Notice of mixing minor grains with polished rice,” stated that “Concerning the provisions for the various units, non-commissioned officers and cadets, the standard for meals, at present, should be 6 *gō* of polished rice and 6 *sen* 銭 [1/100<sup>th</sup> of a yen] (8 for officer cadets) worth of supplementary foods. Barley, red beans, and other minor grains can be mixed into the daily allowance of rice.”<sup>94</sup> In 1893 the Army Minister also reported on how units were using barley to protect against beriberi.<sup>95</sup> It seems the Army Ministry was more interested in the effectiveness of barley than the scientific veracity of arguments in favor of white rice. Although Yamashita argues that Ishiguro lacked power to transform army practice, he also notes that the Bureau could have carried out its own tests on barley.<sup>96</sup> Regrettably, I think, he does not elaborate further.

Another explanation is the institutional inertia within the Army Medical Bureau. In 1908, an anonymous army doctor wrote a lengthy critique of the bureau’s stance against barley-rice, linking its stubbornness to premodern forms of cliquish thinking.<sup>97</sup>

They [Ishiguro and the Bureau] were not directly involved in barrack-level hygiene matters, but were resting their backs on chairs in the central high command. They were not earnestly concerned with the quality of information that came out linking barley to beriberi prevention. By talking about science and principles and having confidence in their own theories, these were their watch-words, they were naturally attached to this single-minded, prejudiced view. . . . They sounded like ancient courtiers who were mutually jealous and suspicious of others. I think that they are extremely boorish fellows.<sup>98</sup>

It is possible that a kind of “group solidarity characteristic of feudalism” may have been at the root of Ishiguro’s inflexibility.<sup>99</sup> That is, there is no doubt that Ishiguro maintained a kind of lordship over army hygiene matters, and his domain was protected from outside authority or competing forms of science by the Army Medical Bureau.



I believe that there are three main reasons why Ishiguro did not accept ideas about barley and the etiology of beriberi. First, Ishiguro belonged to what Ludwik Fleck calls a “thought-collective.” There was a “readiness for directed perception” within the thought-collective that worked by “constraining, inhibiting, and determining” their approach to beriberi.<sup>100</sup> In terms of the influence of values on science, Ishiguro could not acknowledge that barley was an effective treatment for or preventative against beriberi because this ran contrary to the germ theory.

Second, within the Army Medical Bureau, it was an accepted institutional “fact” that white rice had no relation to disease causation. Mori’s science had proven this fact, and once his work was legitimated within the bureau, it acquired truth-value. From this institutional position, the fact was not questioned, and officers of the bureau used the authority of this science to counter any claims that white rice and beriberi were etiologically related.

Third, we must hold Ishiguro’s scientific, altruistic intentions in balance with consideration of his political situation. Meiji period doctors and medical men today note that the institutionalization of white rice in the army, based on the work of Ishiguro and Mori Rintarō, led to many cases of beriberi during the Sino-Japanese and Russo-Japanese Wars.<sup>101</sup> Had the Army Medical Bureau acknowledged the diet deficiency theory, Ishiguro and Mori would have been, implicitly at least, guilty of “engineering” the beriberi epidemics during the wars with China and Russia.<sup>102</sup> Subsequent to the Russo-Japanese War, Mori became the Surgeon General and Ishiguro’s influence still remained strong within the Army Medical Bureau. They had every reason to oppose the diet theory.

### **Beriberi, the Science of Vitamins, and the Construction of Non-knowledge**

Because over 250,000 men were hospitalized with this disease during the Russo-Japanese War, beriberi came to be depicted in medical discourse as a “national enemy.” In 1908 public health officials established a national research council—The Special Beriberi Research Council (*Rinji kakkebyō chōsakai* 臨時脚気病調査会)—employing an elite corps of internists, physiologists, and bacteriologists.<sup>103</sup> Public health officials working within the national assembly, such as Yamane Masatsugu 山根正次 (1855–1925), pushed the funding for this council through the lower house. It was, however, the coterie of Tokyo Imperial University and army doctors that took over the organization and operation of the Beriberi Research Council (or BRC). The council was chaired by army Surgeon General Mori Rintarō and divided into five research groups: bacteriology, medical chemistry, physiology and autopsy, clinical practice, and history and statistics. There was none dedicated to studying the impact of diet on beriberi, evidence that the BRC had little interest in exploring why barley-rice rations protected soldiers or sailors from beriberi.<sup>104</sup>

It must be noted that a preoccupation with the germ theory was not unique to Japan; eighteen doctors worldwide announced that they had discovered the beriberi bacillus between 1880 and 1910.<sup>105</sup> What was particular about Japan was the socialization of the medical community. Bonds of personal attachment tied students to their professors. Students also maintained feudal-like allegiances to the ideas of their professors. Case in point: in the summer of 1908, Mori Rintarō, Kitazato Shibasaburō, and Aoyama Tanemichi discussed beriberi research with their bacteriology mentor Robert Koch (1843–1910), a recent Nobel Prize win-

ner, who was visiting Japan. Koch observed that beriberi in Southeast Asia and kakke in Japan seemed to be different diseases. He said that beriberi was contagious, but noted that it was not clear in the case of kakke. He suggested to Mori that for comparative purposes it would be fruitful to study beriberi in Southeast Asia.<sup>106</sup> At the next BRC meeting, Mori proposed a research expedition to Batavia.

In late 1908, the BRC sent Shibayama Gorōsaku 柴山五郎作 (1871–1913) from the Institute for the Study of Contagious Diseases, Tokyo Imperial University Professor of Medicine Miyamoto Hajimu 宮本叔 (1867–1919), and army doctor Tsuzuki Jinnosuke on an investigative mission to Batavia. There they visited Dutch East Indies hospitals, carrying out clinical studies and autopsies. Upon their return to Japan, they submitted an official report on their findings. Regarding beriberi, they concluded that the disease stemmed, either in a causal or contributing fashion, from *etwas*—German for “something.”<sup>107</sup> This was quite a revelation. According to medical historian Yamashita Seizō, it is unclear why the team decided that a German term was most appropriate; nevertheless, they employed it in such a fashion to mask whether they were talking about a bacillus, toxin, or deficiency.<sup>108</sup> I argue that they used the term “something” because they did not find a causal bacillus and did not want to attribute the cause of the disease to white rice. Rather than recognize the relation between diet and beriberi, the BRC doctors instead purposefully propagated “uncertainty” surrounding disease etiology. Their diction might have been a reminder that they were familiar with German medical literature, a not-so-subtle attempt to cloak their argument in the robes of authority.

In Southeast Asia, Western colonial doctors began focusing on the relationship between diet and beriberi from early in the twentieth century. These doctors drew upon the work of Dutch doctor Christiaan Eijkman (1858–1930), who had in 1895 discovered by accident that chickens fed day-old white rice contracted white rice disease or *polyneuritis* but birds eating unpolished rice did not.<sup>109</sup> At the 1913 conference of the Far Eastern Association of Tropical Medicine, abundant experimental data taken from recent bird and human tests convinced many Western colonial doctors not only that *polyneuritis* and beriberi were the same disease, but also that a white rice diet deficient in a particular element caused beriberi and brown rice or more specifically rice bran prevented the disease.<sup>110</sup> Tokyo Imperial University professors and doctors staffing the BRC, highly invested in a line of research based on a bacteriological approach and very concerned with their individual names as well as the larger reputation of the national research council on which they sat, continued to discount the diet theory and stubbornly defended the position that a microscopic agent was the cause of this disease.

For example, at the Far Eastern Association of Tropical Medicine meeting held in Manila in 1910, BRC member Shibayama Gosakurō defended a bacteriological approach to the disease. He believed that diet was a predisposing cause, not the actual cause. Since beriberi was widespread in Asia but absent in the West, Shibayama argued, “It is not unreasonable to assume that the microorganisms of beriberi are only present in the Orient and, given a predisposing cause, are capable to causing the disease, whereas in the West beriberi does not appear, owing to the absence of the infecting organism, although the same favorable predisposing cause may be present.”<sup>111</sup> This must have been an uncomfortable assertion to make. The majority of the doctors at this conference believed that beriberi was not a contagious disease and that their research proved diet was the main factor in disease causation.

During the discussion portion of the meeting, Shibayama further emphasized the weakness that he saw in the diet deficiency theory. “I would also, in this place, wish especially to emphasize the fact that the polyneuritis of fowls is not identical with beriberi,” he argued, “and that the interpreted experimental results obtained with these birds cannot directly be interpreted in the same sense with human beings.”<sup>112</sup> Despite the fact that several doctors presented data indicating that in human experiments, brown rice protected work-crews, prisoners, and asylum inmates from the effects of beriberi, Shibayama said that polyneuritis in birds could not be associated with beriberi in humans, and that there was no evidence that proved the effectiveness of brown rice on beriberi patients. The conference proceedings, published in *The Philippine Journal of Science*, did not record a reply to Shibayama’s statement. The other doctors may have simply not taken his comment serious enough to warrant a response. Nevertheless, Shibayama’s comment revealed the scientific outlook and the values of the BRC.

Recognizing that the Tokyo doctors and the BRC did not have the luxury of historical hindsight that we enjoy, we need to ask what scientific reasons they had for supporting the contagionist approach. Medical historian Yamashita Seizō notes that “Japanese scientists replicated Eijkman’s experiments after 1897. In Japan, the leading country in beriberi research, the first thing that caught the eyes of scientists were the points of difference between polyneuritis and beriberi. These differences became the basis for supporting the theory that the two diseases were different (This understanding was correct according to pure scientific endeavor).”<sup>113</sup> I argue, to the contrary, that the question is not whether the science was “pure.” Instead, the focus should be on how the rhetorical strategy adopted by Shibayama and his colleagues fits into a BRC-directed program in which doubt and uncertainty were deployed against the diet deficiency theory. Yamashita himself writes that between 1908 and 1917, the collective data published in the BRC journal attested to three trends. First, beriberi was prevalent among white rice eaters. Second, it was also prevalent in those who eat poor supplemental foods. Third, those who eat barley-rice mixtures were rarely afflicted. The Committee, however, did not advance a theory to explain these trends, nor did it pursue the development of bran extracts.<sup>114</sup> Yamashita does not pursue further analysis of the BRC’s institutional stance, but I think it is clear from a critical reading of the BRC sources that the choice of one theory over another had political implications, and that the key players were aware of those implications. Holding what I consider a colonial grip over the field of beriberi research, the BRC, controlled by Army Medical Bureau doctors like Mori and Tokyo professors like Aoyama, attempted to suppress any opposition to its authority. The case of Tsuzuki Jinno-suke reveals how they did this.<sup>115</sup>

From 1910, Tsuzuki, who had traveled to Batavia as a member of the BRC, abandoned the contagionist approach and refocused his efforts on nutritional studies. In his private Beriberi Research Institute, he developed a rice bran extract that he called Anchiiberiberin アンチベリベリン and tested it in animal and human experiments. Several other doctors active in the Far Eastern Association of Tropical Medicine were also experimenting with extracts around 1910.<sup>116</sup>

Tsuzuki’s work posed a challenge to the institutional stance of the BRC. Because he made claims about the effectiveness of rice bran and marketed it as a treatment, something that the internal medicine professors at Tokyo Imperial University did not accept, he was not only kicked off the BRC but was discharged from the army. As the *Toyokuni shinbun* reported

the story on 10 December 1910:

According to the government report yesterday, the circumstances of Rinji Kakkebyō Chōsakai member and Medical Officer 1<sup>st</sup> Class Tsuzuki Jinnosuke's discharge were leaked. Using his position as a BRC member, he arbitrarily announced that rice bran is effective against beriberi, and using this as an opportunity for profit, was planning to sell rice bran all over town. Without authority to guarantee [the science behind his claims], and with the discovery of other infractions in the line of duty, he has already received this resolute punishment.<sup>117</sup>

It appears that his research into rice bran extracts led to his discharge.

Tsuzuki, now freelance, carried out his first high profile experiment at the Tokyo Electric Bureau in 1912. He was given a test group of sixty employees who were eating white rice. He took the fifteen who had never contracted beriberi and designated them the Prevention Group. This group received thirty tablets of his Anchiberiberin a day. Ten were chosen as a Control Group, and received no drugs. Thirty-five employees were currently suffering from beriberi and they became the Treatment Group. They also received thirty tablets a day. All fifteen in the Prevention Group stayed healthy. Six within the Control Group developed beriberi. All thirty-five of the Treatment Group recovered and symptoms were eliminated within four weeks. His data suggested that Anchiberiberin worked both as a preventative and as a treatment.<sup>118</sup>

Tōyama Chinkichi 遠山椿吉 (1857–1928) was another who experimented with the use of rice bran.<sup>119</sup> He began using rice bran on chickens, pigeons, quail, sparrows and finches in 1910 and his results suggested that beriberi was a “proportional nutritional disability” disease stemming from the deficiency of a certain compound. “Beriberi stems from the continued intake, over a period of time, of a diet such as white rice that lacks the nutritional element within bran.”<sup>120</sup>

Tōyama promoted prevention through a four-point program: First, cultivate more minor grains; second, eat more of these whole grains and bread; third, do not eat highly polished rice; fourth, decrease the amount of rice eaten and conversely increase portions of supplementary foodstuffs. How did he conceptualize the realization of this program? Scholars and educators had to teach nutritional science to the masses, he said. The elite class had to lead by example, and if they practiced minor grain dietary regimes, the lower classes would follow.<sup>121</sup>

In 1918 the *Yomiuri shinbun* served as a platform for Tōyama to publicize his ideas. In a series of articles entitled “The Japanese and White Rice,” he told how the Japanese had traditionally eaten brown rice.

The oldest people on the earth attached to rice eating are the Japanese. . . . However, this rice has not always been white rice like we eat today, but brown rice. . . . Only high-ranking people within the elite class ate white rice [during the Edo period]. While culture advanced rapidly during the Genroku era [1688–1703], everyone outside of Edo, Kyoto, or Osaka was eating unpolished brown rice.<sup>122</sup>

Tōyama's main point was that epidemic beriberi was a product of modern Japanese society. As rice polishing technology advanced, so did the prevalence of beriberi.<sup>123</sup> Enrolling history

as a legitimizing device, he argued that eating brown rice or barley was part of the Japanese heritage, and was also naturally effective in preventing beriberi.

Not only did Professors of Tokyo Imperial University refuse to take the work of the diet theorists seriously, they also often referred to such work using derogatory terms. When *über*-contagionist Aoyama Tanemichi heard about Tsuzuki's research, he is purported to have said, "Oh, rice bran's now a medicine for beriberi? Well, I wonder if horse piss would work, too?"<sup>124</sup> Aoyama, director of beriberi research at Tokyo Imperial University, used his institutional authority to discredit any science that did not agree with his medical opinions. He dismissed even data produced by his students that supported the diet deficiency theory as "coincidental."<sup>125</sup>

Historians of the pharmaceutical industry also point out Tsuzuki's educational background influenced the reception of his new drug. His credentials as a graduate of the Aichi Medical School were regarded as less impressive than those of doctors who had matriculated at the prestigious Tokyo Imperial University. When Tsuzuki presented an exhibit in the science section showing the statistical data from his Anchiiberiberin treatments at the 1915 Tokyo Fair, the Tokyo Imperial University Medical Department, in the adjoining booth, posted a large sign that read, "Rice bran cures white rice disease in animals but has no effect on beriberi in humans."<sup>126</sup>

The medical elite did much to block or even negate the work of the diet deficiency theorists. At the annual Medical Association of Japan (Dainippon Igakkai) in 1914, Hayashi Haruo, professor at Tokyo Imperial University and BRC member, explored the nascent vitamin theory. Basing his talk on the work of his student Tazawa Ryōji—the same data that Tazawa would later be accused of distorting in order to curry favor with his senior professor<sup>127</sup>—Hayashi reported that in clinical trials, rice bran extract did not halt disease progression. During treatment, symptoms continued to worsen to the point that Tazawa stopped the trial and returned to the usual treatments of stimulants and diuretics. "Based on what many professors and their assistants have said today," Hayashi argued, "we have clear proof that rice bran extract has no effect."<sup>128</sup> At the end of his talk, interestingly, Hayashi returned to the contagion theory.

I do not believe that beriberi and food are causally related. But, we would not oppose the theory that an inappropriate diet lacking vitamin rich foods predisposes one to contract beriberi. Also, living in an insalubrious environment also predisposes everyone to catch this disease. A poor diet is one of the contributing factors to beriberi. In the navy, they basically eliminated it by reforming the diet. While dietary reform may be one factor in the disease's prevention, I believe that the improvement of general hygiene also played a large role in this process.<sup>129</sup>

Ōmori Kenta, professor at Keiō University Medical School, commented that Hayashi's presentation basically put a stop to understanding beriberi as a vitamin deficiency disease.<sup>130</sup>

We know that scientific beliefs are value laden and that asking questions of efficacy such as "why did they support a theory that did not cure beriberi?" are not the most fruitful. To begin to illuminate the relationship between science and society, and the dynamics of professional hegemony, what we need to examine are the stakes and the spoils. The stakes were high for the anti-vitamin doctors. If the vitamin theory were proven a fact, an entire generation of work done at Tokyo, starting in the 1880s after the closure of the Beriberi Hos-

pital, dedicated to discovering the microscopic agent that caused beriberi, would have been discredited. Not only would have Tokyo Imperial University professors been proven dead wrong, but also the diet deficiency theory and the dietary treatments of traditional medicine doctors would have been vindicated. The elite academics and their like-minded colleagues in the army would lose face.

The spoils were equally important. These doctors had nothing to gain by supporting the diet deficiency theory. They participated in no discoveries, so no academic glory was to be earned. Tsuzuki and Tōyama had already pioneered rice bran extraction methods and developed several different kinds of serum treatments. As doctors at the premier medical research institute in Japan, they would have been merely following the lead of other scientists. The microorganism hypothesis, on the other hand, offered the potential for the discovery of the beriberi bacillus or toxin. As long as the cause was regarded as unclear, doctors like Aoyama and Hayashi could continue to cite uncertainty concerning disease etiology as justification for their pursuit of the contagion theory.

Reputation vis-à-vis lower ranking doctors was not the only issue. Kitazato Shibasaburō, star pupil of Robert Koch (1843–1910), had set up an Institute for the Study of Contagious Diseases with the support of the Home Ministry. This was a deliberate alliance, because under the protection of the Home Ministry, Kitazato could keep his Institute outside of the control of the Ministry of Education and Tokyo Imperial University. Flaunting his autonomy in the face of the imperial university doctors, Kitazato was a thorn in the side of Tokyo Imperial University. The Ministry of Education finally absorbed the Institute for the Study of Contagious Diseases into its fold in 1914, bringing it under the colonial grasp of Tokyo doctors. Kitazato immediately quit, set up the Kitazato Institute for the Study of Contagious Diseases, and brought the entire staff of the Institute for the Study of Contagious Diseases to his private research facilities.<sup>131</sup>

From 1908, members of the Institute for the Study of Contagious Diseases such as Shiga Kiyoshi 志賀潔 (1870–1957) served on the Beriberi Research Council alongside doctors from the imperial universities. While originally conceptualizing the disease as contagious, Shiga later switched his approach and explored the relationship between diet and disease etiology.<sup>132</sup> This made the rivalry even stronger.

After the 1914 Medical Association of Japan meeting, Shiga took Professor Hayashi to task for his continued support of the contagion theory. Shiga recounted how Hayashi did not believe that experimentally induced white rice disease in birds, or polyneuritis, was the same disease as beriberi in humans. Hayashi also used the case study of a merchant marine ship that traveled on a 500-day training voyage around South America and across the Indian Ocean to back the contagion theory. The crew consisted of officers, enlisted men and trainees. One trainee was suffering from a light case of beriberi at the beginning of the voyage. Out of 125 trainees, seventy developed beriberi. Among the twenty-seven enlisted men and twelve officers, there were no cases of the disease. The diet of the enlisted men and officers contained Western food while the trainees' fare consisted of predominantly white rice.<sup>133</sup> Hayashi stressed that the one trainee with beriberi infected the others. Shiga did not agree. There had been numerous examples like this dating back to the early 1880s in the navy, and Takaki Kanehiro had argued that such cases proved the causal relationship between diet and beriberi. Shiga criticized Hayashi for his adherence to the contagion theory.



Attempting to explain these cases through the contagionist approach is totally impossible. There is nothing new to be said about these cases. Why were there no cases among the officers or enlisted men if this disease is contagious. . . . The nutrition deficiency that I advocate can explain Hayashi's causes. I am not saying that the cause of beriberi stems from the relationship of eating white rice or not eating white rice. The nutrition deficiency theory looks at the differences of labor and lifestyle even when dealing with the same diet and argues that there are differences born from more than simply nutrition.<sup>134</sup>

The rivalry between the Kitazato faction and the Tokyo faction added another layer of importance to the beriberi debate. If Tokyo doctors conceded, Kitazato Institute doctors, now championing the diet theory, would have prevailed. In a very real sense, reputation at the top of the Japanese medical world, and the power to hold sway over it, was at stake.

### The Recolonization of Beriberi Research

As much as the senior medical elite within Tokyo Imperial University and the BRC wanted to deny that beriberi and diet were causally related, some researchers from these institutions began publishing data supporting the vitamin theory. Irisawa Tatsukichi and Tazawa Ryōji published results in the 1917 Beriberi Research Council journal arguing that rice bran extract had some effect on beriberi patients.<sup>135</sup> They did not go so far as to embrace the vitamin theory promoted by Tsuzuki and Tōyama. Based on current science, Irisawa and Tazawa might well have thought that Tsuzuki's Anchi-beriberin was no magic bullet; the Tokyo researchers had every right to be suspicious of the effectiveness of rice bran extract because the absorption rate of these early treatments were extremely low.<sup>136</sup> Clinical data would have suggested that small amounts of this substance had no effect on disease progression.

Instead of trying to reproduce the results of Tsuzuki and Tōyama by replicating those researchers' experiments, Irisawa and Tazawa carried out new tests designed to verify their own claims. Tsuzuki was quite critical of the Tokyo faction's disregard for his data. He argued, "Irisawa and Tazawa talk about the effects that come from using rice bran extract in pill form. If they used extract in the form of injection, however, the same way that Professor Tōyama uses *Urihin*, then I have confidence that they would arrive at the same results as Professor Tōyama and I have."<sup>137</sup> In short, Tsuzuki claimed that Irisawa was ignoring the research of non-Tokyo faculty while reconfirming what they had already proven. This conflict between the establishment and outsiders, between imperial university researchers and scholars in other laboratories, reveals, in my view, an attempt by the former group to recolonize the field. Irisawa was seeking to reassert the supremacy of Tokyo professors in the field of beriberi research in order to assure that they, not outsiders, controlled developments and maintained their standing the upper echelons of the medical community.

Professors of medicine at Tokyo had been accused of carving out feudal-like enclaves of power and influence from the late 1890s.<sup>138</sup> Pundits within the medical community accused Tokyo professors of continuing this practice as late as 1918, and by then the accusations were not only of lingering feudalism but also of outright colonization. The editors of *Nihon no ikai* 日本之醫界 (Japan Medical World) wrote that,

For the most part, any scientific association with the prefix "Japan" is occupied



by a Tokyo faction staffing its chair and executive officer positions. [The authority of the offices] are exhausted to the limit in pursuit of the [Tokyo faction's] willful selfishness. In all of these associations, the election of the officers and discussants are entrusted to the nomination of the chair. Also, the election of the chair, which is left to the consideration of the officers is like the godfather (*oyabun*) nominating his lieutenants (*kobun*) and the lieutenants selecting their godfather as the chair. Also, all of the official business/duties are carried out under the direction of the godfather, shouldered by the lieutenants, and moreover, all the costs for these activities are covered by the membership fees. In short, it is nothing less than members being forced to pay taxes for the willful and selfish whims of the godfather and his lieutenants. Members cannot become the chair or the officials. They are not given the right to vote, and are only given tax-paying duties to shoulder. They are like Indians under British rule.<sup>139</sup>

The Aoyama faction (Aoyama died of throat cancer in 1917) and Irisawa were both accused of attempting to make bodies like the Internal Medicine Association their own “private possession” by forceful “occupation.”<sup>140</sup> As noted, I refer to the process at work in the late 1910s as the “recolonization” of the Internal Medicine Association by the next generation of Tokyo professors like Irisawa. Because of the overwhelming evidence connecting diet to beriberi, the next generation of Tokyo doctors could no longer hold the line that the old guard had propagated since the 1880s; they could not keep repeating assertions of doubt and uncertainty. I am not arguing that there was a Kuhnian-style revolution in scientific thinking. The vitamin revolution had occurred in 1910 when Tsuzuki and Shiga produced experiment-based data attesting to the efficacy of rice bran extracts. Instead of drawing upon the work of these researchers, however, Irisawa recolonized the upper echelon of the Japanese internal medicine world by taking a gradual approach to recognizing the relation of diet and beriberi, and by acknowledging the validity only of his own group's work in confirming that rice bran extracts cured this disease.

The medical press criticized the Tokyo Imperial University group, quite bluntly, for not acknowledging the work of Tsuzuki and Tōyama. In 1918, *Nihon no ikai* editors reported that, “Tsuzuki Jinnosuke submitted a paper on rice bran extract to this year's [5<sup>th</sup> Annual Japan Internal Medicine] Conference. Because of the fear that he would refer to Tazawa's data, the Hygiene Conference inquired whether he might retract his application, but apparently he did not respond to this request.”<sup>141</sup> At this meeting, eleven doctors presented papers concerning beriberi. Tsuzuki argued that his data on Anchiberiberin showed the total recovery rate had been increasing since 1911, and he stressed that Professor Tazawa and other prominent doctors should recognize that rice bran extracts such as Anchiberiberin were effective against beriberi. The medical news quoted Tsuzuki's challenge of the Tokyo faction's claims that bran extracts have no effect: “There is no need to question the consistent effect of bran extract. Last year I treated 1707 patients at my research institute and produced results of its obvious effect. Can there be a more eloquent endorsement of rice bran extract than this? . . . The era for debating the effectiveness of rice bran is already past. Can't the most stubborn ‘no effect’ proponents, Professors Irisawa and Tazawa, recognize this?”<sup>142</sup>

During the post-presentation discussion, Tazawa conceded that there seemed to be a relation between the disease of white rice eaters and beriberi, but he did not admit that they

were the same. While rice bran extract was effective on white rice disease, Tazawa refrained from saying it was effective on beriberi. Appealing to Western authority by reading aloud from a book by one of the world's leading white rice disease specialists, Dr. H. Schaumann, Tazawa cited a remark that Anchiberiberin was impure and not possibly effective against beriberi. Tazawa added that if Anchiberiberin were indeed effective against beriberi, he would like to know the identity of the effective element and how it worked. Tsuzuki became angry, shot back that Schaumann had used an expired sample of Anchiberiberin, then asserted that the element in rice bran, which he himself had extracted, was called Anchiberiberin.<sup>143</sup>

As noted in the introduction to this paper, the medical press was quite critical of Tazawa, who claimed that rice bran extracts had no effect on beriberi patients when he was working in the lab of Professor Hayashi but then switched his stance once he entered the lab of Professor Irisawa. The *Nihon no ikai* editor wrote that Tazawa's waffling was "shameless," entitling this section "Tazawa Pursued, Flees: The Fake Scholar Who Could Not Answer in His Defense."<sup>144</sup> At the beginning of the discussion session, Tazawa had asked for some time to reiterate his main point. "But all he succeeded in making clear, through an exceedingly detailed defense of himself, was that he was 'Mr. Change-My-Theory-When-I-Change-Laboratories,'" the editor maintained.<sup>145</sup> Indeed, the discussion became so hostile towards Tazawa that the Internal Medicine Association officials, made up of the Tokyo faction, "were greatly flustered, and in an attempt to rescue Tazawa, they stopped him from saying anything more."<sup>146</sup>

In what appears to have been an attempt to placate the community in the wake of the backlash against Irisawa and Tazawa's effort to recolonize the Internal Medicine Association, the Tokyo faction brought in a young researcher from Kyoto Imperial University. The conference organization committee for the 1919 Internal Medicine Association meeting in Kyoto asked Shimazono Junjirō 島薮順次郎 (1877–1937) to give a state of the field address on the topic of beriberi. Shimazono had graduated from Tokyo University Medical School in 1905, served in the army during the Russo-Japanese War, and then studied in Germany from 1911 to 1913. After returning from abroad, in 1914 he took a position at Kyoto University Medical School. Before World War I, the Japanese medical establishment looked predominantly to Germany for its institutions, theories, methods and approaches. Because German scholarship was no longer available during the war, Tokyo professors had to turn to the Anglophone world to keep abreast of the major developments within Western medicine.<sup>147</sup>

At the conference, Shimazono summarized the literatures and declared that there was no evidence to support the contagion theory. It was indisputable that a diet in which the main staple was white rice caused beriberi. He did not, however, assume that polyneuritis and beriberi were the same. Had Shimazono declared that bird beriberi, curable using rice bran extracts, and human beriberi were the same, he would have been implicitly endorsing of the extracts that Tsuzuki and Tōyama had been working on, and would have discredited the research agenda and institutional stance of Tokyo Imperial University professors and also the reputation of the BRC; he would have vindicated the work of the diet theorists, none of whom were imperial university faculty. He stopped short of this. What he did conclude was this: "Based on this opinion, we cannot deny that beriberi is caused by a deficiency in the beriberi vitamin [called vitamin B]. There are cases in which giving vitamins to beriberi patients are effective, but there is no consensus yet."<sup>148</sup> While he did not endorse rice bran extracts such as Anchiberiberin, he did create the discursive space for such tests to be carried

out and confirmed at the imperial universities.

Why Shimazono was brought in to represent the Tokyo faction is a question that I have to research further. At the moment my hypothesis is that Irisawa and Tazawa had upset enough people that the Tokyo Imperial University clique thought it best to remove them from their position at the forefront of beriberi research at the university.

Because researchers such as Shimazono at the imperial universities, unlike many scientists in the West, did not accept that white rice disease in birds and beriberi in humans were the same disease, it fell to a private university scientist to begin experimenting on humans to establish whether the diseases were indeed the same. Professor Ōmori Kenta 大森憲太 (1889–1973) of Keiō University obtained a Ministry of Education grant in April 1921 to support investigation of the cause of beriberi. When researchers at the Keiō medical department, including Ōmori, ate food containing no vitamin B, they all developed beriberi. Initial symptoms of the disease developed within seven to nineteen days and full-blown beriberi emerged by the fortieth day. Treatment centered on the administering of vitamin B. Taking over 200 grams of bran preparations produced immediate results.<sup>149</sup> Ōmori repeated the experiment, and he had fellow scientists carry out similar tests. The results were the same. Backed by repeated tests and peer review, Ōmori asserted: “Beri-beri is caused by a lack of vitamin B in diet,” at the annual medical conference at Keiō University in November 1921.<sup>150</sup>

According to Ōmori, the best prevention was to eat foods rich in vitamin B such as products made from soy beans such as tofu, soy milk, tofu paste, *azuki*, kidney beans, barley, milk, raw fish, carrots, sweet potatoes, spinach, peony flowers, Dutch hollyhock, onions, peanuts, Irish potatoes, and rice bran. These foods, he assumed, were not luxurious and the common people could include them in their diets.<sup>151</sup>

While the traditional Japanese diet did contain many foods rich in vitamin B, even Ōmori recognized that because economic development was not uniform, the lower classes did not have the income to spend on supplementary foods. He argued that

White rice consumption by everyone is the sign that the country is enlightened (*kaika*). The advancement of civilization is not, however, restricted to the advancement of the social welfare of the people. . . . Now, the main people who contract beriberi are the proletariat class who, although desire and lust after civilization, because of incomplete economic power, have yet to receive the benefits of this lifestyle. . . . Since we cannot hope for economic increases in a single day, the only other option is to change the main staple. In other words, we must abolish white rice and adopt the consumption of half-polished[, or brown,] rice.<sup>152</sup>

Since it was not possible to improve the people’s diets because of social and economic reasons, Ōmori stressed the need for the state to regulate the consumption of white rice. In short, white rice was plentiful, but most could not afford much else, and this situation led Ōmori to call beriberi, stemming from the national white-rice diet, an “affliction of the people (*kokuminbyō* 国民病).”<sup>153</sup>

Shimazono also explored the environmental influences on the spread of beriberi, and he eventually carried out his own human experiments. He used the daily menu of a factory dorm (a usual hotbed for beriberi), containing 61 grams of protein, 5 grams of fat, and 457 grams of carbohydrates, coming from the 616 grams of daily rice, to induce beriberi in hu-

man subjects.<sup>154</sup>

We experimented with factory food on healthy people, put them in the hospital, and observed them. Most developed signs of vitamin B deficiency such as a dulling of the senses, swelling, digestive troubles, low blood pressure and an unsteady pulse. Based on this set of experiments, we confirmed that when Japanese live on a diet of white rice, they develop vitamin B deficiency. When a white rice diet lacks enough vegetable and animal products, or these are not available, the diet becomes vitamin B deficient.<sup>155</sup>

The final breakdown of the Tokyo Imperial University internal medicine department stance against the diet theory came in 1925. First, because similar research was taking place in several institutions and the etiology of beriberi was clear, the army convened a final BRC meeting; the principal order of business on the agenda was to dissolve the Committee itself.<sup>156</sup> At that last meeting, in June, Shimazono led the presentations with a report on the comparison between vitamin B deficiency and beriberi. He concluded, “It is my opinion that a diet deficient in vitamin B is the basic factor in the development of beriberi, and administering vitamin B leads to recovery. Based on these two facts, we can now state that beriberi and a vitamin B deficient diet have an intimate causal relationship.”<sup>157</sup> In the eighteen years of its existence, the BRC had done much to further the study of beriberi. But it had also hindered the efforts of researchers interested in the dietary origins of this disease. Second, Shimazono became a Tokyo faculty member in 1925. The following year, he received his D.Sc. in medicine based on his beriberi research.<sup>158</sup> For the first time, a diet deficiency theorist was a professor of medicine at Tokyo Imperial University.

## Conclusion

My examination of the beriberi debate addresses the question of how Japanese doctors modernized medicine during the Meiji period. It also examines how these doctors, working in the clinic and the laboratory, produced scientific knowledge in prewar Japan. The debate over beriberi etiology also reveals something crucial about the nature and power of medicine in modern Japan. At the same time that government public health officials were colonizing the bodies of the unhygienic masses, doctors at Tokyo Imperial University—the flagship of modern, enlightened, and scientific thought—were also colonizing the upper echelon of the new, Western-trained medical community in the early Meiji period. From this position, they dominated research throughout the prewar era (and we could probably add the postwar era as well). I suggest that the “occupation” of the Internal Medicine Society and other associations by the Tokyo Imperial University professors is symptomatic of a process of nation building and thereby forms part of an emerging direction in Meiji studies that reconceptualizes Japan’s modernization and the Meiji state in terms of internal colonization.

Mark Ravina, in *Land and Lordship in Early Modern Japan*, notes that the emergence of a post-restoration, modern nation-state was “an internal process” of imperialism. In a recent articulation of this reconceptualization, he discusses the emergence of the modern Japanese nation-state in terms of world society theory.<sup>159</sup> In *Colonizing Sex*, Sabine Frühstück writes that internal colonization was a process of battling “against enemies within Japan.”<sup>160</sup> My own

definition of internal colonization draws upon Robert Bartlett's *The Making of Europe*, where he argues that it was the "cellular multiplication, of the cultural and social forms found in the . . . core."<sup>161</sup> After the Meiji government established Tokyo as the new capital, it rapidly replaced the domains with prefectures and replicated central institutions at the local level. In short, I see internal colonization as a state-making process that began with the Meiji Restoration and was solidified during the 1880s. This is similar to Karatani Kōjin's argument that "the implementation of policies of homogenization and centralization led to the establishment of a modern state" by the third decade of Meiji.<sup>162</sup>

Since modern Western states had institutes dedicated to the production of scientific knowledge, having an imperial university medical school was part of a recognizable marker of a Civilized and Enlightened nation and an essential requirement to be a player within the modern world system.<sup>163</sup> As the early Meiji leaders founded the various parts that would come together and form Tokyo Imperial University,<sup>164</sup> the Medical Department carved out its own sphere of influence and colonized the emerging community of Western medicine practitioners. The state controlled bodies and knowledge through a variety of public health offices and medical institutes. We know that the major public health-related epistemological shift across the premodern/modern divide was to refigure health not as an individual's right but rather as one's duty to the state.<sup>165</sup> In this "colonial" context, state interests took priority over individual interests; indeed, sources reveal that Tokyo professors controlled the construction of medical knowledge surrounding beriberi etiology, going so far as to produce "non-knowledge" to protect their own research agendas. Warwick Anderson writes that, "We need to recognize that the basic language of Western medicine, with its claims to universalism and modernity, has always used, as it still does, the vocabulary of empire."<sup>166</sup> Throughout the beriberi debate, Tokyo professors may not have used the "vocabulary of empire," but their critics did.

The story of beriberi is one instance within a larger group of modern diseases that reveal the uglier side of this colonial medicine in action. We could add tuberculosis prevention to this list. The hereditary theory was supported by industrialists within the central government, inhibiting proactive disease prevention until TB threatened Japan's war-making ability in China in the late 1930s.<sup>167</sup> Another is Hansen's disease, where sufferers (or former sufferers) were forcefully confined to leprosarium until 1996.<sup>168</sup> Finally, but by no means lastly, we could mention Minamata disease, the mercury poisoning that was covered up for decades to hide the relation between industry and affliction.<sup>169</sup>

I would like to conclude with a postwar postscript. Following this litany of bad aspects of colonial medicine, a bit of "energizing" news might be welcome. Beriberi research after World War II led to the development in Japan of vitamin and energy drinks that powered the office and factory workers who rebuilt the economy and the nation.<sup>170</sup> A Thai company copied one of these and called it *Kratingdaeng*®. It later came to the U.S. in translation as *Red Bull*®.<sup>171</sup> We are still living out the history of this disease: Thanks to the beriberi debate, we now have students drinking *RockSt*★*r*® in our classrooms today.

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*Yomiuri shinbun* 1878

“Kakke wa Nihon tokuyū no yamai, sono ryōhō o kenkyū shi, kanja o sukū no ga *Kakkebyōin* no mokuteki” 脚気は日本特有の病、その療法を研究し、患者を救うのが脚気病院の目的. *Yomiuri shinbun* (Tōkyō) 読売新聞. 12 July 1878.

*Yomiuri shinbun* 1879

“Korera ni kakattarashi hitozuma, shindan ukereba ōsawagi ni naru to kawa e minage/Osaka” コレラにかかったらし人妻、診断受ければ大騒ぎになると川へ身投げ／大阪. *Yomiuri shinbun* (Tōkyō) 読売新聞. 6 July 1879.

*Yomiuri shinbun* 1882

“Monbushō kanri kakkebyōin o haishi, kakke no shinsa wa kongo Tōkyō daigaku igakubu de kanshō” 文部省管理脚気病院を廃止、脚気の審査は今後東京大学医学部で管掌. *Yomiuri shinbun* (Tōkyō) 読売新聞. 4 May 1882.

*Yomiuri shinbun* 1885

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*Yomiuri shinbun* 1893

“Kakke ni bakuhan ga yūkō kanja jūbun no ichi ni, kaku rentai de shigatsu kara shikyū” 脚気に麦飯が有効患者 10分の1に、格連隊で4月から支給. *Yomiuri shinbun* (Tōkyō) 読売新聞. 30 March 1893.

*Yomiuri shinbun* 1895

“Korera wa nai ga kakke ga ryūkō” コレラはないが脚気が流行. *Yomiuri shinbun* (Tōkyō) 読売新聞. 11 July 1895.

*Yomiuri shinbun* 1906

“Rikugun hishoku no kairyō kakke yobō ni nikushoku jūshika” 陸軍日食の改良脚気予防に肉食重視か. *Yomiuri shinbun* (Tōkyō) 読売新聞. 4 January 1906.

## NOTES

1 *Nihon no ikai* 1918a, p. 5.

2 *Nihon no ikai* 1918b, p. 4.

3 Aikokusei 1908a, p. 1130, is a good introduction into the beriberi debate. The identity of the writer who used the pseudonym Aikokusei is unknown to historians. Itakura Kiyonobu speculates that be-

cause of the detail concerning beriberi in the army, it was someone in the army, probably a medical officer (Itakura 1988a, vol. 1, p. 247).

4 Two exceptions are Bartholomew 1989 and Low 2005.

5 On the famous Broad Street pump case, see Rosen 1993.

6 Carpenter 2000.

7 Yamashita Seizō's three-volume corpus is an exhaustive study of the history of this disease from a traditional history-of-ideas approach, with the narrative leading ever closer towards the discovery of vitamins. Yamashita 1983, Yamashita 1988, Yamashita 1995.

8 Oberländer 2005, pp. 13–36.

9 With the conceptual help of Brett L. Walker, who acted as our discussant, I organized the “Made in Japan? A Constructivist Inquiry into East Asian Science” panel for the 2006 History of Science Society annual meeting focusing on a similar question: Was there is a distinct form of modern science in Japan, one that is the product of a unique set of social and cultural circumstances, or did the development of science in modern Japan reflect a local variant of a larger set of global scientific trends? Walker 2005, pp. 187–193, explores this question concerning the birth of Japanese ecology.

10 While Itakura Kiyonobu notes the “political” nature (政治問題) of the debate, he does not articulate the larger significance of the politics he discusses. Itakura 1998.

11 The resistance of the Ministry of Education and Tokyo Imperial University to the establishment of a Home Ministry sponsored Institute for the Study of Contagious Disease under the auspices of Kitazato Shibasaburō 北里柴三郎 (1852–1931) in the 1890s was symptomatic, I would argue, of Tokyo's attempt to keep its control over the medical community in Japan. See Bartholomew 1982, pp. 305–12.

12 See the incident over Takeuchi's bacteria (*Takeuchi-kin jiken* 竹内菌事件) for a heated exchange in the medical and popular press between Ogata Masanori 緒方正規 (1854–1919) of Tokyo Imperial University and Kitazato Shibasaburō of the Institute for the Study of Contagious Disease over whether the bacillus isolated from Takeuchi Kaneyoshi's stool was indeed the cholera bacillus or not. The exchange is emblematic of the Tokyo's fight for dominance over the production and verification of scientific knowledge in the Meiji era. Yamamoto 1982, pp. 795–824; Odaka 1992, pp. 110–12.

13 Osterhammel 1997, pp. 16–17.

14 Arnold 1993.

15 *Nihon no ikai* 1918b, p. 4.

16 Frühstück 2003.

17 Rogaski 2004, p. 163, notes in passing that “Japanese elites successfully avoided Western colonization in part by acquiring the ability to colonize themselves” with the standards of Western sanitation. An example of how the state colonized the bodies of the people, and also how the masses reacted is “Korera ni kakattarashi hitozuma, shindan ukeraba ōsawagi ni naru to kawa he minage/Osaka,” *Yomiuri Shinbun* (7/6/1879): 3. “While it may be true that it is the same [end] to die of cholera or to die by drowning yourself, [this is a case] of a overly rash [acceptance of] fate and [subsequent] suicide: The wife of a certain Tamura, carpenter from Honda Sanbancho-Osaka, was stricken with repeated bouts of diarrhea. She thought that this was, no doubt, a [classic] case of cholera. She worried that if examined by a physician and diagnosed with cholera, a yellow sign would be plastered directly to the entrance of her house saying ‘Cholera,’ or ‘Contagious Disease,’ causing all her neighbors to despise her. Unbearably sad, her womanly naive inclinations overwhelmed her, becoming a [full-blown] plan. Just at that time, the vegetable seller came through the front door and said, ‘What happened? Your face is an awful color.’ While not carefully listening to the conditions being explained, the vegetable seller said, ‘There is no doubt that it is cholera. Quickly turn yourself in and get checked by a doctor. If you don't, there will be trouble for us all.’ The wife, more and more driven to despair, thought that if she threw herself into the Fuchi River, she would not be despised by her neighbors and wouldn't cause trouble for her husband, so she rashly decided to die. On the night of June 28<sup>th</sup>, she sneaked out of her house, and throwing herself

from the nearby Kamei Bridge, died.”

18 For the military’s control over the health of its recruits, see Takaki 1993, pp. 158–79.

19 Anderson 1998, p. 529.

20 Irisawa and Tazawa 1917, pp. 1–12.

21 Ishiguro 1896, pp. 238–39; Hayashi 1914, pp. 1265–84.

22 Proctor and Schiebinger 2008. This is similar to what historians explore as “uncertainty” within the modern relationship between environment and disease. See also Mitman, Murphy, and Sellers 2004.

23 Case in point, when the Army Medical Bureau and Tokyo internal medicine heads planned the Beriberi Research Council, it included numerous sections, such as bacteriology and chemistry, but not one dedicated to the study of nutrition. After the BRC sent doctors to Southeast Asia to study beriberi, where the nutrition deficiency theory was gaining strength among Western colonial doctors, the official report purposefully masked the causal agent, never articulating whether it was a diet deficiency or a micro-organism, referring to it simply as “*etwas*,” the German word meaning “something.” Shibayama Gorōsaku, Miyamoto Hajime, and Tsuzuki Jinnosuke, “Batavia fukin ‘Beriberi’ byō chōsa fukumeisho,” *Gun’idan zaasshi* 3: Supplement, quoted in Yamashita 1995, pp. 270–71.

24 Ōmori 1923, p. 233.

25 Ōmori 1921; Oinuma 1921.

26 *Meiji temō ki*, vol. 4, pp. 196, 399–400. Also quoted in Yamashita 1988, pp. 99–100. Donald Keene quotes a portion of this passage in his biography of the Meiji emperor, but translates *mugi* as wheat, not barley. Keene 2002, pp. 290–91.

27 *Yomiuri shinbun* 1878, pp. 1–2.

28 Nagayo 1879, pp. 13–22, 72–73.

29 *Kanpō* treatments for *kakke* focused on a dietary regime, such as forbidden and therapeutic foods. These types of pre- and proscriptions circulated within China since the Sui (581–618) and Tang (618–907) dynasties. Yamashita 1995, pp. 264–70.

30 *Kakkebyōin daiichi hōkoku*, pp. 30–31.

31 Yamawaki 1924, p. 34.

32 Katsuki 1699 (1981), pp. 348–49. Also quoted in Tatsukawa 1998, pp. 266–67.

33 Rosen 1993, p. 264.

34 Anderson 1877–1878, p. 172. According to Charles Rosenburg, doctors and hygienists believed that epidemics stemmed from “poor sanitation and a consequent accumulation of rotting filth that in its decomposition produced a disease-inducing atmospheric miasma.” Rosenburg 1992, p. 296.

35 Nagayo 1881, pp. 117–18.

36 See Oberländer 2005 for more on this process.

37 The official request is dated 9 April 1880, from the Naimushō to the Dajōkan. Quoted in Yamashita 1988, pp. 120–21. This news was reported in the popular press as well. *Yomiuri shinbun* 1882, p. 1.

38 Latour 1987, pp. 119–22.

39 Fleck 1979, p. 93. Kuhn 1996, p. 175.

40 Hacking 1992, p. 132.

41 *Ibid.*, p. 145.

42 *Ibid.*, p. 132.

43 It is an often-cited fact that the Meiji government looked to German example for developing medical, scientific, and public health institutions. See, e.g., Burns 2000, p. 24.

44 According to Ludwik Fleck, a “thought-collective” is a group of scientists working together on a similar problem, whose shared scientific beliefs are called a “thought-style.” The thought-style itself directs how the thought-collective understands their scientific endeavors. It effects a “readiness for directed perception” within the thought-collective, and works by “constraining, inhibiting, and determining” the approach to a certain problem. The thought-style establishes the parameters for one way of thinking,

- and it excludes other approaches to the same problem. Fleck 1979, p. 93.
- 45 Central Sanitary Bureau, Navy Department 1892, pp. 36–37.
- 46 Takaki 1906b, pp. 1175–76 (pp. 235–36 of 1993 reprinting).
- 47 Ibid.
- 48 In 1885, he hinted at the popular practice of using barley to treat those suffering from beriberi when he lectured to the Navy Officers' Club that, "Now, there is nothing better than barley food for preventing [Beriberi]...It is accordingly considered that the best preventative measure, at present, against [beriberi], will be to give barley." Central Sanitary Bureau, Navy Department 1892, pp. 36–37.
- 49 Ogata 1885, pp. 3–7. Oberländer 2005, pp. 13–36, examines Ogata and his discovery in detail. After graduating from the the imperial university medical department in 1880, Ogata was selected by the government to do further training in Europe, and studied in Munich and Berlin.
- 50 *Yomiuri shinbun* 1885, p. 1.
- 51 Kitazato 1889, pp. 57–59.
- 52 Ishiguro 1885, pp. 43–44.
- 53 Ibid., pp. 20–21.
- 54 Ishiguro commented on how the confined quarters of military life contributed to the spread of disease, noting that "Germs of epidemic contagious diseases like *kakke* often dwell inside homes." Ibid., p. 24.
- 55 Mori 1889, pp. 1–5; quoted from *Ōgai zenshū* 28, p. 220. A microtome is a bladed instrument used to slice thin samples of tissue for examination under the microscope.
- 56 Mori 1901; quoted from *Ōgai zenshū* 34, p. 166.
- 57 Quoted in Bowering 1979, p. 13.
- 58 Oya 1987, quoted in LaMarre 1998, p. 604.
- 59 Mori 1886, p. 13.
- 60 Weatherall 1995, p. 194.
- 61 Kumagawa and Mori 1886, p. 13.
- 62 Kamminga and Cunningham 1995, p. 8.
- 63 Kumagawa and Mori 1889b, pp. 21–22.
- 64 Kumagawa and Mori 1889c, pp. 9–10.
- 65 Liebig developed a method for burning organic and inorganic compounds in a special chamber that allowed the measuring of the compound's elemental (i.e. nitrogen, carbon) make-up. Liebig's methods became standardized and "[h]is combustion apparatus became a symbol of the new era of organic chemistry." Holmes 1973, pp. 331–32.
- 66 Mori 1890; quoted from *Ōgai zenshū* 28, p. 136. This report was submitted on 31 March 1890.
- 67 Ibid., p. 139. Interestingly, although Mori discounts Voit's theories, he is analyzing these test results according to a Voitian understanding of protein consumption in the body. Voit's work of protein led him to formulate a theory of nitrogen intake, storage, and the relative amount of energy to be gained from them. Again, intake and excretion were varied so Voit thought "the urea production as a measure not of the muscle activity at any particular time, but of the capacity for such activity over a longer time period." Holmes 1976, p. 64.
- 68 Arnold 1993, p. 10.
- 69 Takaki 1911, p. 246 of 1993 collection.
- 70 Ishiguro 1905, pp. 31–32.
- 71 Yamashita 1988, p. 157. Yamashita Seizō, personal letter to author.
- 72 Yamashita 1988, pp. 153–54.
- 73 Takada 1895, p. 33; Koike Masanao, "Genkyokuchō no kakke ni kan suru kunji," *Gun'i gakkai zasshi* 162 supplement (1907): 6.

- 74 Takada 1895, p. 34. The 1,860 year-old-story may be referring to the barley remedy that is found in ancient Chinese medical texts.
- 75 Aikokusei 1908a, p. 1130. Rikugun Eisei Jiseki Hensan Iinkai 1907, pp. 1–7; Rikugun Imukyoku 1909, pp. 40–41.
- 76 “Taiwan rikugun eisei gaikyo,” *Taiwan rikugun gun’i bu* (March), 1905 quoted in Yamashita 1988, p. 449; *Yomiuri shinbun* 1895, p. 5; Iku 1896, p. 10.
- 77 Quoted in Ishiguro 1896, pp. 601–03. The original “instruction” appears in Ishiguro Tadanori, “Ishiguro Eisei Chōkan no kunji,” *Rikugun igakkai zasshi* 72 (1896): 238–39.
- 78 Ishiguro 1896, p. 601.
- 79 Iku 1896, p. 10. According to Yamashita 1988, p. 409, T. K. Iku was Toki Yorinori’s pen name. It is quite possible that Toki needed to use a pen name in order to openly criticize the upper echelon of the Army Medical Bureau.
- 80 Iku 1896, p. 10.
- 81 On 11 June 1895, Mori arrived in Taipei, and on 8 August, he became the Taiwan Sōtokufu Rikugun’i buchō. He left Taiwan on 22 September and was back in Tokyo by 4 October. From September 1895 to January 1896, Ishizaka Tadahiro was the chief of military medicine on Taiwan. He was replaced by Toki, but Toki’s name does not appear in the official record. Yamashita 1988, pp. 477–78, note 61.
- 82 While there was much support for barley-rations within the army medical corps, the Army Medical Bureau postponed the addition of barley because, they said, it would have complicated the main diet of white rice and caused difficulties in supply. Nishimura 1934, p. 161.
- 83 *Ikai jiho* 1908, p. 1293.
- 84 Aikokusei 1908b, p. 1154; Seaman 1907, p. 242. In March, the army high command issued the following order concerning field rations: “10 March 1905 #2000, Instructions for barley rice rations for the army in the field. For those attached to the army in the field, because it has been recognized that it is necessary to eat barley-rice as a means of beriberi prevention, when the situation allows, endeavor to make the main diet 4 *gō* of polished rice and 2 *gō* of split barley.” This order was not limited only to the campaign forces, but soon was applied to the home front as well. “29 March 1905 #2649, Instructions for barley rations within Japan. It has already been instructed that the army in the field should endeavor to eat barley rice as a form of beriberi prevention when the situation allows. For the units within Japan, and with this purpose, endeavor to make the main diet a 7 to 3, rice to barley mixture.” Quoted in Rikugun Gun’idan 1913, p. 1334.
- 85 Fujii 1911, pp. 42–43, 44.
- 86 *Yomiuri shinbun* 1906, p. 2.
- 87 “March 30, 1909: Imperial edict 66, Army Provisions Revised,” quoted in Rikugun Gun’idan 1913, p. 1333, notes that either 5 *gō* of rice or 675 grams of hardtack, 150 grams of canned meat, 11.25 grams of salt, and 18.75 grams of soy sauce constituted the daily dietary standards.
- 88 For example, Ishiguro 1885, pp. 29–33 noted that the diet in the countryside was rough and course compared to urban fare.
- 89 Ohnuki-Tierney 1993.
- 90 Tsuzuki 1907, pp. 60–61.
- 91 Ibid.
- 92 Ibid., pp. 62–63.
- 93 Yamashita 1989, p. 298.
- 94 Quoted in Rikugun Gun’idan 1913, p. 1325.
- 95 *Yomiuri shinbun* 1893, p. 2.
- 96 Yamashita 1988, p. 412, writes, “Why was Ishiguro—who directly witnessed Tōta Chōan’s barley

treatment at the Beriberi Hospital, saw how Takaki Kanehiro used barely to rid the navy of beriberi, and dealt with [the fact that] army divisions were using barley to reduce the infection rate—so persistent in continuing his opposition to barley rice? If truly there was no scientific evidence [as he claimed], since the army was flooded with beriberi sufferers, shouldn't he have conducted a experiment using barley? I do not think that his attitude of simply refusing to acknowledge barley instead of carrying out this simple test was normal."

97 Aikokusei 1908c, p. 1178, wrote that, "Because of these [results from Osaka and elsewhere], Tadanori should have consented and allowed the mixing of rice and barley. After collecting results for several years [if they showed that barley did not protect against beriberi] then I am in agreement that the practice of mixing rice and barley need not be continued. But, if the results were obvious, and [Tadanori] said that there is not any science to back up the barley-rice theory, despite the fact that rice-eating units, year after year, have a high infection rate, and then deny these facts in words and deeds and refrain from enacting [the barley reforms], I would have to oppose."

98 Ibid., p. 1179.

99 Bartholomew 1989, p. 192, talks about the feudal legacy and its influence on Meiji period science.

100 Fleck 1979, p. 93.

101 Yamashita 1988, p. 450, notes that "It is nothing less than regrettable that such a large number of soldiers unnecessarily sacrificed did not register with the Army Ministry."

102 Aikokusei 1908d, p. 1379, argues that the Army Medical Bureau "engineered" the large numbers of beriberi patients with their "outlawry," and irrational persecution of the diet-deficiency faction.

103 "Rinji Kakkebyō Chōsakai saisoku," presented to the Imperial Diet on 29 August 1908, quoted in Nihon Kagakushi Gakkai 1965, p. 129.

104 Itakura 1988a, p. 238.

105 Robert R. Williams 1961, pp.16–19.

106 *Tōkyō iji shishi* 1908, pp. 45–46.

107 Shibayama Gorōsaku, Miyamoto Hajime, and Tsuzuki Jinnosuke, "Batavia fukin 'Beriberi' byō chōsa fukumeisho," *Gun'dan zasshi* 3: Supplement, quoted in Yamashita 1995, pp. 270–71.

108 Yamashita 1995, p. 270–71.

109 Carpenter 2000, pp. 39–44.

110 Fraser and Stanton 1910, pp. 58–59. Originally read at the first biennial meeting of the Far Eastern Association of Tropical Medicine on 10 March 1910 in Manila.

111 Shibayama 1910, p. 125. Carpenter 2000, p. 83, also discusses this conference and the comments of various participants.

112 "Discussions on the Papers by Doctors De Hann, Frase, Highet, Aron, Shibayama, and Kilborne," *The Philippine Journal of Science B: Medical Sciences* 5 (1910), pp. 137–144. Originally discussed at the first biennial meeting of the Far Eastern Association of Tropical Medicine on 10 March 1910 in Manila.

113 Yamashita 1995, p. 291.

114 Ibid., pp.328–29.

115 Yamada 1943, p. 225, notes that When Mori Rintarō entered the Army Medical Bureau, Aoyama Tanemichi said, "Don't tell me that when you become Surgeon General, having been bewitched by popular opinion, you will say that barley is necessary for beriberi prevention." "Oh no," Mori replied, "I will not prostitute myself to that level yet."

116 Tsuzuki 1911, p. 985.

117 "Tsuzuki Gun'isho menshoku no shinsō," *Toyokuni shinbun* (11 December 1910), quoted in Itakura 1988a, p. 371.

118 Tsuzuki 1912, pp. 259–62.



- 119 Professor Suzuki Umetarō 鈴木梅太郎 (1874–1943) also produced a rice bran extract called *Orizandin*, but because Suzuki was a professor of agricultural chemistry and not a medical doctor, his work is not addressed here.
- 120 Tōyama 1911, pp. 87–88.
- 121 Tōyama 1913, pp. 5–6, 14–15.
- 122 Tōyama 1918a, p. 4.
- 123 Tōyama 1918b, p. 4.
- 124 Quoted in Nihon Shinyakushi Kankōkai 1969, p. 232.
- 125 Tazawa 1965, pp. 4–5.
- 126 Nihon Shinyakushi Kankōkai 1969, p. 232.
- 127 See note 1. Hayashi 1914, p. 1275.
- 128 *Ibid.*, p. 1282.
- 129 *Ibid.*, p. 1284.
- 130 Ōmori Kenta, “Kindai no kakke gen’in kenkyū no ayumi,” *Bitamin kenkyū gojū nen* quoted in Itakura 1988b, p. 111.
- 131 For more on this process, see Bartholomew 1982, pp. 295–341.
- 132 Shiga 1911, pp. 789–806.
- 133 Shiga 1914, p. 2.
- 134 *Ibid.*
- 135 Irisawa and Tazawa 1917, pp. 1–12.
- 136 Yamashita 1995, p. 278.
- 137 *Nihon no ikai* 1918a, p. 4.
- 138 Bartholomew 1989, pp. 191–92.
- 139 *Nihon no ikai* 1918a, p. 4.
- 140 *Ibid.*
- 141 *Ibid.*, p. 5.
- 142 *Nihon no ikai* 1918b, p. 4.
- 143 *Ibid.*
- 144 *Ibid.*, pp. 4–5.
- 145 *Ibid.*, p. 4.
- 146 *Ibid.*, pp. 4–5.
- 147 Ōmori 1927, p. 69.
- 148 Shimazono Junjirō, “Kakke,” *Nihon naika gakkai zasshi* 7:5 (1919), p. 227, quoted in Ōmori 1927, pp. 69–71.
- 149 Ōmori 1923, p. 238.
- 150 *Ibid.*, p. 233. Ōmori 1927, p. 73. Ōmori 1921b, p. 4, wrote, “Based on this data, beriberi stems from a deficiency in vitamin B. A decrease in supply of vitamin food quickly increases the deficiency and accelerates the advance of this disease. A supply of vitamin B cures it. Without a supply of vitamin B, the formerly healthy subjects got beriberi. That is, eating a diet that lacks vitamin B causes beriberi. In turn, this is cured using vitamin B. We can clearly say that beriberi is a vitamin B deficiency disease.”
- 151 Ōmori 1921c, p. 4.
- 152 Ōmori 1927, p. 4.
- 153 Ōmori 1921a, p. 4, Ōmori 1921c, p. 4.
- 154 For beriberi in factory dorms, see Hane 1998, p. 158, and Tsurumi 1990, p. 86. Ishigaki Ayako, in her autobiography, remembered that when she visited a textile factory in 1919, 20% of the female workers had beriberi. In the mess hall, the factory official noted that most of the women were from the country-side and ate only barley at home, but at the factory, they were able to eat white rice at every

- meal. This luxury meant that the workers were “better fed than they would be at home.” Ishigaki 1940, pp. 111–12. I am indebted to Peter Duus for bringing this passage to my attention.
- 155 Shimazono 1927, pp. 18–20.
- 156 *Ikai jihō* 1925a, p. 1072.
- 157 Shimazono 1925, p. 1100.
- 158 Itakura 1988b, pp. 128–29.
- 159 Ravina 1999, p. 210. Ravina 2006, pp. 35–52.
- 160 Frühstück 2003, p. 4.
- 161 Bartlett 1993, p. 306.
- 162 Karatani 1993, p. 94.
- 163 What Ravina might refer to as the “paraphernalia of nationalism.” See Ravina 2006, p. 38.
- 164 Bartholomew 1989, pp. 90–98.
- 165 Burns 2000, pp. 17–49.
- 166 Anderson 1998, p. 529.
- 167 Johnston 1995.
- 168 Burns 2003, pp. 104–18. Also see Fujino 1993.
- 169 George 2001, pp. 62–68, argues that Tokyo University Professor Tamiya Takeo 田宮猛雄 (1889–1963), for example, was part of a conglomerate of industry, bureaucracy, and medical community big-wigs that participated in the Shin Nitchitsu corporation’s attempt to spread doubt and uncertainty surrounding the role of its factory that spewed organic mercury into Minamata Bay. The medical elite in Tokyo went so far as to say that claims made by doctors at “hick” universities like Kumamoto Daigaku, who argued early on that the factory was the cause of the mercury poisoning, were not as trustworthy as those made by doctors at the “center.” *Ibid.*, p. 64.
- 170 Kitazawa 2004, pp. 291–330.
- 171 [http://en.wikipedia.org/wiki/Red\\_bull](http://en.wikipedia.org/wiki/Red_bull).

## 概要

### 戦前に於ける医学の権威：脚気研究と軍医学

アレキサンダー・ベイ

本稿は、1885（明治18）年から1925（大正14）年までの約40年にわたって展開した「脚気論争」を通して、日本における医学の近代化の過程を考察した。脚気病（ビタミンB1欠乏症）は、あらゆる社会階層の人々を苦しめる病気であったため、公衆衛生上きわめて大きな問題であった（たとえば、明治天皇も同病には苦しめられたことがある）。従って、脚気病が社会にもたらした影響は小さいものではなく、その原因をめぐっては、国家レベルで争点となった。いわゆる脚気論争は、海軍と、陸軍及び東京帝国大学医科大学の教授陣（帝大派）との間で展開した。海軍の軍医は医学統計を用いて、脚気が蛋白質不足症であると推定した。そして、兵食に麦飯を加えることで、この病気をほぼ克服することに成功したのである。

一方、陸軍の軍医や帝大の教授らは、脚気の原因を未発見の細菌だと主張して譲らなかつた。特に帝大派は、実験室で得られたデータ以外を認めず、医学統計だけでは科学的に証明したことにならないとの立場をとった。麦飯の使用は漢方医学の派生だと思われる傾向にあったことも、脚気論争の動向に影響を与えた。漢方医学による脚気の治療方法は、生薬の服用と麦・小豆を摂取するというものであった。しかし、日本で近代医学を第一線でリードする者にとって、漢方は封建的かつ非科学的な、過去の遺物でしかなく、文明化した日本では無用の長物でしかないと判断していたのである。実際には明治の医学は多元的なものであり、漢方が果たした役割は小さいものではない。たとえば、西洋医であっても、脚気患者を治療する際には、しばしば漢方医の処方を用いていたのである。陸軍及び帝大派は、脚気の治療に漢方のアプローチを導入することに強く抵抗したため、この点が脚気論争の中心をなした。