

philippine studies: historical and ethnographic viewpoints

Ateneo de Manila University · Loyola Heights, Quezon City · 1108 Philippines

Medicalizing *Gutom* Hunger, Diet, and Beriberi during the American Period

Theresa Ventura

Philippine Studies: Historical and Ethnographic Viewpoints
vol. 63 nos. 1 (2015): 39–69

Copyright © Ateneo de Manila University

Philippine Studies: Historical and Ethnographic Viewpoints is published by the Ateneo de Manila University. Contents may not be copied or sent via email or other means to multiple sites and posted to a listserv without the copyright holder's written permission. Users may download and print articles for individual, noncommercial use only. However, unless prior permission has been obtained, you may not download an entire issue of a journal, or download multiple copies of articles.

Please contact the publisher for any further use of this work at philstudies.soss@ateneo.edu.

<http://www.philippinestudies.net>

THERESA VENTURA

Medicalizing *Gutom* Hunger, Diet, and Beriberi during the American Period

This article looks at American responses to food scarcity in the colonial Philippines. Dismissive of hunger and starvation in the early occupation, Americans initially ascribed ill health to poorly chosen foods like rice. Labor unrest, crop failures following Taal Volcano's 1911 eruption, and José Albert's identification of infantile beriberi, however, forced American administrators, doctors, and agriculturalists to confront scarcity in several ways. First, "corn campaigns" sought to enhance rice-based diets with corn. Second, research linking beriberi to mechanically milled rice led to vitamin B supplementation campaigns. However, the medicalization of hunger obscured the root causes of scarcity, which American rule exacerbated.

KEYWORDS: BERIBERI · FAMINE · UNITED STATES · HEALTH · PHILIPPINE–AMERICAN WAR

Asked about the availability of food in the American-occupied Philippines, Commissioner W. Cameron Forbes (1905) denied that hunger, let alone starvation, was a problem in the archipelago. To the extent that Filipinos suffered from what he called a “lack of physique and health,” the only identifiable culprit was “improper food” (ibid., 2). While “nature provides almost lavishly the necessities for keeping body and soul together,” Forbes (ibid.) argued, Filipinos were “poorly fed because fish and rice alone are poor, and that’s about all they use. They have an emaciated appearance, due, I think, largely to insufficient and ill chosen food” (ibid.). The quality of diet, the future governor-general asserted, was more important than the quantity of available food.

Forbes’s answer reveals the ways in which American colonialism both relied on and transformed long-standing tropes that divided the world into tropical and temperate zones. When confronted with a question about food scarcity, he asserted that the inherent fertility of the Philippines had rendered Filipinos both spoiled by and captive of nature. His defense followed a narrative laid out by the Briton Benjamin Kidd (1899) in *The Control of the Tropics*, which urged Americans to take up the “white man’s burden,” not to civilize savages, as Kipling suggested, but to bring otherwise wasted tropical resources to market. David Arnold (1996) has called this racialized global division “tropicality,” demonstrating how it informed colonial interventions in monsoon Asia and Africa in the nineteenth and early twentieth centuries. Making the tropics modern entailed controlling, categorizing, and improving nature and people through interventions in resource management and public health. But inasmuch as these projects had to address the devastating effects of El Niño droughts, the degradations of commercial agriculture, the illnesses caused by chronic food scarcities, and social protest, the knowledge gleaned from within undermined tropicality. By the second decade of the occupation, Americans and Filipinos would participate in an international crusade to find scientific proof of Forbes’s second assertion that “fish and rice alone” were poor foods. The early-twentieth-century “discovery” of beriberi, a vitamin B deficiency associated with rice-based diets, was not simply an advance in nutritional knowledge but a medicalized response to the challenges and upheavals of food scarcity that would point to new although no less interventionist possibilities for development in monsoon Asia.

This article aims to understand the management of hunger during the American occupation and to consider how the subsequent medicalization of food scarcity contributed to the recasting of the tropics from places of plenty to places of want. It does so by building upon and integrating social histories of famine with a newer literature on American imperialism, colonial science, and environmental history. Reynaldo Ileto (1985) and Ken de Bevoise (1995) first called attention to the politics of hunger when each demonstrated how Spanish and American forces exacerbated and manipulated wartime food shortages in their fight with Filipino nationalists. Although their extensive local research is impressive, both miss the extent to which the dynamic relationship between famine and colonialism was regionwide. Droughts related to the El Niño Southern Oscillation (ENSO) in 1876–1878 and 1896 took well over 10 million lives in South Asia and, as Mike Davis (2001) has argued, acted as an ecological enabler of European imperialism. But whereas Davis has stressed conquest, others have shown how reactions to ENSO famines generated interest in conservation, sparked humanitarian ideas about hunger that challenged colonial trade imbalances and contributed to the production of nutritional knowledge (Grove 1995; Grove et al. 1998; Vernon 2007). These interventions and the new biopolitical knowledge they produced suggested that tropical landscapes posed less of a threat to White and native health than did bodily practices, custom, and, by the period between the two world wars, diet (Worboys 1988). This shift, as Warwick Anderson (2006, 3) has argued about American colonial medicine in the Philippines, turned the attention of medical bureaucrats away from proving biological difference to charting “civilizational potential,” suggesting a direct line between late-empire and later international development. Beriberi research in particular, which was orchestrated by the American-founded and Philippine-based but inter-imperial Far Eastern Association of Tropical Medicine (FEATM), foreshadowed how a nongovernmental and international institution could assume a role in suggesting and shaping policies for monsoon Asia (Arnold 2009).

While these regionwide contexts may have been missing from histories of Philippine famine, the upheavals, challenges, and materiality of hunger in the Philippines are largely missing from histories of science and development (see esp. Carpenter 2000). Thus another aim of this article is to show how Philippine challenges, medical practice, and tastes were also constitutive in the making of modern nutritional sciences. To this end I offer brief accounts

of three different but related projects: cost of living surveys published in the *Philippine Journal of Science*, the Bureaus of Agriculture and of Education's corn campaigns, and the Philippine physician José Albert's (1908) research on beriberi and infant mortality. As labor protest highlighted the plight of workers who died from starvation, American administrators responded with investigations into the cost of living and food needs of the "typical" worker. With cost and quantity proven adequate, new investigations into the quality and composition of food turned farming and diet into objects of reform. More than forays into vocational education, school gardens and corn-growing contests aimed to develop a taste for corn among a people Americans thought irrationally favored rice and therefore were at fault for their disease, although also imbued with the power to overcome it (Sawyer 1912, 54; Worcester 1914, 903). Albert's beriberi research, by contrast, provided an opportunity for Philippine physicians to help shape an international research agenda. By ascribing high infant mortality rates to beriberi early in the American occupation, Albert subtly accused Americans of neglecting the health of women and children and precipitated a race to identify, isolate, and eradicate its cause.

Food Scarcity and Environmental Crisis prior to the US Occupation

Theodore Roosevelt appointed W. Cameron Forbes to the Philippine Commission on the basis of his financial acumen, experience with railroads, and past success in coaching Harvard's football team against Yale. In Manila Forbes transformed himself into an armchair naturalist, agricultural expert, and correspondent of Raj administrators like Harcourt Butler, secretary of the British Famine Commission in 1901. His letters with Butler never broached the subject of famine but instead empathized with the shared challenges of imperial administration, including attacks by a nationalist press that Forbes (1914, 1) held responsible for harming "the cause of progress and deter[ring] the people from accepting the good things that were done for them." For Forbes "good things" included outside investment, increased agricultural productivity, and the infrastructure to move goods to the market. As he explained to an earlier correspondent, the Philippines was a "rich and un-prosperous country," a paradoxical state he attributed to the Spanish failure to survey, categorize, and harness the archipelago's vast natural resources. Annexation left the United States with an opportunity to turn

"these islands into a veritable garden spot, rivaling Java, New Zealand, and Sumatra" (Forbes 1907, 3). "There are," he wrote to a potential investor, "enormous possibilities for wealth here, and we are laying the foundations for a great commercial structure" (Forbes 1904, 2). Forbes's Progressive Era reworking of the "black legend" in which empire became a problem-solving exercise for efficient management and scientific expertise rested on three omissions: a long history of Spanish and Philippine botanical collecting and agricultural improvement efforts (De Vos 2007; Bankoff 2011), the country's integration into world agricultural markets (McCoy and De Jesus 1982; Aguilar 1998), and its quarter-century history of drought and environmental crises. The omissions were consequential.

Far from the tropical paradise of the imperial imagination, much of monsoon Asia was food insecure and environmentally stressed in the late eighteenth and nineteenth centuries. This condition was due to a combination of natural and man-made factors and is worth recounting in some detail, if only to highlight the vast gulf between environmental realities and the expectations that Americans carried to the Philippines. The meticulous reconstructions of Richard Grove and others (Grove et al. 1998; Grove and Chappell 2000; Grove 2007) have shown how the El Niño Southern Oscillation (ENSO) system, in which a warmer Pacific Ocean dries up monsoon rains, was unusually strong between 1788 and 1793, 1876 and 1879, 1889 and 1891, and 1896 and 1902. The region experienced acute droughts and agricultural shortfalls just as European and American gunboats, imperial proconsuls, trading houses, and local merchants forcefully expanded global capitalism in the name of civilization. This deadly political ecology, to borrow a concept from Mike Davis (2001), meant that larger swaths of land were dedicated to the growing of export commodities just as ENSO droughts made subsistence ever more precarious. Luzon and the Visayas, two regions given over to sugar, coffee, and abaca, were dependent on rice from Indochina as early as 1877 (Garcia 1905, 92; McCoy and De Jesus 1982; Coclanis 1993). In the Visayas Negros experienced ten distinct years of famine between 1856 and 1897, while Panay suffered a massive rise in mortality during the long drought between 1876 and 1879 with Augustinian friars keeping records of corpses in the streets (Lopez-Gonzaga 1993; Aguilar 1998, 166; Davis 2001, 96). The 1896 ENSO drought, combined with the Spanish blockade of rice imports, produced severe famine in western Batangas. Balayan district lost 16,890 people out of 21,362 mainly to hunger (Ileto 1985, 103).

Even without the extremes of drought-induced famines, commercialization set in motion a series of changes in farming practices and consumption that contributed to an overall contraction of the food supply and a decline in peasant well being. With regard to farming, commercial agriculture caught an ever-increasing number of cultivators in the web of sharecropping relations. Peasant producers had much less control over the uses to which they put their land, giving commercial crops more space than kitchen garden plants that supplemented family diets. Small cultivators, 49.8 percent of whom worked lands smaller than one hectare, could not grow their own food reliably (US Bureau of the Census 1905, 180). Urban centers, fed by the rural periphery, meanwhile experienced a phenomenal growth as witnessed by Manila's rise (Doeppers 1985). As the price of land and the cost of farming increased, rural food chased urban money; commodities like chickens and eggs became too commercially valuable for peasant diets. In response to an 1895 food shortage in Zambales province health officials petitioned to stop the flow of foodstuffs to Manila. Provincial officials rejected the proposal (De Bevoise 1995, 61). With regard to consumption imported Indochinese rice was mechanically milled. The milling process produced a whiter and drier grain that lasted longer and could travel further. These improvements came at a then unknown nutritional cost as milling removed the thiamine-rich pericarp, a thin layer of skin underneath the husk. Rice became a main dietary staple just as the grain became less wholesome and daily access to a wide variety of food contracted. The combined changes to diet led to a marked lack of thiamine (vitamin B1) in the diets of working people, predisposing them to beriberi—an extremely painful, debilitating, and sometimes-fatal edema in the lower limbs. Outbreaks, discussed later, were commonplace among conscripts and in prisons, sanitariums, and mines—places where authorities rationed meals consisting mostly of rice.

Commercialization also unleashed a series of knock-on environmental effects that made recovery from drought and famine harder. Deforestation followed as large plantations colonized the lands, pushing displaced people into mountains at rates much higher than previously believed (Bankoff 2007). With fewer trees and less foliage to protect the ground from a powerful sun, the soil in commercial areas dried out, becoming less productive and more vulnerable to flooding. Unable to contain the torrential downpours of the typhoon season, aridified soil slipped down mountainsides, flooded riverbeds, drowned people and animals, and destroyed crops, roads, and

bridges. An 1876 study discovered that the riverbeds of the Agno and Cayanga in Pangasinan were beyond capacity, but did not offer a viable solution as seen by more extensive damage in 1888 (De Bevoise 1995, 59–63). Road and port damage stanching the interisland exchange in foodstuffs and increased the importance of growing port cities like Manila and Iloilo.

Locusts and other pests thrived in the deforested and arid climate. Frequent locust outbreaks plagued the islands. *Langostas de tierra* had a fifteen-year breeding cycle in the eighteenth and early nineteenth centuries; aridification boosted this cycle to every two to three years in some regions. Anecdotal evidence also indicates that the attacks were more destructive to farms and crops. In 1867 northeastern Negros experienced three days of darkness while the airborne pests blocked out the sun and moon during a sugarcane-fueled feeding frenzy (ibid., 62). Municipal and provincial officials across the archipelago issued similar reports throughout the 1880s and 1890s and again in the early years of the American occupation. Entire communities worked together to prevent outbreaks. Knowing that the best chance of staving off an attack depended on striking when the insects were in the larval stage, peasants exerted a considerable amount of effort plowing lands suspected of harboring the eggs. Once brought to the surface, hogs and fowl then ate the eggs. If the bugs made it to the grasshopper stage after the first planting, men, women, and children would congregate on one another's lands and beat "upon the ground with branches, sticks, or other suitable implements until the insects have been completely exterminated" (US Bureau of the Census 1905, 90). Another method of extermination was to "light bonfires and make great noise with bells, kettles, and other objects, all the inhabitants of the town gathering where this devastating insect appears" (ibid.). Such methods, noted an American surveyor, "appear[ed] to have failed during the last plague of locusts which totally destroyed the crops in many localities" (ibid.).

In addition to insect plagues, disease also haunted the islands. Rinderpest was among the most damaging diseases to visit the late-nineteenth-century Philippines. In another demonstration of global integration, the highly contagious and fatal cattle disease spread across trade networks linking East Africa and monsoon Asia in the late nineteenth and early twentieth century. The Southeast Asian carabao, for reasons unknown to the veterinarians and husbandmen of the era, was among the least resistant. Between 1888 and 1930 successive waves of disease wiped out upwards of 90 percent of

the carabao population, making it “arguably the single greatest catastrophe in the nineteenth-century Philippines” (De Bevoise 1995, 158; Doeppers 2010). Carabao deaths decreased crop output, further reduced food supply, and bred more disease. Swampy and untilled fields offered the ideal breeding ground for annopheline mosquitoes, which, deprived of carabao blood, preyed on human flesh to an extent that caused malarial outbreaks. Malaria added to the amount of untilled land, reproducing conditions for locust and mosquito breeding. Carabao deaths deprived peasant families of milk, the only form of widely consumed dairy.

US Occupation and Hunger Intensification

Into this matrix of ecological crisis, disease, and scarcity, the United States Army made a sudden and disruptive entry in the summer of 1898. Although Forbes might have insisted that there was no food crisis in 1905, military officials and soldiers were frank about their manipulation and exacerbation of extant scarcities between 1899 and 1902. The sheer size of the US contingent alone—over 125,000 troops—strained the archipelago’s food resources. As a large and wealthy invader the army offered high prices for scarce foods, especially as the tinned beef procured from Chicago was heavily adulterated and proved unfit for travel and consumption. Upon exhausting the archipelago’s limited meat supply, the army imported frozen beef from Australia.¹ Far more destructive than the military’s insatiable appetite was the command’s decision to destroy the resistance by cutting off the food supply. It instituted a pass system restricting civilian movement in early 1899. Only merchants of known loyalty could obtain a pass that allowed them to continue their trade. All goods had to be weighed on arrival and departure. The system severely disrupted the daily small-scale traffic in foodstuffs crucial to small municipalities and barangays. In July 1899 the residents of Las Piñas in Cavite protested against the state of “absolute want and nourishment” that the passes caused (De Lara 1899, 1). Residents demanded that they be given passes to go to Manila “to buy foodstuffs for subsistence” (ibid.). The army next moved from restriction to destruction.

Gen. J. Franklin Bell’s scorched-earth policy in late 1899 called for the wholesale destruction of crops and rice stores in an attempt to starve out guerilla forces. He justified the policy as expedient in the light of overstretched and scattered US battalions. Reinforcements in the winter of 1900–1901 in December and January, however, amplified rather than ended

the policy. In Bikol “large crop destruction expeditions” set entire barrios and municipalities alight. Army regulars responded to a surprising defeat by a small garrison in Donsol, Sorsogon, by setting fire to nearby barrios and fields. Within three weeks US forces had destroyed nineteen towns in southern Bikol, 800 outposts and storehouses, and large quantities of rice and hemp (Linn 1989, 113–17).

The reconcentration policy instituted in southern Luzon in 1901 brought more civilians under direct US Army control, which again regulated who and what left the camps. As in Bikol, the Army razed fields, homes, entire villages, and public spaces. Port closures guaranteed that smaller islands disproportionately suffered from the loss of the interisland food trade. Lt. Col. William H. Van Home (1900) described the cumulative toll that closed ports and systematic crop destruction had taken on Iloilo: “Yesterday, market day, there were fully three hundred people in this town without means of subsistence and several have died in the market place and on the streets from sheer starvation. These people are now in such a condition that they could not work, even if work could be found for them.”²

Volunteers debated the efficacy and morality of manipulating hunger. One volunteer stationed in Dagami, Leyte, wrote of the “queer feeling” that arose when he thought of the “number of men, women, and children dependent for food on his permission” (De Bevoise 1995, 63). Another volunteer defended enforced hunger as a legitimate strategy preferable to an immediate death by gun: “If this war can be ended by even such strong measures as starvation or others equally severe, why of course it must be used” (ibid.). But *gutom* (hunger) ultimately stole many more lives than the gun. Over 20,000 Filipinos died in combat. An estimated 200,000 to 500,000 died from famine or disease. Nor did *gutom* ease with the war’s declared end. Indeed no region could claim a surplus of food by July 1902. Civilian administrators under the direction of William Howard Taft and eager to win local allies and silence an anti-imperialist chorus in the US seized upon the food crisis as an opportunity.

The Philippine Commission, the civilian administrative body endowed by McKinley with the power to make laws for the Philippines, began offering food in exchange for cooperation and peace in 1901. Taft convinced a US Congress that was wary of spending money on the distant archipelago to create a one-time US\$3 million “Congressional Relief Fund,” which the commission then expended on reconstruction and infrastructure.

Assumptions about health, diet, and labor governed the disbursement. Rather than give direct aid to the poor, Americans spent the bulk of the aid on the Benguet Road to Baguio. At an elevation of approximately 500 feet above sea level, civilian commissioners and army officers prioritized the construction of the road to a temperate hill station. Following a path laid out by Europeans, the “Simla of the Philippines” was to inoculate white bodies from the debilitating effects of humidity and sun in the lowlands (Anderson 2006, 142–47). Remaining funds were next spent on rice from Saigon and Rangoon, dairy cattle from the United States, and carabao from elsewhere in Southeast Asia. Fresh cow milk, one commissioner reasoned, would lessen the severity of tuberculosis and cholera outbreaks in Manila but the sixty Jersey grade cows from California all died upon arrival in Manila. So too did over half of the 1,805 carabaos imported from Shanghai (Philippine Commission 1904, 729–30). The distribution of rice, however, was less problematic. Batangas, still struggling with famine, received 11,164 tons of rice, only twenty-two tons of which were allotted for direct aid to the “indigent class” (Foreman 1906/1980, 623). Government officials distributed the remainder as “payment for the extermination of locusts, or for labor in road-making and other public works” (ibid.). Employment, the belief went, kept guns and revolutionary material out of otherwise idle hands.

Newly arrived Americans treated the Congressional Relief Fund as if it had an alchemical ability to transmute destitute and hostile Filipinos into dutiful subjects. William Freer (1906, 144), a Thomasite teacher stationed in Camarines Sur province, wrote that municipalities receiving aid experienced an “awakening.” Freer inferred that individual transformations had occurred—akin to the spiritual awakening of evangelicalism—based on the kinds of infrastructural transformations he witnessed. Poverty and a general look of dilapidation signaled that a town had not yet submitted to American authority. The Camarines Sur municipality of Pili suffered from the three evils of a failed rice crop, rinderpest, and a government composed of “weak officials [that] failed to do the little they might have done to improve the conditions” (ibid.). Pili then accepted twenty sacks of rice, which paid workers to reroof the *presidencia*, the former seat of Spanish power, and transform the building into an elementary school. Other men received rice as wages for “road and bridge work in the vicinity” (ibid.). Providence shortly thereafter rewarded Pili with its first locust-free rice crop in several years. “The people,” Freer (ibid.) wrote, “took heart.” Nearby Bula also took

heart and sent a petition offering to build a school in exchange for rice. The ultimate symbol of the awakening flew on the opening day:

The American flag floated from the staff planted in the school-yard, and the towns-people gave a dinner to the two hundred and odd children who presented themselves for admission. Thus did the poverty-bound people of Bula show their mettle, and so was their lives quickened by the establishment of a public school on modern lines. (ibid., 157–58)

Agricultural Science and Continuing Rice Scarcity

With the widespread deployment of food as a tool of war and pacification, it was somewhat surprising that those charged with surveying Philippine agriculture during and after the war were surprised by the prevalence of rice imports. “It seem[s] singular,” United States Department of Agriculture (USDA) employee Frank Hitchcock (1899, 2) noted, “that an almost exclusively agricultural country should not produce enough food for the consumption of its own inhabitants, but such is at present the case as regards the Philippines.” Hitchcock (ibid.), like Forbes, assumed that the islands possessed enough fertile land to meet its food needs but lacked a knowledgeable and expert class of people to teach peasants how to make those lands productive. To this end the USDA sent over 200 agricultural scientists and reformers to staff the Bureau of Agriculture (BA). The BA was modeled on the USDA, then only 37 years old, and the British Agriculture Department for India, which was created in 1885 in response to the famines.

American agronomists initially labored under the assumptions of tropicality, enchanted by landscapes they imagined as lush. David Grandison Fairchild (1898, 1), USDA Special Agent In-Charge-of Plant and Seed Importation, wondered about the “finer varieties of Manila coconuts, cotton, guyava (sic), oranges, and bananas” and excitedly noted that after a year spent in the Dutch East Indies he was awake to “the possibilities there are in the organizing of such colonies if they are properly managed.” Similar to the medical bureaucrats studied by Warwick Anderson (2006) and with whom they shared research facilities, agricultural scientists initially held the tropics distinct from the temperate world, at once rich with potential but riddled

with danger. While travel abroad allowed Grandison to expand his authority as a botanist (McCook 2009), like other medical and agricultural bureaucrats he initially approached the Philippines as a vast laboratory in which to conduct experiments aimed at preserving temperate bodies from tropical heat, gradually shifting to improving native bodies and biology.

Just as the army's medical department sought to protect white soldiers from the heat with khaki uniforms, reformulated rations, and sanitary camps (Anderson 2006, 42), its veterinary unit opened experiment stations in southern Batangas and in Culion, Palawan, to identify local grasses suitable to feed North American cavalry horses (Bankoff 2004). The BA's plant introduction unit tested North American food crops in the highland soils of the La Trinidad Valley near Baguio, Benguet, with the aim of providing administrators with fresh and familiar foods (Philippine Commission 1907, 282). As military hygiene gave way to colonial public health, medical officials sought to improve Philippine bodies through sanitary training, hookworm eradication, and a retreat to the actual laboratory to study the composition and etiology of disease. The BA, meanwhile, created a network of experiment stations dedicated to identifying and reproducing the hardiest strains of sugar, coconut, and abaca. Both hygiene and agricultural science were to produce healthy workers to plant the strongest seeds, an ideal that Americans set as one of the many benchmarks to measure Philippine readiness for independence. To this common end, the BA and the colonial health service shared the facilities of the Bureau of Government Laboratories, renamed the Bureau of Science in 1901, and promoted their work in the *Philippine Journal of Science* with an American and international professional audience.

Increasing hectareage or the yield of rice for local consumption was not among the BA's priorities. In this sense its agricultural experiment stations differed little in practice from British and Dutch stations in South and Southeast Asia, which grew dramatically in number between 1900 and 1930. In 1910 all, except one station in Java, worked on crops intended for export to metropolitan industrial markets (Busch 1981). Although the contraction in rice production was undeniable, US agronomists did not see rice imports as a problem for the majority of Filipinos. A USDA-affiliated contributor to the *1903 Census of the Philippines* wrote, "as a rule, the falling off in the production of rice has not resulted in any great loss to the population" (US Bureau of the Census 1905, 87). More crucially, the liberal capitalist model that Americans followed encouraged long-distance trade by denigrating local

production. English merchant Frederic Sawyer (1900, 103), who worked and lived in Manila, advised commissioners that rice for subsistence was "the lowest use that the land and the husbandmen can be put to." Imports, by contrast, indicated "that the cultivators are raising something more profitable, and earning money by exporting valuable produce, wherewith to import rice from countries in a lower stage of civilization" (ibid.). Amid food scarcity and on the heels of famine, Americans built a colonial policy that held local rice and food cultivation as contrary to the loftier goal of benevolent uplift and market discipline.

Hunger as Pathological

Although Americans were not disposed to seeing food as a problem, the practice of paying food wages and allotting meager rations to public works and military laborers politicized hunger. James Vernon (2007) has chronicled the remarkable mid-nineteenth-century transformation of hunger in Britain and its colonies. Humanitarian concern and political critique of British poor laws and famine in Ireland and India turned starvation from a mark of personal failure into proof of the failure of states to deliver on promises of protection in exchange for allegiance (ibid., 79).

In the Philippines the radical Manila press that had so plagued Forbes exposed a US colonialism that promised uplift through the introduction of roads and rails but in practice denied laborers decent sustenance. Rations given to male Tagalog, Bontoc, Japanese, and Chinese laborers consisted of little more than a half-cup of rice, tinned tomatoes, and onions. The women and children who provided laundering services to the camps were denied payment and rations of their own, forcing relatives to share what little they had. The diets of prisoners in Bilibid, of patients at the Culion leper colony, and of the Philippine Scouts were restricted similarly to little more than rice supplemented with tinned tomatoes. Intense labor and meager diets limited to milled rice resulted in high rates of fatigue and beriberi outbreaks. By 1908, 12 percent of the young men serving in the scouts had been treated for beriberi (Kilbourne 1910). Culion experienced several acute outbreaks between 1910 and 1911.

Early tensions flared over working conditions on the Benguet Road in 1903. Pascual Poblete, editor of *El Grito del Pueblo* and a founder of the Partido Nacionalista, graphically depicted the plight of "those unfortunate laborers," such as Francisco del Rosario, who "stepped over the threshold" of

his mother's house after fleeing inhumane work conditions and proclaimed, "Mother, give me something to eat, I am dying of hunger" (Bankoff 2005, 1062). He died the next day. Poblete demanded "an investigation [to] be made into this matter and that the persons who have mistreated 'these brothers of ours' in such an inhuman manner be punished with an iron hand" (ibid.). The Philippine Commission authorized an investigation into conditions on the road. The investigator, James Ross (1903, 369), recorded only seventeen deaths, including the death of Francisco Malabayabas, whose brother Pedro reported that he "died in Paniqui, on Saturday, the 25th of July, from the effects of hunger and exhaustion. He ate some coconuts, was taken sick shortly after midnight and died during the day" (ibid., 363). The small number of deaths acknowledged by Ross absolved Americans in their own eyes. Ross's report, however, was not enough to silence other more subtle critics from the margins of the medical bureaucracy.

José Albert, a pediatrician and briefly a student roommate of José Rizal in Paris, forged tense ties with Americans. Taft appointed the Manila doctor and pediatrics professor to a "commission of inquiry" into Philippine and regionwide opium policy in 1903. Albert's continuing prominence and position depended on his cooperation with a US medical regime that cast hunger and disease as the pathological consequences of tropicality and Filipino failings. At a 1907 meeting of the Philippine Islands Medical Association William E. Musgrave, who would go on to direct the Philippine General Hospital, blamed Manila's stunningly high rates of infant mortality on the physiology of Filipinas. "The average Filipino woman," Musgrave alleged, "is poorly developed, and even those who have borne several children usually have small breasts, so that the milk-giving capacity is at a minimum" (Musgrave and Richmond 1907, 364).

Deficient Filipina bodies therefore required "the necessity of instituting artificial food for breast milk in infant feeding to an extent, and at an age of the infant, probably not surpassed if it is equaled in any other country" (ibid.).⁴ Albert (1908, 345) responded directly to Musgrave the next year with a talk on what he identified as "infantile beriberi." Although he agreed that breast milk was problematic, Albert (ibid., 347) proposed that mothers suffering from beriberi passed the disease on to their nurslings. Whereas Musgrave reduced mothers to nothing more than another source of "insufficient food," Albert's wedding of beriberi to infant health held out the hope that one could save the child by improving, rather than replacing, the mother.

Research, Albert (ibid., 348) argued, should instead focus on finding a cause and cure for beriberi as opposed to investigating the supposed deficiencies of women.

Both Albert and Musgrave engaged in a gendered project in which male doctors competed for the right to claim, protect, and heal female bodies that stood for the nation at large. At the same time Albert and Musgrave's argument illustrated how the Philippines, along with British India, was an important field in the development of nutritional research (Vernon 2007, 106–8). But while the British researcher Robert McCarrison fed rats a variety of regional and religious diets to prove the effect of food on health, Americans in the Philippines experimented directly with living people through a combination of forced or restricted feedings and social surveys to prove that poor food quality, not quantity, was responsible for ill health. Forbes, in his role as an administrator of Manila's Bilibid prison, took advantage of the enclosed nature of the prison to direct what and how much convicts could eat. The results, he alleged, were impossible to deny. "The physique" of long-term prisoners fed bread and meat instead of rice "is so much better than that of the short-term prisoners in Bilibid that it is readily noticeable to anybody, even a casual visitor" (Forbes 1905, 2).

The Taytay Cost-of-Living Survey

Forbes's assertion gained social scientific backing when in 1909 the Bureau of Science adopted a mode of inquiry favored by progressives in the United States: the cost-of-living survey. The first such survey was conducted in the relatively well-off barrio of Taytay, east of Manila. The study, led by botanist Elmer D. Merrill (1909) and Hans Aron (1909), a physician at the Philippine Medical School, brought together the dual projects of tropical agriculture and medicine to prove that wages were commensurate to food costs. While labor protest turned food into an object of political contention, the Taytay study attempted to redirect that attention.

If food was plentiful and wages adequate, then chronic illness had to be, as Forbes (1905) had argued, a symptom of poorly chosen foods. Merrill (1909) and Aron (1909) treated Taytay as a stand-in for all Philippine towns, obliterating differences in crops, landscape, and tenure patterns. In their focus on the cost and availability of food in one place at one time they also removed Taytay, and thus the entire archipelago, from a half-century of global trade relations and drought. Aron (ibid., 225) presented Taytay—

thoroughly decontextualized and rendered apolitical—as an ideal site for investigation because it was possible to get “an idea of the nourishment of a tropical people living in accord to their usual custom in a provincial town free from white men.”

Working with an unnamed Philippine Medical School assistant as an interpreter, Merrill and Aron questioned heads of households about food consumption. Dividing the interviewed families into “the very rich” (two families that owned plantations), “wealthy people” (of an undetermined occupation), and the “middle and poorer classes” (fishermen and day laborers among them), they determined that all residents regularly consumed dried or fresh fish (*ibid.*, 225–26; Merrill 1909, 220). Merrill and Aron then noted the absence of foods that made up an idealized American diet. Meat was consumed “very rarely,” chicken and eggs were “as a rule too expensive for the poorer and middle classes,” and wheat bread was “scarcely used at all, so that wheat cannot be considered to have any place in the dietary of the average native” (Aron 1909, 226; Merrill 1909, 220). The same held for “imported preserved meats, fish, fruits, vegetables, milk, butter, cheese and etc.” (Merrill 1909, 220). Market vegetables and fruits were locally grown and seasonal, which, Merrill (*ibid.*) acknowledged, meant that they were not necessarily always available.

After determining the makeup and size of the daily average meal—700 grams of rice for a workingman—Aron (1909, 229) then hired a “reliable native boy of Taytay” to purchase these items in the market. Because market prices were not set, the investigators determined that they would never obtain a “fair” price had they gone themselves, and neither would a “Filipino student, since the latter might be looked upon as a foreigner and hence get less for his money than a native of the village” (*ibid.*). Obtaining “authentic” results was important, as an aim of the survey was to determine not just what Filipinos ate in a day, but also the cost of a day’s food for laboring adult men. Aron (*ibid.*, 230–31) estimated that three to twelve centavos daily would purchase 40 grams of protein from a cheap fish and 850 grams of rice, providing a worker with 3,100 daily calories. In response to the wage question, Aron (*ibid.*, 231) concluded that “it may not be without interest as having a bearing on many sociologic and economic questions in these Islands to state that in a provincial town a Filipino can live very comfortably on 12 centavos a day.” Wage increases were not necessary. Armed with social science, Americans thus dismissed both labor protest as needless and local diet as unhealthful.

The Taytay study marked the beginning of a concerted US scientific and interventionist interest in Philippine diet that grew during the second decade of their administration. Two factors drove this interest. The first was a renewed food crisis in Batangas after the eruption of Taal Volcano in 1911. The eruption could be heard for hundreds of miles, destroyed seven barangays, and took 1,500 lives. Volcanic ash up to over a centimeter thick fell over an area of 1,994 square-kilometers, strangling crops. Drought, perhaps related to ash, struck Luzon in midsummer. The result was a collapse in agricultural production, agrarian protest, and a strike wave in Manila (Kerkvliet 1992; Pomeroy 1992; Scott 1992). The second was greater attention paid to beriberi, adult and infantile, as Albert had first called for in 1908. The crisis in Batangas and the nutritional knowledge forged around beriberi furthered Forbes’s contention that the Philippine diet was built upon poor food. Cultivating a new people and a new nation, for Americans, depended upon the cultivation of a taste for corn and, after that effort failed, improvement of the quality of rice.

Campaigning for Corn

The years 1911 and 1912 were the first in which the Bureau of Agriculture directed its energies toward local food supply rather than commercial crops. Meeting the food needs of Filipinos was a new and unprecedented goal that the bureau sought to achieve with colonization in Mindanao, school gardens, and planting corn. In the first decade of the occupation, the US continued to wage war against Mindanao’s people. Its limited agricultural experiments included rubber and coconut cropping on the San Ramon Penal farm in southern Zamboanga. The agricultural colonies of the second decade were different. Colonies were to employ landless northerners who threatened to either add to Manila’s labor unrest or make illegal swiddens in forest reserves. Approximately 30,000 people from Luzon were settled in Mindanao and Sulu to grow a mixture of corn and rice for distribution and sale elsewhere in the archipelago. In short, the south was to feed the north, a novel spatial relation for the archipelago. Mindanao’s distinctive weather patterns—drought in the northern half of the archipelago usually meant rain in the south—allowed Americans to present this relationship as natural. One administrator asserted, “A general crop failure throughout all three regions of the Archipelago will very rarely occur during the same year” (Philippine Commission 1915, 376). The colonization schemes were small, unfunded,



Fig. 1 First-place winner of a Laguna province corn-growing contest. Source: Foreman 1913, 298

slow to produce enough to meet northern demand and largely abandoned until the 1930s when Philippine officials sought to compete with Japanese migration to Luzon (Abinales 2000).

The BA worked with the public primary schools to promote a gardening curriculum. While this was certainly an important part of a general move by the schools away from classical and literacy to vocational education, as Glenn May (1980; 2009) has argued, the gardening curriculum was also supposed to boost local food production. By planting vegetables, greens, and corn, the schools acted as the kitchen gardens that cultivators could no longer afford to tend. That teachers and the BA sought to turn student-run farms into viable markets was a measure of the extent to which food in general was in short supply as well as a statement that particular kinds of food were better than others. It was also a gendered curriculum that put boys into new roles as gardeners and taught girls how to prepare greens.

The corn campaign, like the garden curriculum, sought to exert influence beyond the schools. But, rather than encourage the planting of supplemental food crops, the corn campaign aimed to transform taste and ultimately displace rice as the dietary staple. Americans found corn preferable to rice for a variety of reasons. In a mark of the moralizing and cultural prejudice driving early nutritional research as well as the diffuse nature of the work of research, Americans simply assumed that the American staple was more healthful despite concurrent investigations into corn's relationship to pellagra in the US south. As Commissioner Dean Conant Worcester (1914, 903) simply asserted, "Corn is a far better food than rice." Corn also had the advantage of a shorter growing season, allowing administrators to hope that its planting would do away with the "critical seasons between rice harvests, when lack of food is no uncommon thing, and those too frequent periods when drought and consequent rice shortage mean hunger and famine" (*Philippine Craftsman* 1912a, 73). Planting corn in school gardens did not require irrigation or flooding the school grounds. Playgrounds and surrounding areas could be transformed easily into gardens just steps away from a main school building. Corn grew fast, allowing teachers to hold corn-growing contests throughout the school year. The Teacher's Committee on Gardens and Farms (Sawyer 1912, 59) concluded that:

Since it is believed that great efforts should be made to increase the production of corn in the Islands in order to increase the food supply



Fig. 2. A booth in Malabon, Rizal, constructed from corn, made to resemble and compete with the palay (rice) floats of the Pahoy-Pahoy festivals. Note that the “properly costumed” schoolgirls were dressed in terno, with the starched butterfly sleeve. This was not everyday wear in the Philippines. Source: Foreman 1912, 490

of the people, the committee recommends that corn growing contests be instituted during the year in every locality where possible. These contests should be carried on in a systematic manner, every boy should be encouraged to take part and suitable awards should be given to the winners.

Corn also grew tall and it photographed well, the importance of which could not be underestimated. The administration used images of happy children standing next to thriving corn plants as a counter to anti-imperialist and nationalist accusations of starvation (fig. 1).

Despite its promise, corn did not make great inroads into the everyday diets of many Filipinos. The primary obstacle facing the campaigners was corn itself. A vast majority of Filipinos considered corn unfit for human consumption. Corn was animal fodder. To this day corn remains a marginal part of the diet in the Philippines, except in the Southern Luzon provinces of Laguna and Batangas—the two provinces hardest hit by famine between 1896 and 1902—and in the hispanicized plantation town of Vigan, Ilocos Sur province, as well as in nonirrigated parts of Cebu and Mindanao (Aguilar 2005). In the language of the Ilongot of the southern Sierra Madre and the Caraballo Mountains, to call someone a “corn eater” is to call that person poor.³

In order to make corn palatable to Filipino tastes, the schools and the BA instituted a multipronged campaign to capture the hearts and stomachs of students, their parents, and entire provinces. Domestic science courses taught female students how to prepare corn. North H. Foreman (1913, 308–9), superintendent in charge of school gardens, estimated that the 189 corn fairs held in the schools in 1912 introduced 137,438 people to the idea of eating corn as a staple food by teaching recipes that blended rice corn meal with rice flour. The commission then authorized the construction of corn booths in public markets that provided, according to Foreman (*ibid.*, 308), 247,048 free corn-based meals along with recipes in local dialects (fig. 2). The school recipes and free meals attempted to appeal to local tastes. “Recipes tried out in the locality and liked by the people were used. Only the recipes involving the use of ingredients and cooking utensils available in the average Filipino home were distributed” (*ibid.*).

The images of the corn campaign demonstrate the extent to which the BA and schools also adopted Philippine modes of display. First, corn campaigners enlisted the help of Emilio Aguinaldo. The Philippine Commission rewarded



Fig. 3. "King Corn," with an American face, at a corn fair in Calamba, Laguna. Source: Foreman 1912, 491

Aguinaldo handsomely in land in exchange for his support after the war. Aguinaldo, in turn, allowed himself to be transformed into a model farmer and devoted a small amount of land on his vast sugar estate in Dasmariñas, Cavite, to corn. Government photographers captured his corn plots on film and declined an invitation to do the same for Aguinaldo's cane fields. Second, although the Philippine Commission had deemed unauthorized dramatic plays seditious (Fernandez 1996), BA and educational authorities turned to street plays and parades as a promising medium to promote corn. The parades emphasized the healthfulness of the grain, with one held in San Fernando, La Union, that began with a line of weak "rice-fed" children followed by vigorous "corn-fed" children (*Philippine Craftsman* 1912b, 510). Third, American-sponsored corn festivals featured elaborate scarecrows made of corn that closely resembled the giant *pahoy-pahoy* (scarecrows in Visayan) made of rice straw. Peasant rice farmers relied on *pahoy-pahoy* to scare away rice-eating birds called *maya* and would celebrate a successful harvest by decorating homes and main streets with the rice constructions (fig. 3). By replacing rice-made *pahoy-pahoy* with corn-made scarecrows, American officials hoped to literally convert rice fields to corn.

However, kitchen gardens, the corn campaign, and the southern agricultural colonies all failed to substantially increase the island's supply of rice and corn for domestic interisland consumption. Yet tropical agriculture became more committed to the improvement of local food supply. The change heralded a line of scientific investigation that diminished older views of the tropics as limitlessly fertile and anticipated a trend in colonial agriculture that came to fruition between the wars: the shift from a plantation-oriented discipline to one concerned with wider agricultural systems (Worboys 1988).

Beriberi and the Medicalization of Food Scarcity

The Bureau of Science and Health pursued a transimperial investigation that constructed remarkably diverse but rice-based monsoon Asian diets as singularly deficient. Just two years after José Albert drew attention toward infantile beriberi, Victor Heiser hosted the inaugural meeting of the Far Eastern Association of Tropical Medicine in Manila (Albert 1908). The FEATM was a loose network of doctors who shared laboratory research in tropical medicine. As a latecomer to empire, the FEATM allowed Heiser to capitalize on European research, advertise what he saw as American advances,

and direct new projects that, according to Arnold (2009), foreshadowed mid-twentieth-century possibilities for a postcolonial governance by nongovernmental entities in monsoon Asia. Echoing Forbes, Heiser (1910, 171) described Filipinos as “a poverty-stricken people with a poor physical inheritance,” “lacking ambition productively to till the fertile soil.”

Although beriberi was just one in a myriad of diseases and deficiencies of the tropics, it captured the attention of FEATM doctors for much of the second decade of the twentieth century for several reasons. Foremost was the disease’s ubiquity in enclosed and controlled spaces. A Dutch representative to the FEATM spoke of twenty-four incidences among coalminers at Blinjoie in the Dutch East Indies (De Haan 1910, 65). A British representative of the King spoke of outbreaks in Siam among prisoners in the Bangkok central jail in 1890, workers on the Koral Railway in 1896, Asian ship hands in 1897, and an insane asylum and reformatory (Highet 1910). In the Federated Malay States British researchers and prison doctors described beriberi outbreaks among “Malays at the Kuala Lumpur police depot” (Fraser and Stanton 1910, 56).

With beriberi proving immune to soap, practitioners began to connect beriberi to diet by treating enclosed spaces as laboratory and experimenting directly with the diets of those within. Heiser extended Forbes’s 1905 introduction of wheat and meat into Bilibid and to the patients of the Culion leper asylum, albeit somewhat unintentionally. As rice prices skyrocketed after the drought in 1911, the Philippine Commission purchased a large amount of polished rice in an effort to reduce market prices. It then fed residents at Culion the polished rice and little else, inducing beriberi among the already sick and segregated population. Having contributed to the deaths of at least 110 patients by July 1912, Heiser (1914, 2) called for the immediate removal of all polished rice from Culion, “curing” all cases of beriberi three months later. On the basis of these observations, the FEATM resolved that “sufficient evidence has now been produced in support of the view that beriberi is associated with the continuous consumption of white (polished) rice as the staple article of diet, and the Association accordingly desires to bring this matter to the notice of the various governments concerned” (Roberts 1961, 48).

With the severe droughts in 1911 and 1912 renewing food crises at the same moment that medical bureaucrats were linking the consumption of polished rice to beriberi, research into the components of rice deflected

attention away from food scarcity. The race to identify whether polished rice was toxic (as initially argued by Eijkman in the Dutch East Indies, or deficient (a belief of Heiser’s) produced a remarkable amount of research into the constituents of the grain. This research was key to the production of the modern nutritional sciences, especially when doctors linked beriberi to a deficiency of thiamine (vitamin B1), which had been removed from the rice grain by the milling process. Removing or replacing milled, as opposed to all kinds of, rice became Heiser’s goal, which he attempted to put into practice through the FEATM. At the international level, beriberi eradication included proposals to limit the trade or to tax milled rice, proposals that did not go very far. By the 1920s and into the period after the Second World War, the League of Nations World Health Organization would make recommendations for thiamine enrichment. The goal was not to increase food quantity but instead to improve the quality of available white rice.

Yet, while medical professionals and agriculturalists debated and set guidelines for nutritional enrichment, people from the working classes turned toward an increasingly common tincture for protection from beriberi. As Albert (1908) had noted, *tiqui-tiqui*, an extract made from rice hulls, offered an inexpensive protection against beriberi and was widely sold in *sari-sari* (convenience) stores. Without knowledge of vitamins as understood in contemporary terms, those who took the tincture essentially replaced the thiamine that mechanical milling had removed from their diets of the poor. Its growing use may tell us why the FEATM and the Western empires rapidly lost their concern about beriberi by 1920, nearly as fast as it grew after 1910.

Conclusion

The inauguration of a plantation economy in the mid-nineteenth-century Philippines occurred against the backdrop of drought and environmental change, leaving the people of commercial regions vulnerable to famine. Wars with Spain and the United States magnified the problem. Yet American colonials were slow to recognize the extent to which hunger plagued the people of the Philippines. This blindness was informed by an understanding of the tropics as a fecund paradise waiting for development. When confronted with a question about starvation and ill health, W. Cameron Forbes contended that illness was a result of the Filipino habit to consume poorly chosen food, particularly milled rice supplemented with fish. He thus turned hunger into a mark of a personal and cultural failure to cultivate good taste.

Food, or rather the lack of food, did not become a matter of official state interest until labor unrest and Taal's eruption forced Americans to acknowledge the reality of food scarcity. But even then, the Bureaus of Agriculture and Science pursued technical solutions predicated on the belief that rice was unhealthy. The Bureau of Agriculture sought to boost food supply by encouraging greater corn consumption, first in schools and, from there, in families and whole communities. The Bureau of Science, meanwhile, responded to José Albert's work on infantile beriberi and sought to connect the grain to the prevalence of the disease among Filipinos and in monsoon Asia more generally. This line of research would eventually reveal that mechanical milling removed the thiamine-rich pericarp from rice, which in turn predisposed those dependent on rice alone to the debilitating disease, as witnessed by outbreaks among confined people in highly regulated institutions like prisoners in Bilibid and patients on Culion.

Yet the link between the missing pericarp and beriberi did not quite suggest a solution. Was the best route to curing beriberi an increase in the quantity of other foods available, either at the market or through land available for kitchen gardens, or was it to simply supplement the vitamin B that had been removed by milling? The continued research of the Bureau of Science on how to synthesize and reproduce vitamin B reveals the extent to which experts answered the above question with vitamin supplementation, the consequence was a medicalization of food. The growing prevalence and use of tiqui-tiqui indicates, too, that in the immediate period, urban and rural workers also turned to supplementation. Further research on how Filipinos had consumed and used tiqui-tiqui has the potential to reveal how and if people outside of the medical profession also subscribed to the medicalization of food shortages and how, moving into the midcentury, they changed their expectations, protests, and daily practices.

The early-twentieth-century discovery of vitamin B and its link to beriberi has assumed a place in the pantheon of advancement of modern medical and nutritional knowledge. But, by following Iletto's lead, we can also see the seemingly sudden and dramatic late-nineteenth-century incidence of beriberi as an extreme manifestation of colonial power, global capitalism, and environmental change. The medicalization of gutom therefore worked to obscure the food scarcities and inequalities of power that American rule exacerbated, substituting a technocratic cure for one of justice.

Abbreviations Used

BA	Bureau of Agriculture
ENSO	El Niño Southern Oscillation
FEATM	Far Eastern Association of Tropical Medicine
USDA	United States Department of Agriculture

Notes

This article is a revised version of a paper originally presented at the "Historiography and Nation since Pasyon and Revolution: Conference in Honor of Professor Reynaldo C Iletto," Ateneo de Manila University, Quezon City, organized by this journal, the Ateneo's Department of History, and Kyoto University's Center for Southeast Asian Studies, 8–9 Feb. 2013.

- 1 An investigation into the cost effectiveness of Australian imports revealed that the smaller military force consumed 12,394,445 pounds of meat from Jan. to June 1903. See Taft 1905, 3.
- 2 In less than three months American forces in Marinduque destroyed 71 tons, 2,708 bushels, and 352 sacks of palay (unhusked rice); 2,083 bushels, 171 sacks, and "much" rice; 2.5 tons and 428 bales of hemp; 1,800 pounds of tobacco; 1 acre, 70 bushels, and 3 sacks of corn; an acre of sweet potatoes; 3 sacks of peas, carrots, and onions; and 150 bolts of cloth. Soldiers did not spare the work implements that would have allowed the population to replant farms or to merely subsist; 45 boats and 10 fishing nets were destroyed, as were 230 carabaos (much more scarce given the concurrent rinderpest epidemic); 396 cattle; 519 horses (De Bevoise 1995, 64).
- 3 My thanks to Patricia Afable, Smithsonian Institution, for pointing this out to me.
- 4 Musgrave later directed the Philippine General Hospital and, according to Anderson (2006, 229; 2009), fled to San Francisco after "disaffected nurses tried to poison him, and he became a leading hospital administrator and professor of tropical medicine."

References

- Abinales, Patricio. 2000. *Making Mindanao: Cotabato and Davao in the formation of the Philippine nation-state*. Quezon City: Ateneo de Manila University Press.
- Aguilar, Filomeno V. Jr. 1998. *Clash of spirits: The history of power and sugar planter hegemony on a Visayan island*. Honolulu: University of Hawai'i Press.
- . 2005. Rice in the Filipino diet and culture. Philippine Institute for Development Studies (PIDS) Discussion Paper Series 2005–15. Makati City: PIDS. Online, <http://dirp3.pids.gov.ph/ris/dps/pidsdps0515.pdf>, accessed 10 Nov. 2014.
- Albert, José. 1908. A case of infantile beriberi with autopsy report. *Philippine Journal of Science* 3(4): 345–48.
- Anderson, Warwick. 2006. *Colonial pathologies: American tropical medicine, race, and hygiene in the Philippines*. Durham, NC: Duke University Press.
- . 2009. Modern sentinel and colonial microcosm: Science, discipline, and distress at the

- Philippine General Hospital. *Philippine Studies* 57(2): 153–77.
- Arnold, David. 1996. *The problem of nature: Environment, culture, and European expansion*. Oxford: Blackwell.
- . 2009. Tropical governance: Managing health in monsoon Asia, 1908–1938. Asia Research Institute (ARI) Working Paper, No. 116, May. Singapore: ARI, National University of Singapore. Online, www.nus.ari.edu.sg/pub/wps.htm, accessed 7 Jan. 2013.
- Aron, Hans. 1909. The food of the people of Taytay from a physiological standpoint. *Philippine Journal of Science* 4(4): 225–31.
- Bankoff, Greg. 2004. Bestia incognita: The horse and its history in the Philippines, 1880–1930. *Anthrozoos* 17(1): 3–25.
- . 2005. 'These brothers of ours': Poblete's *Obreros* and the road to Baguio, 1903–1905. *Journal of Social History* 38(4): 1047–72.
- . 2007. One island too many: Reappraising the extent of deforestation in the Philippines prior to 1946. *Journal of Historical Geography* 33:314–34.
- . 2011. The science of nature and the nature of science in the Spanish and American Philippines. In *Cultivating the colonies: Colonial states and their environmental legacies*, ed. Christina Folke Ax, Niels Brimnes, Niklas Thode Jensen, and Karen Oslund, 78–108. Athens, OH: Ohio University Press.
- Busch, Lawrence. 1981. *Science and agricultural development*. Montclair, NJ: Allanheld Osmun.
- Carpenter, Kenneth J. 2000. *Beriberi, white rice, and vitamin B: A disease, a cause, a cure*. Berkeley: University of California Press.
- Coclanis, Peter. 1993. Southeast Asia and the world rice market. *Journal of Southeast Asian Studies* 24:251–67.
- Davis, Mike. 2001. *Late Victorian holocausts: El Niño famines and the making of the Third World*. London: Verso.
- De Bevoise, Ken. 1995. *Agents of apocalypse: Epidemic disease in the colonial Philippines*. Princeton: Princeton University Press.
- De Haan, J. 1910. On the etiology of beriberi. *Philippine Journal of Science* 5:65–71.
- De Lara, Calixto. 1899. Letter of Calixto de Lara, *Presidente de Las Piñas*, to Captain General of Operations of Americans, 13 July. Record Group 395, Box 1. US National Archives and Records Administration, College Park, MD.
- De Vos, Paula. 2007. Natural history and the pursuit of empire in eighteenth-century Spain. *Eighteenth-Century Studies* 40(2): 20–39.
- Doepfers, Daniel F. 1985. *Manila, 1900–1941: Social change in a late colonial capital*. Quezon City: Ateneo de Manila University Press.
- . 2010. Fighting rinderpest in the Philippines, 1886–1941. In *Healing the herds: Disease, livestock economies, and the globalization of veterinary medicine*, ed. Karen Brown and Daniel Gilfoyle, 108–28. Athens, OH: Ohio University Press.
- Fairchild, David Grandison. 1898. Letter to Joseph Beal Steere, 11 May. Joseph Beal Steere Collection, Box 4. Bentley Historical Library, University of Michigan, Ann Arbor, MI.
- Fernandez, Doreen. 1996. *Palabas: Essays on Philippine theater*. Quezon City: Ateneo de Manila University Press.
- Forbes, W. Cameron. 1904. Letter to H. E. Andrews, Esq., 6 Jan. Forbes Papers, Outgoing Correspondence, MS Am 1366, v. 2. Houghton Library, Harvard University, Cambridge, MA.
- . 1905. Letter to Henry L. Higginson, 13 Feb. Forbes Papers, Outgoing Correspondence, MS Am 1366, v. 2. Houghton Library, Harvard University, Cambridge, MA.
- . 1907. Letter to Mr. Fish, 7 Dec. Forbes Papers, Outgoing Letters, MS Am 1366, v. 2. Houghton Library, Harvard University, Cambridge MA.
- . 1914. Letter to Harcourt Butler, 9 Feb. Forbes Papers, Outgoing Correspondence, MS Am 1366, v. 17. Houghton Library, Harvard University, Cambridge MA.
- Foreman, John. 1906/1980. *The Philippine Islands*. Manila: Filipiniana Book Guild.
- Foreman, North H. 1912. Later suggestions for corn demonstrations. *Philippine Craftsman* 1(6): 487–92.
- . 1913. Results of the 1912 corn campaign. *Philippine Craftsman* 2(3): 297–309.
- Fraser, Henry and A. T. Stanton. 1910. The etiology of beriberi. *Philippine Journal of Science* 5:55–64.
- Freer, William B. 1906. *The Philippine experiences of an American teacher: A narrative of work and travel in the Philippine Islands*. New York: Charles Scribner's Sons.
- Garcia, Regino. 1905. Cultivation of rice. In *Census of the Philippine Islands taken under the direction of the Philippine Commission in the year 1903*, vol. 4, comp. United States Bureau of the Census, 88–96. Washington, DC: Bureau of the Census.
- Grove, Richard. 1995. *Green imperialism: Colonial expansion, tropical island Edens, and the origins of environmentalism, 1600–1860*. Cambridge, UK: Cambridge.
- . 2007. The great El Niño of 1789–93 and its global consequences: Reconstructing an extreme climate event in world environmental history. *The Medieval History Journal* 10(1–2): 75–98.
- Grove, Richard and John Chappell, eds. 2000. *El Niño: History and crisis*. Cambridge: White Horse Press.
- Grove, Richard H., Vinita Damodaran, and Satpal Sangwan, eds. 1998. *Nature and the Orient: The environmental history of South and Southeast Asia*. New Delhi: Oxford University Press India.
- Heiser, Victor. 1910. Unsolved health problems peculiar to the Philippines. *Philippine Journal of Science* 5:171–77.
- . 1914. Beriberi—an additional experience at Culion—how can a knowledge as to its prevention best be applied from the standpoint of state medicine? Read at the Third Biennial Meeting of the Far Eastern Association of Tropical Medicine, held in Saigon, 8–15 Nov. 1913. *Medical Record*, 31 Jan.: 35.
- Hight, Campbell H. 1910. Beriberi in Siam. *Philippine Journal of Science* 5:73–80.
- Hitchcock, Frank H. 1899. Notes on the plant products of the Philippine Islands. US Record Group 350, Box 246, U.S. National Archives and Records Administration, College Park, MD.
- Ileto, Reynaldo. 1985. Food crisis during the revolution: Western Batangas, 1897–98. *Kabar Seberang Sulating Maphilindo* 15:101–17.
- Kerkvliet, Melinda. 1992. *Manila workers' unions, 1900–1950*. Quezon City: New Day.

Kidd, Benjamin. 1899. *The control of the tropics*. New York: Macmillan.

Kilbourne, E. D. 1910. Food salts in relation to beriberi. *Philippine Journal of Science* 5:133–35.

Linn, Brian McAllister. 1989. *The United States Army and counterinsurgency in the Philippine War, 1899–1902*. Chapel Hill: University of North Carolina Press.

Lopez-Gonzaga, Violeta. 1993. Landlessness, insurgency and food crisis in Negros Island: A study of the social, political and economic determinants of hunger. In *Famine and society*, ed. Jean E. Floud and Amrita Rangasami, 107–19. New Delhi: Indian Law Institute.

May, Glenn Anthony. 1980. *Social engineering in the Philippines: The aims, execution, and impact of American colonial policy, 1900–1913*. New York: Praeger.

———. 2009. The business of education in the colonial Philippines, 1909–1930. In *Colonial crucible: Empire in the making of the modern American state*, ed. Alfred W. McCoy and Francisco Scarano, 151–62. Madison: University of Wisconsin Press.

McCook, Stuart. 2009. The world was my garden: Tropical botany and cosmopolitanism in American Science, 1898–1935. In *Colonial crucible: Empire in the making of the modern American state*, ed. Alfred McCoy and Francisco Scarano, 499–507. Madison: University of Wisconsin Press.

McCoy, Alfred W. and Ed. C. de Jesus, eds. 1982. *Philippine social history: Global trade and local transformations*. Honolulu: University of Hawai'i Press.

Merrill, Elmer D. 1909. The principal foods utilized by the natives. *Philippine Journal of Science* 4(4): 219–25.

Musgrave, W. E. and George Richmond. 1907. Infant feeding and its influence upon infant mortality in the Philippine Islands. *Philippine Journal of Science* 2:361–85.

Philippine Commission. 1904. *Reports of the United States Philippine Commission to the Secretary of War*, vol. 1. Washington, DC: Government Printing Office.

———. 1907. *Reports of the United States Philippine Commission to the Secretary of War*, vol. 1. Washington, DC: Government Printing Office.

———. 1915. *Reports of the United States Philippine Commission to the Secretary of War, July 1, 1913 to December 31, 1914*. Washington, DC: Government Printing Office.

Philippine Craftsman. 1912a. Industrial notes: Corn and food supply. *Philippine Craftsman* 1(1): 72–78.

———. 1912b. Industrial notes. *Philippine Craftsman* 1(6): 501–10.

Pomeroy, William J. 1992. *The Philippines: Colonialism, collaboration, and resistance*. New York: International Publishers.

Roberts, William R. 1961. *Toward the conquest of beriberi*. Cambridge, MA: Harvard University Press.

Ross, James. 1903. Report of an investigation made by James Ross, Supervisor of Fiscals, concerning alleged sufferings and deaths among certain laborers sent from Manila during the month of July, 1903, to work on the Benguet Road. In *Annual reports of the War Department for the year ended June 30, 1903*, vol. 5, 358–86. Washington, DC: Government Printing Office.

Sawyer, Frederic. 1900. *The inhabitants of the Philippines*. New York: Charles Scribner's Sons.

Sawyer, Leroy R. 1912. The industrial teachers' conferences, Baguio, May 1912. *Philippine Craftsman* 1(1): 53–59.

Scott, William Henry. 1992. *The Union Obrera Democratica: First Filipino labor union*. Quezon City: New Day.

Taft, William Howard. 1905. *Letter from the Secretary of War, transmitting, in response to a Senate Resolution of Jan 28, 1905, certain information in regard to the meat supply for the Army in the Philippine Islands, 2 Feb.* Committee on Military Affairs. Washington, DC: Government Printing Office.

United States Bureau of the Census. 1905. *Census of the Philippine Islands taken under the direction of the Philippine Commission in the year 1903*, vol. 4. Washington, DC: United States Bureau of the Census.

Van Horne, William H. 1900. Letter to adjutant general, Department of the Visayas, 7 Oct. Record Group 395, Box 3, Record 2477. US National Archives and Records Administration, College Park, MD.

Vernon, James. 2007. *Hunger: A modern history*. Cambridge, MA: Harvard University Press.

Worboys, Michael. 1988. The discovery of colonial malnutrition between the wars. In *Imperial medicine and indigenous societies*, ed. David Arnold, 208–24. New York: St. Martin's Press.

Worcester, Dean Conant. 1914. *The Philippines past and present*. New York: Macmillan.

Theresa Ventura is assistant professor, Department of History, Concordia University, Sir George Williams Campus, McConnel Building, 1400 de Maisonneuve Blvd WLB 1001.18, Montreal, Quebec, H3G 1M8, Canada. She is currently completing a manuscript entitled "Empire Reformed: The United States, the Philippines, and the Practices of Development, 1898–1946," which looks at the intersections between colonialism, natural resource management, and state building. <theresa.ventura@concordia.ca>

