"No Nation Can Go Forward When It Is Crippled by Disease": Philippine Science and the Cold War, 1946–65

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This article outlines a notion of postcolonial Philippine science. First, it touches on the links between science, medicine, the Cold War, and nation building. Second, it examines the niche occupied by applied sciences, particularly nutrition, agriculture, and medicine, in nation building. Between 1946 and 1965, Philippine presidents understood science functionally, in terms of harnessing the country's natural resources for economic development; and strategically, in terms of the Philippines being a regional leader of the free world in Southeast Asia. To realize the Philippines' Cold War aspirations, they mobilized technical assistance from the US. The Bataan Rice Enrichment Project (1946–49) and the establishment of the International Rice Research Institute (1962) indicated a shift in the emphasis of US assistance from economic aid to technical cooperation in the field of nutrition and agriculture.

Through a close study of the Philippine Medical Association, this article examines inner tensions between physicians who advocated an individualized treatment of disease and those who advocated mass campaigns. Between 1946 and 1965, a mobilization mentality suffused the practice of science in the Philippines such that the pursuit of knowledge would lead to unanswered Cold War questions—particularly socialized medicine—expanding healthcare access to rural areas.

Keywords: Philippines, postcolonial science, Cold War, disease eradication, Bataan Rice Enrichment Project, International Rice Research Institute, Philippine Medical Association, socialized medicine

In his first State of the Nation Address, on January 25, 1954, President Ramon Magsaysay of the Philippines asserted, "We must have a healthy manpower as the most essential factor for economic advancement. No nation can go forward when it is crippled by disease" (Magsaysay 1954). The address attests to the centrality of public health in transcending the problem of underdevelopment of the postcolonial state.

The 1950s coincided with the emergence of the Cold War and decolonization in Southeast Asia. The US sought to subvert the spread of Communist ideology. To this

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effect, it secured the loyalty of leaders from Asia and Africa through a program of technical assistance, particularly in agriculture and health. By portraying poverty and disease as the breeding grounds of Communism, the US sought to assist with disease eradication, particularly the anti-malaria campaigns in the Philippines and other Southeast Asian nations. The Filipino political leadership perceived public health as the means to usher in development of remote islands and was open to US developmental assistance (Neelakantan 2015a).

This study investigates the niche in nation building occupied by applied sciences, particularly nutrition, agriculture, and medicine. The argument has two strands. First, Philippine science was packaged as a program of delivery that was intended to address basic needs of the people, particularly self-sufficiency in food. Second, between 1946 and 1965 Philippine presidents understood science functionally, in terms of harnessing the country's natural resources for economic development; and strategically, in terms of furthering the country's aspirations as the leader of the free world in Southeast Asia. To realize the Philippines' Cold War aspirations, the presidents mobilized US technical assistance. The Bataan Rice Enrichment Project (1946–49) and the establishment of the International Rice Research Institute (IRRI) at Los Baños in 1962 indicated a shift in the emphasis of US assistance in the Philippines from economic aid to technical cooperation, particularly in the field of nutrition and agriculture.

Locating the "Postcolonial" in Philippine Science

This article seeks to outline a notion of postcolonial Philippine science. The notion of "postcolonial" has considerable conceptual ambiguity. It has been taken to signify a time period after colonialism; a critique of the legacy of colonialism; an ideological backing for newly created states; a complicity of Western knowledge with colonial projects; or an argument that colonial engagements can reveal the ambivalence, anxiety, and instability deep within Western thought and practice (Anderson 2002, 645). Postcolonial theory seeks to contest the assumption that Western knowledge is objective, authoritative, and universally applicable.

In 1959, W. W. Rostow described the stages of "economic growth" in his non-Communist manifesto. Rostow emphasized the role of science and technology in achieving takeoff from a traditional society (Rostow 1959). Science, according to Rostow's narrative, was diffused from Europe. George Basalla amplified this diffusionist perspective by giving details of the spread of Western science from its European center to the periphery or the colonies (Basalla 1967, 612–622). According to Basalla's simple

evolutionary model accounting for the diffusion of science, in phase one the periphery provided raw materials for European science. In phase two, the derivative and dependent institutions of colonial science emerged; and sometimes an independent national science, called phase three, would later develop. By the early 1990s, Basalla's simple evolutionary model of scientific development provoked extensive criticism. In the early 1990s, Paolo Palladino and Michael Worboys—taking Lewis Pyenson's work on the Dutch East Indies as a proxy for diffusionism in science—suggested that Western methods of knowledge had not been accepted passively but were selectively absorbed in relation to existing traditions of knowledge and religion (Pyenson 1989; Palladino and Worboys 1993, 102). Imperialism also shaped the development of metropolitan institutions and knowledge. Discussions of diffusion and nation building have gradually given way to talk of contact zones and network construction.

Postcolonial science as a field of enquiry crosses geopolitical boundaries as it tracks flows, circuits of scientists, knowledges, machines, and techniques (Anderson 2002). Postcolonial science—which focuses on contact zones of clashing knowledges—is incomplete unless it is firmly situated in a political and institutional context (Abraham 2006, 213). Science is central to forging the identity of the postcolonial state. It exists simultaneously as history, as myth, as political slogan, as social category, as technology, as modern Western knowledge, and as an instrument of change (Abraham 2006, 213). Postcolonial science in the Philippine context was a state-building project—as reflected in the establishment of the Philippine Research Reactor (PRR-1) atomic reactor and IRRI.

Given the paucity of historiography on postcolonial Philippine science, one might justify this study on the basis of a lack. But the story of Philippine science during the Cold War is rather eclectic in terms of archival sources. Therefore, a paucity of secondary literature does not provide justification for this article. Rather, this study closely examines the underlying concerns of Philippine presidents (1946–65) and scientists in addressing the dilemma of how to refashion science that was at once relevant to the Philippines' national needs and increased the country's visibility on the international stage. For example, Kathleen Gutierrez investigates the ways in which medical botany writing furthered the symbolic and commercial promise of plants in the context of postcolonial nationalism and international science. Based on a close reading of the Filipino botanist Eduardo Quisumbing's *Medicinal Plants of the Philippines*, Gutierrez highlights the features of medical botany writing that produced articulations of nationalism in the Philippines in the aftermath of World War II (Gutierrez 2018, 36). Through his writing and encyclopedism (genre-bending deluge of information, colonial science, and use of scientific terminology), Quisumbing established a fresh narrative for Philippine science

that had emerged from the ravages of wars and colonial influence. *Medicinal Plants*, according to Gutierrez, is an expression of scientific achievement through encyclopedic gesturing to effect science-minded aims and create a certain kind of nationalism through flora (Gutierrez 2018, 62). As the scope of Gutierrez's article is restricted to botany, the role of applied sciences, particularly medicine, in nation building remains marginal in the narrative.

Physicians dominated the first generation of nationalist leaders in the Philippines under American colonialism (1898–1946). For the nationalist physicians, decolonization was linked to the tropes of scientific progress (Ileto 1988, 105; Anderson and Pols 2012, 93).

Warwick Anderson (2007) contends that the production of scientific knowledge was treated as an index of modernity and national development in the Philippines. But Anderson's article does not elaborate on the circumstances under which science became an instrument of postcolonial nation building.

Sunil Amrith's influential monograph (2006) argues that India played a more influential role in shaping post-World War II Asia's health paradigms than did the Indonesians or the Burmese, who were preoccupied with establishing the legitimacy of the postcolonial state amidst much ethnic strife. However, this line of argument does not hold true with respect to transnational Philippine initiatives in agriculture, for example, the training of Indonesian students from the Faculty of Agriculture (Bogor) at the University of the Philippines (UP) College of Agriculture at Los Baños in the 1950s. Nonetheless, Amrith's monograph has opened new possibilities for historians to examine the transnational circulation of technical expertise across Asia.

During the 1950s, a concern with nation building in newly independent states of Asia and Africa was central to modernization theory. The dominant narrative at the time was how to develop Asian and African states toward a new form of modernity along Western, if not necessarily capitalist, lines (Berger 2003). A conspicuous feature of the political landscape across Asia during the 1950s was an increased emphasis on the role of the state in mediating national development. Gabrielle Hecht observes that at the heart of the modernization theory were disagreements between the USSR and the US regarding industrialization of newly independent countries. Whereas the USSR offered a development path that would lead Asian countries to socialism through large-scale industrialization, the US envisaged that with the right sort of technical assistance, any human society could climb the ladder of progress and that industrialization and democratization would proceed hand in hand (Hecht 2011, 1–12). A common denominator underlying competing US and USSR visions of modernization for newly decolonized nations was the ability of science to provide a panacea for the problem of underdevelopment. But the reception of

international technical assistance was uneven across countries (Immerwahr 2015, 11).[1)]

Anderson (2012) notes that since the 1970s there has been active debate about the meaning of science, technology, and medicine within the Indian context, much of it occurring within the Gandhian, Marxist, subaltern, and postcolonial frameworks. However, the relationships among Indian, Southeast Asian, and global science and technology studies scholarship remain fragmentary. A major research question raised by this article is whether Philippine science was a variant of postcolonial science more generally, or whether it embodied a distinctive national flavor.

"Scientific Research, in the Long Run, Does Pay Off in Terms of Pesos and Centavos"

The challenges of post-World War II national reconstruction necessitated quick changes in the Philippine economy that included producing cash crops for export, increasing food production, and improving people's living standards. To this end, Presidents Manuel Roxas and Elpidio Quirino (between 1946 and 1953) mobilized applied sciences—particularly nutrition, agriculture, and medicine—that would enable the nation to attain self-sufficiency in economic affairs. At the time, within Philippine policy circles it was noted, "Scientific research, in the long run, does pay off in terms of pesos and centavos, in terms of higher efficiency and reduced man-hours of work, in terms of richer harvests and healthier citizens" (Varela 1954). Financial limitations of the state implied that scientific investigations were tied to practical concerns. In general, research in the Philippines lacked funding and the state struggled to attract the best minds to research.

On June 3, 1946—a month before US colonialism finally ended in the Philippines—

1) After its efforts to implement communitarian strategies as part of the New Deal (1933–39) failed, the US bankrolled community development programs in the Global South, in the aftermath of World War II. Such measures were calculated to win political loyalties of local villages in the fight against Communism. The US included a community development program in its bilateral aid package to India in 1952. It invested great hopes in India's community development program that focused on democratic decentralization. But the benefits of the Indian program were elusive. Local development plans were modest in their ambition and focused on the construction of wells, market roads, and community centers that benefited well-off members of the village communities. Conspicuously absent from the community development initiatives in India were issues associated with social inequality. In contrast, in the Philippines—where the Huk rebellion threatened to topple the government—the community development program was seen by the US government as a form of counterinsurgency. Through community development, Filipino politicians sought to create vertical bonds that linked peasants to landlords and crowd out the dangers of peasant solidarity. Around 1953, when the Huk rebellion subsided, the US exported the Philippine variant of the community development program to Vietnam.

Roxas, in his first State of the Nation Address, outlined the challenges facing the nascent nation. The Philippines was born amidst much political turmoil.[2] Roxas expressed disappointment that the government did not have the financial means to support postwar economic rehabilitation:

> Public health and sanitation have retreated far from the level which existed before the war. Epidemic is a constant threat. The three great pests of our land—the rat, the mosquito, and the locust—have thrived on our misfortune and threaten us with both disease and hunger. Control measures against all of them must be taken.
>
> Famine is a strong possibility; shortages of food are even now critical. We are immediately faced by a shortage, which will grow more critical within the next few months, in our staple food product—rice. In some sections of the country rice is not being planted because of the lack of carabaos and the threat of rats and locusts. In others, planting is diminished because of the absence of law and order and the fear that the harvest may be stolen. There is a world shortage of rice. Many nations of the earth are as unfortunate as we; in the case of our own shortage we can expect very little assistance from abroad. We are doing everything in our power to get as much assistance as we can. (Roxas 1946)

Given the scarcity of rice, Roxas mobilized the population to grow corn, root crops, and vegetables. He emphasized an all-out food campaign that encouraged the substitution of rice with corn. His administration also introduced the idea of anti-famine gardens.[3] In addition to increasing the production of rice, Roxas identified symbolic capital in disease eradication (particularly malaria) as the means to resuscitate a strong and healthy population.

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2) The Huk rebellion—a peasant-based guerrilla insurrection—was directed originally against Japanese occupation (1942–45) and later against the failure of Roxas's social welfare program as the legislation had several loopholes. The economic objectives of the Huks—developed between 1946 and 1950—reflected a strong Communist orientation by 1950. The Huks advocated real independence for the Philippines, "unsullied" and "unadulterated" by economic ties with the US, such as the Bell Act. Instead, they advocated a more equitable crop distribution between landlord and tenant, government purchase of large landed estates and their sale to tenants, and agricultural loans to aid small farmers. As the Huks were unable to get along with Quirino, they backed José Laurel. However, the Huk candidate lost the 1949 presidential election against the Liberal candidate, Quirino. Consequently, the Huks denounced electoral processes. The Huk Politburo declared the existence of a "revolutionary situation" in January 1950 and advocated an armed overthrow of the government. By March 1950 the Huks asserted their manifesto, "New Democracy," which would erase the economic, political, and cultural domination of the US, feudal landlords, and the Liberal Party and instead place political control in the hands of the Filipino peasantry, proletariat, and intelligentsia. For details, see Fifield (1951).

3) In 1948, the republican government in Indonesia designed a three-year food production plan (christened the Kasimo Plan, after then Minister of Food Affairs I. J. Kasimo) aimed at achieving self-reliance in food. In order to guarantee a high quality of rice, Kasimo advocated the creation of seedling gardens. For a parallel with Indonesia, refer to Nawiyanto (2013).

Fig. 1 The Malaria Control Unit of the Philippines Public Health Rehabilitation Program (1946)
Source: National Library of Medicine, NLM Image ID 10395113.

In January 1946, five months after the end of the Pacific War, the US—in mutual agreement with the Philippine Bureau of Health—developed a road map for preventing disease that had a negative bearing on economic recovery. The US Public Health Services (USPHS) appropriated a sum of US$1 billion to assist the Philippine Bureau of Health to rehabilitate the devastated Philippine quarantine service, the School of Hygiene at Alabang, and the Bacteriological Laboratory of the UP.[4] The USPHS identified malaria as a rural disease that vitiated agricultural productivity and estimated that up to half the working population was afflicted with the disease.[5] The Bureau of Health, with restricted allocation of funds, was unable to cope with malaria and its associated socioeconomic effects (see Fig. 1).

After Philippine independence in July 1946, the USPHS was unable to cement cooperation with the Malaria Control Organization of the Philippine Department of Health as the latter suffered from a shortage of trained medical personnel. As a result, the USPHS implemented malaria control as a public health rehabilitation project. Its methods included house-to-house surveys of the disease among inhabitants of Negros Occidental

4) US Public Health Report of the Philippines Public Health Rehabilitation: July 4, 1946 to June 30, 1950, Frank Waring Papers, Harry S. Truman Presidential Library.
5) US Public Health Report of the Philippines Public Health Rehabilitation: July 4, 1946 to June 30, 1950, Frank Waring Papers, Harry S. Truman Presidential Library.

and Negros Oriental Provinces, entomological surveys, public health propaganda through lectures illustrating the importance of the disease, and control of the vector through insecticidal spraying. Malaria control was incorporated into the curricula of elementary and high schools, particularly in these two provinces. Not surprisingly, the Negros Islands recorded an 85 percent decrease in the incidence of malaria between 1946 and 1950 and a 65 percent decline in death rates attributed to the disease.[6)]

Despite successes in specific areas, the malaria control program in the Philippines prior to 1950 was beset with organizational bottlenecks. The national government had granted the measly sum of 180,000 pesos for malaria control work (Francisco 1950, 347). Insecticidal spraying was the weakest arm of the program. Most of the plantation owners had not taken malaria seriously, and there was a pervasive absence of preventive measures.

Until 1950 the Philippines suffered from economic instability primarily due to a budgetary deficit and an insufficient increase in the production of cash crops (particularly sugarcane and abaca); the latter could be partly attributed to malaria and schistosomiasis, which impeded the efficiency of the workforce. To compound the problem, the Huk rebellion gained momentum in March 1950.[7)] The US was determined to retain the Philippines within the orbit of democratic powers but was concerned that the latter's inability to release peso savings for capital investment, stimulate industrialization, and raise people's living standards would lead to internal unrest.[8)] The Bell Mission recommended that the US government provide financial assistance amounting to US$250 million to the Philippines so that the latter could carry out a five-year plan of economic development (Ravenholt 1951, 414).

After the sudden death of Roxas in 1948, Quirino, a political conservative and pro-American, drew support from the sugar barons for presidency. During his presidency, large-scale inequalities in the distribution of agricultural holdings provided a fertile breeding ground for the Huk rebellion (Merrill 1993, 137–159).

Quirino's first State of the Nation Address exhorted Filipino citizens to work toward total economic mobilization and attacking poverty (Quirino 1949). In his quest for the nation's economic self-sufficiency, the president devised measures to increase the

6) US Public Health Report of the Philippines Public Health Rehabilitation: July 4, 1946 to June 30, 1950, Frank Waring Papers, Harry S. Truman Presidential Library.

7) By 1950 Huk leadership had been taken over by the Communists, who alleged that the Philippine government was a "puppet" in the hands of the US. See, for example, Neal Peterson *et al.*, *Foreign Relations of the United States, 1950, East Asia and the Pacific*, Vol. 6 (Washington, DC: Government Printing Office, 1976).

8) Paul Claussen *et al.*, *Foreign Relations of the United States, 1951, East Asia and the Pacific*, Vol. 6, Part 2 (Washington, DC: US Government Printing Office, 1977).

acreage under rice, particularly in Mindanao:

> We must turn our concentrated attention to the development of Mindanao. Something must be done without loss of time to convert that vast region into a real empire of wealth. I recommend a general program of road construction to encourage production and communication. The establishment of the planned hydro-electric and fertilizer plant in Maria Cristina Falls will give the proper agricultural and industrial incentives. Locust pest is hampering the agricultural development of Northern Mindanao and even as far as Bohol and Cebu. I also recommend that sufficient appropriation be set aside to eradicate this winged enemy to our increased production. (Quirino 1949)

The Philippine government's proposal of opening Mindanao for economic development converged with the Economic Cooperation Administration's (ECA) plan of containing the spread of the Huk rebellion to the island (Fifield 1951, 16).

Magsaysay—secretary of defense (1950–53) during Quirino's presidency—had won military victories against the Huks. He contested the 1953 presidential election on a Nacionalista Party ticket against the Liberal candidate Carlos Romulo. After assuming office in 1953, Magsaysay promised to ameliorate people's living conditions.

In his second State of the Nation Address, Magsaysay asserted that there was more to national security than simply maintaining territorial integrity and public order. As an independent nation, the Philippines had to assure its citizens freedom from disease, ignorance, and want (Magsaysay 1955). Magsaysay emphasized that the government could not do everything for the Filipinos and that people had to help themselves (Magsaysay 1956). To this effect, the Magsaysay administration reoriented health, education, and welfare programs with an emphasis on self-help.[9] Magsaysay's concern with the "common man" was the logical first step in imbuing the Filipino way of life with the substance of democracy. In the pursuit of democratic ideals, he urged Filipinos to work ground-up—from factories, barrios (rural areas), and towns (Magsaysay 1956). For the fulfillment of Filipinos' basic needs, he identified the following requirements: (a) self-sufficiency in food (rice); (b) a strong administrative apparatus for the implementation of community development; (c) industrialization based on the utilization of locally available resources; (d) reorientation of the education system with an emphasis on science; and (e) scientific research (see Fig. 2).

Magsaysay exhorted that education reforms in the Philippines be oriented toward general, scientific, and vocational education. He expressed concern that diminishing interest in natural and physical sciences ran contrary to the rapidly developing requirements of the atomic age (Magsaysay 1955). At the heart of Magsaysay's concern was

9) The notion of self-help was evolved by the Magsaysay administration to attack the root causes of rural poverty by stimulating community initiative and responsibility.

Fig. 2 Community Development through Self-Help (c. 1957)
Source: Series: Propaganda Posters Distributed in Asia, Latin America and the Middle East, 1900–2003, Record Group 306: Records of the US Information Agency (1900–2003); US National Archives and Records Administration (NARA) Identifier 6949000.

how to refashion science such that it was at once open to international collaboration and relevant to national priorities. To this end, he created a Science Advisory Committee in 1955 composed of representatives from universities and research organizations. The committee did not explicitly mention medicine in its agenda.

Magsaysay's vision of using public health as a pathway for economic development was congruent with the US objective of subverting Communism in newly independent countries. In 1955 US President Dwight Eisenhower pointed out that a strong program of international aid was urgent in order to prevent newly independent countries of Asia and Africa from deflecting to the Communist camp.[10] To this end, the Eisenhower administration appropriated US$700 million to target toward technical and economic assistance to underdeveloped nations, particularly in the form of malaria eradication.[11]

10) Draft of Eisenhower's Speech, 1955, File White House Correspondence: General Files, John Foster Dulles Papers, Box 5, Dwight Eisenhower Presidential Library.
11) Draft of Eisenhower's Speech, 1955, File White House Correspondence: General Files, John Foster Dulles Papers, Box 5, Dwight Eisenhower Presidential Library.

Eisenhower observed that by 1954, malaria had attacked 200 million people and killed over two million and that the US had formulated a blueprint in cooperation with the World Health Organization to wipe out malaria globally. Eisenhower contended that malaria eradication was congruent with the American national interest of opening up new markets in underdeveloped countries. In the fiscal year 1954, the ECA loaned US$22 million to the Philippines to augment food production and ameliorate public health conditions in rural areas, especially to eradicate malaria.[12] The apparent speed with which malaria could be brought under control using DDT made malaria control attractive for US planners, who saw the elimination of the disease as an instrument for winning "hearts and minds" in the war against Communist expansion (Packard 1997, 283).

By 1954 the Magsaysay administration had enacted the Rural Health Act, which provided for the establishment of rural health units for every municipal district. The Act instituted health officers for municipalities. The power of municipal health officers was centralized with the provincial health officers (Ford and Cruz 1957, 687–696). At the time, isolated disease eradication programs related to malaria, tuberculosis, and venereal diseases were implemented on a piecemeal basis. The district health officers had limited authority to implement health programs within their jurisdiction. Most activities of the rural health units were concentrated at the level of the *poblacion* (district headquarters), leaving outlying barrios underserved (Neelakantan 2015a). At the time, the major stumbling blocks to Philippine development were administrative and political.[13] Governmental functions were dispersed among an excessive number of departments, which resulted in diffusion of responsibility and led to procedural delays in the implementation of public health programs.

Despite the administration's legislative measures—such as the enactment of the Rural Health Act—that reaffirmed Magsaysay's commitment to ensuring freedom from disease, the implementation of public health measures was contingent on the availability of American aid. The Eisenhower administration wanted Magsaysay to mount vigorous attacks on the Philippines' socioeconomic problems and to become a symbol in the war against Communism (Cullather 1993, 332). But these hopes were not fulfilled. Within months of Magsaysay's inauguration, the ruling Nacionalista Party coalition fragmented. Growing Filipino resentment against the US military bases in the Philippines threatened bilateral relations.

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12) Policy toward Philippines, File NSC 5413/1, NSC Series: Policy Papers Subseries, White House Office of Special Assistant: NSC Records, 1952 to 1961, Box 10, Dwight Eisenhower Presidential Library.

13) Donald Stone, Common Administrative Obstacles to Development, Dated January to April 1961, Dennis Fitzgerald Papers, Box 5, Dwight Eisenhower Presidential Library.

In a confidential letter to then US Secretary of State John Foster Dulles, Magsaysay expressed concern that the Philippines did not have the means to fully implement the rural development program.[14] He requested US$10 million from the Eisenhower administration to implement the program and prevent disillusionment among the masses.[15] In requesting increased funding for the rural development program, Magsaysay emphasized the centrality of the Philippines to the success of the US anti-Communist propaganda in Asia.

The Philippines' strong cultural ties with the US placed the former's scientific research on a strong footing vis-à-vis other ex-colonial nations in a similar economic position (Varela 1954, 363). At the time, it was widely held within scientific circles that pure research undertaken in US laboratories could serve as a stepping-stone for applied research undertaken by Filipino scientists. The institutional foundations of Philippine science in the postwar period appeared to be jeopardized by the bureaucracy. The governments under Roxas and Quirino were disappointing in their budgetary allocation to research (Gutierrez 2018, 44–45).

The Philippine Bureau of Science, established in 1905, undertook research in tropical medicine, botany, zoology, entomology, and geology. The research activities of the bureau were disrupted due to the Pacific War (1942–45). In 1947, after Philippine independence, the Bureau of Science was renamed the Institute of Science. The institute carried out research in various branches of science and drew personnel from state universities.[16] It undertook quality control of vaccines produced locally at Alabang and established minimum standards for agricultural products. But research coordination was carried out by the National Research Council of the Philippines (Neelakantan 2019). The combined efforts of the National Research Council of the Philippines and the University of the Philippines resulted in the passage of Republic Act 1606 in August 1956, "An Act to Promote Scientific, Engineering and Technological Research, Invention and Development" (Valenzuela 1960, 515). This Act created the National Science Board, which provided financial incentives for a number of research projects, particularly pharmaceutical and pharmacological research on Philippine medicinal plants; nutrition surveys that assessed the nutritive value of Filipino foods; and biological research on antibiotics, tetanus toxoids, and human rabies (Valenzuela 1960, 515). Increased congressional interest in science during Carlos Garcia's presidency (1957–61) resulted in the creation of

14) Robert McMahon *et al.*, *Foreign Relations of the United States, 1955–1957, Southeast Asia*, Vol. 22 (Washington, DC: United States Government Printing Office, 1989).
15) Letter from President Magsaysay to US Secretary of State Dulles, March 15, 1956.
16) S. N. Dasgupta, Status of Research in the Philippines 1948 (I), UNESCO Report No. UNESCO NS/71, January 18, 1950.

a committee to revise Republic Act 1606 in order to mobilize private participation in research funding. The results of the congressional committee were spelled out in Republic Act 2067, a measure that was intended to integrate, coordinate, and intensify science and technology and foster innovation.

Republic Act 2067 paved the way for the Science Act of 1958. The Science Act established the National Science Development Board (NSDB) in place of the former National Science Board, although the changes were cosmetic. The NSDB supervised and partially funded the following projects: (1) the establishment of the Institute of Applied Research and Graduate Studies in Engineering in the UP; (2) scientific and industrial research under the jurisdiction of the National Institute of Science and Technology; (3) pharmaceutical and pharmacological research in the College of Pharmacy, UP; (4) the promotion of science consciousness under the leadership of the National Science Foundation of the Philippines; (5) agricultural research in the College of Agriculture, UP; and (6) nutrition research, undertaken by the Food and Nutrition Center, UP College of Medicine (Valenzuela 1960, 516–517). The Philippine Atomic Energy Commission's radioactive iodine studies on treating various thyroid disorders attracted the attention of the International Atomic Energy Commission (Valenzuela 1960, 520).

The scientific landscape of the Philippines during the 1950s and 1960s could be characterized in terms of symbolic projects that signified the nation was increasing its visibility and respectability within the international community. An editorial in the *Manila Times* on November 4, 1963 proclaimed that the egg-shaped dome of the new atomic reactor, the PRR-1—built with US assistance under the Atoms for Peace program—symbolized the Philippines' desire to keep pace with development along Western lines.[17] The public hoped that the atomic reactor would serve as a training ground for local scientists, inspire a new generation to take up science, and halt the emigration of scientists overseas. During the 1960s and 1970s, the PRR-1 became the nucleus for research in the Philippines on radioisotope production, neutron spectrometry, and reactor physics before it was mothballed in 1988 due to technical reasons (Guillermo 2012).

Postcolonial science in the Philippines was largely statist in its orientation. The Philippine private sector's need for research was less urgent than the adaptation of already available technology from abroad, especially in the textile, flour milling, steel, and pharmaceutical sectors. Philippine private industries' gross expenditure on research and development accounted for a mere 0.04 percent of the gross national income (Ramirez 1962, 465). At the time, research was influenced by government priorities in national

17) Letter from C. H. G. Oldham to R. H. Nolte, Science in the Philippines: Problems and Opinions, January 6, 1964, Doc CHGO-22, Institute of Current World Affairs.

development such that when an area of science happened to be defined as relevant to national priorities, funding from the NSDB would be assured. Between 1958 and 1966, applied research attracted almost 90 percent of all research funding, whereas basic research did not receive more than 10 percent of available resources (Ramirez 1962, 465). Consequently, Philippine scientists had to work independently to obtain grants from the US.

Low salaries and lack of prestige accorded to scientists dissuaded Filipino students from pursuing a research career. For instance, Ralph Blanco, a former instructor of mathematics at De La Salle University, worked out a hypothesis on the symmetry of energy and matter (Marasigan 1955, 85). His hypothesis could be verified by bringing together electrons and positrons and producing gamma rays. But to verify the hypothesis, Blanco needed a Bevatron (particle accelerator). As Bevatrons were expensive, Blanco abandoned his field of research and instead joined the civilian defense forces. Blanco's inability to continue his research is illustrative of the neglect of mathematics and physics in Philippine science, given their perceived inability to address the country's developmental needs in contrast to agricultural or medical sciences. The underlining features of the Philippine research landscape of the 1950s included an excessive emphasis on teaching rather than research and the absorption of most productive scientists into administrative positions.

Amador Muriel, a former physics instructor from the UP, recounted that until 1956 the university did not have a single doctoral physicist. Between 1959 and 1967, of the 12 Filipino students who had left for the US to earn a doctoral degree in physics, only one returned home (Muriel 1970, 38–39). Similarly, of the 13,829 foreign-born physicians in the US in 1966, 25 percent were Filipinos (Van der Kroef 1968, 243). The lack of local facilities for proper training of professionals and the lack of incentives to stay in the Philippines were two factors responsible for the brain drain of Filipino professionals overseas.

Euro-American Empire, Scientific Nationalism, and the Cold War: The Bataan Rice Enrichment Project, 1946–49

In 1946 beriberi was the second leading cause of death in the Philippines, after tuberculosis. Between 1947 and 1949, a province-wide feeding experiment was undertaken in Bataan, as a collaborative venture between the American chemist Robert R. Williams, who synthesized thiamine, and Juan Salcedo, the Philippine secretary of health between 1950 and 1953. The experiment revealed that polished white rice enriched with thiamine

reduced the incidence of beriberi in vulnerable populations. Yet, by willfully exposing 50 percent of Bataan's population to polished rice—and, consequently, beriberi—Williams recreated the prisons and asylums that European and American researchers had used to induce beriberi in unwilling research subjects in colonial Philippines prior to World War II (Ventura 2020). The attainment of Philippine political independence in 1946 was concomitant with the onset of the Cold War, marked by political, ideological, and military rivalry between the US and the USSR. The US—in its attempts to stem the appeal of the Soviet planned economy and land reforms—designed technical solutions to hunger such as rice enrichment. Such technical fixes medicalized food scarcity.

A deep historical contextualization of the Bataan Rice Enrichment Project reveals that Euro-American biomedical practitioners discovered beriberi in carceral laboratories in colonial Philippines that included prisons, plantations, barracks, and leprosy colonies (Ventura 2020, 294). Unlike Williams, who narrowly associated beriberi with thiamine deficiency, Filipino physicians prior to World War II, particularly Manuel Zamora and Primo Arambulo, encountered beriberi as a problem of infant mortality and maternal health. These physicians introduced *tiki-tiki* (a thiamine-rich rice bran supplement) that could be produced at low cost (McElhinny 2009; Ventura 2020). Arambulo equated *tiki-tiki* with national self-sufficiency. Salcedo did not reject rice enrichment in favor of *tiki-tiki*, as the latter was associated with a children's supplement during the late colonial period (Ventura 2020, 305). Post-World War II nutritional enrichment programs were meant to supplement adult diets.

The nutrition policy in postcolonial Philippines bore the imprint of Salcedo. He began his career between 1929 and 1936 at the UP as an instructor of physiology. In 1943, during the Pacific War, he took graduate courses at Columbia University. There he met Williams, who had synthesized vitamin B1 in 1935. Together, Salcedo and Williams worked out a plan to attack beriberi in the Philippines in 1943 (Baldwin 1975, 11). The plan became feasible after the defeat of Japan in 1945. In 1946 Hoffman-La Roche pioneered the rice enrichment premix consisting of thiamine, niacin, and iron that was subsequently used in the Bataan rice enrichment experiment, beginning in 1947. At the time, Salcedo was director of field operations of USPHS and was the founding father of the Philippine Association of Nutrition, a nongovernmental institution that agitated for the creation of a state entity dedicated solely to the problem of nutrition. In 1948 the Roxas administration appointed Salcedo as the chairperson of the state-created Institute of Nutrition (see Fig. 3).

The Bataan experiment was made possible due to a grant from the Williams-Waterman Fund for the Combat of Dietary Diseases to the Philippine Department of Health. Seven municipalities on the east coast of the province with a population of 63,508 constituted

Fig. 3 Juan Salcedo, Health Secretary of the Philippines (1950–53) and Chairperson of the NSDB (1962–65, 1966–70)
Source: With permission from the Nutrition Foundation of the Philippines.

the experimental area, whereas the remainder of the province—which included five municipalities with a population of 29,393—constituted the control area (Salcedo *et al.* 1950, 503). People from the experimental area consumed artificially enriched polished rice over the two-year period of the study, leading to a cataclysmic fall in mortality to near zero levels by 1949. The ratio of persons who displayed symptoms of beriberi dropped from 12.76 percent in 1947 to 1.55 percent in 1949 (Salcedo 1962, 573). In contrast, the death rate due to beriberi remained unchanged in the control area. By denying enriched rice to the control area, the Bataan experiment unknowingly exposed research participants to the risk of beriberi (Ventura 2020, 294).

In 1951 Salcedo extended the practice of rice enrichment to the provinces of North Luzon, particularly Tarlac, Nueva Ecija, and Pangasinan, the rice bowl of the Philippines. Retail prices of rice increased by 1 percent as a consequence of rice enrichment costs borne by millers (National Research Council 1958, 9). Local ordinances were enacted that forbade the sale of unenriched rice, but these were poorly enforced. In August 1952, as health secretary (1950–53) under the Quirino administration, Salcedo spearheaded the enactment of National Rice Enrichment Act 832, which made rice enrichment mandatory.

First, rice millers protested against the legislation as millers who did not comply with the national law had a 1 percent cost advantage over the complying ones (National Research Council 1958, 9). Second, due to an extant legislation in the Philippines, rice millers and other producers were obligated to pay a 2 percent tax on the value of their output. Of the 8,000 rice millers in the Philippines during the early 1950s, 7,000 were very small millers who did not maintain account books. As a result, nearly 90 percent of rice millers did not pay tax. But with the introduction of the Act, traders were apprehen-

sive that with the Department of Health's supervision of the distribution of premix—which included thiamine used in rice enrichment—the government could readily calculate the tax evaded by the millers (National Research Council 1958, 9). Provincial millers formed a union to resist the Enrichment Act.

The chief factor slowing the expansion of rice enrichment in the Philippines was the underlying concern among Filipino state officials outside the Department of Health that the thiamine premix was possibly monopolized by Hoffman-La Roche. Williams's role as patent holder for synthetic thiamine raised considerable suspicion in the Philippines that he was motivated by profit (Williams 1961, 171; Ventura 2020, 306).

The Food and Agriculture Organization (FAO) critiqued the findings of the Bataan study and the National Rice Enrichment Act in 1956. In its critique, the FAO noted that rice enrichment was introduced to Japan in 1950 (Mercado 1956, 1–10). The Japanese method of rice enrichment consisted of enlisting the support of housewives, who would voluntarily add thiamine to rice; this was in contrast to the Philippines, which mandated rice enrichment by the mills through state legislation. The FAO findings revealed that in contrast to Japan, the Philippines did not emphasize nutrition education, a critical pillar in ensuring the successful implementation of the National Rice Enrichment Act.

In his biography, Salcedo reminisces that Magsaysay assured him of presidential support for rice enrichment (Williams 1985, 52). But in reality, Magsaysay did not do so. In his address to millers in 1955, Magsaysay promised to seek the repeal of the Rice Enrichment Act (Williams 1985, 52). Salcedo was disappointed, as the law had not been implemented on a significant scale. A few days before his death on March 15, 1957, Magsaysay had planned to organize a national conference to identify organizational bottlenecks that impeded the implementation of the rice enrichment program (Editorial 1958). His successor, Garcia, created a committee to study the means to implement the Rice Enrichment Act. But the committee was unable to complete its task, and its activities were postponed due to the influential rice millers' lobby.

The Garcia administration attempted to implement the Rice Enrichment Act through the Office of Nutrition in order to coordinate those working on nutrition-related issues at the regional or provincial level (Valencia 1960, 46–49). The Institute of Nutrition—which had been under the jurisdiction of the Ministry of Health during the Roxas and Quirino presidencies—used to provide consultation to the government on nutrition-related matters. A rider in the budget prevented the Institute of Nutrition from releasing any of its funds for activities related to implementation of the National Rice Enrichment Act (Mercado 1956, 1–10). The implementation of the Act faltered due to organizational bottlenecks.

Instead of investigating the cause of beriberi, the Bataan Rice Enrichment Project

sought to demonstrate to the Filipino government and citizens the benefits of fortifying polished rice with thiamine. Although rice enrichment raised post-World War II hopes of worldwide eradication of nutritional diseases through UN agencies such as the FAO, enrichment also medicalized food scarcities attributed to socioeconomic inequalities. Williams was deeply embittered by his inability to turn the Bataan project into an international model for rice enrichment. He attributed the FAO's rejection of the results of the Bataan project to "hostility to Americans on the part of Europeans or hostility to Filipinos on the part of other Asians" (Williams 1961, 202). As US technical assistance became tethered to Cold War objectives, the Philippines became less free to reject US aid agreements which mandated that US companies supply commodities necessary for technocratic projects (Ventura 2020, 309). While beriberi's decline in Manila might have apparently contributed to declining interest in rice enrichment, endemic hunger in rural areas of the Philippines—particularly in Mindanao in 1960—might have provided an impetus to the discovery of miracle rice at the IRRI in 1966.

All in a Grain of Rice: The Cold War Origins of the International Rice Research Institute

The prevailing political and intellectual climate in the US between 1945 and 1955 was shaped by the Cold War, a part of which included the Population-National Security Theory. This theory purported to causally link overpopulation, resource exhaustion, hunger, political instability, appeal to Communism, and danger to US national interests (Perkins 1998, 119–121). According to this theory, world hunger was a cause of resource extraction and further political instability. Plant breeding could be seen as a panacea for hunger because science could increase and stabilize yields. The apolitical nature of science in solving tractable problems related to food and population growth was instrumental in bringing together the Rockefeller and Ford Foundations in the establishment of the IRRI.

In 1950 US President Harry Truman appointed Nelson Rockefeller as the chairperson of the International Development Advisory Board to expand the Point Four Program, intended to assist people of underdeveloped nations to increase their living standards. In 1951 Rockefeller published his report in *Foreign Affairs*. The report indicated that the security and prosperity of the US and industrialized nations could be maintained only if there was complementary progress of economically backward regions (Rockefeller 1951, 530). Rockefeller noted that the first priority of US foreign policy was to raise food production in underdeveloped nations by 25 percent, followed by the

development and export of raw materials from those countries to the US and Europe, and to render technical assistance. He warned that any reckless handling of US technical assistance to underdeveloped countries would disrupt supplies of raw materials to the US as a result of the former countries being thrown into the close economic orbit of the USSR (Rockefeller 1951, 528). The report was illustrative of a dominant view in US political circles that saw the food problem in newly independent nations in relation to political and economic problems. In 1951—as Rockefeller was advising Truman on the implementation of the Point Four Program—his foundation was creating a new research and funding division to define the world food problem and its solutions (Anderson 1991, 62).

In 1950–51 the Rockefeller Foundation contemplated establishing a major agricultural science division which could draw on the foundation's experiences in the Southern US, China, and Mexico. At the time, P. L. Mapa, secretary of agricultural and natural resources of the Philippines, in an informal correspondence with John D. Rockefeller III cited the achievements of the Mexican program of the foundation, which had raised people's living standards (Anderson 1991, 67). In the view of Philippine agricultural scientists, increased production of rice and corn would contribute to the creation of economic stability—but the varieties of seeds available at the time did not yield as much as those planted in other countries. Mapa advocated raising people's living standards in the Philippines, as the country was a good example of democracy in Asia and it was crucial for democracies to achieve economic stability (Anderson 1991, 71). The Rockefeller Foundation conceded that there was a special problem in the Philippines with respect to the correlation between the prevalence of hunger and the appeal of Communist ideology. The identification of health and agriculture as objects of attention of the Rockefeller Foundation occurred in conjunction with a belief in the universal application of science and technology (Anderson 1991, 63). Foundation officials referred to "tractable" problems, meaning those that would yield to the application of science and technology. Work on tractable problems helped the foundation in dealing with governments as these problems seemed free of political entanglements during the Cold War.

Ex-CIA official John Kerry King, in his 1953 article in *Foreign Affairs*, noted that in Cold War Asia—caught between two opposing ideological blocs—the supply of rice had major political implications. The major challenge in the struggle to keep South and Southeast Asia free of Communist domination was raising people's living standards. In 1952, Communist China emerged as a net exporter of rice after several years of scarcity. China used rice in its propaganda to reinforce the productive superiority of the Communist system. At the time, a need was felt within US foreign policy circles to convince South and Southeast Asian nations that increased production and a higher standard of

living were possible in their own countries without resort to totalitarian methods. King asserted that "the struggle of the East versus the West in Asia is, in part, a race for production and rice is the symbol and substance of it" (King 1953, 453–460). King's statement was significant as it placed rice in the context of regional security and US relations with non-Communist Asia.

The establishment of the IRRI was the result of a joint venture between the Rockefeller Foundation, Ford Foundation, UP College of Agriculture at Los Baños, and Cornell University. The Ford Foundation funded the IRRI after its earlier investment in community development programs in India amounting to US$100 million (1951–53) failed to generate dramatic results (Anderson 1991, 81). The community development program was undertaken for geopolitical reasons. The foundation feared that a rapidly expanding population relative to food supplies in Southeast Asia would result in newly independent countries of the region falling into the Communist camp (Chandler 1992, 6). Disruptions in India's Second Five-Year Plan around 1960–61, caused by declining agricultural yields, shifted the focus of American aid programs in the country from containing peasant unrest to increasing agricultural yields. The Central Intelligence Agency urged the Ford Foundation to take immediate action to avert a food crisis in Asia (Cullather 2010, 162). The new director of the Ford Foundation, Henry Heald, hired the Cornell agronomist Forrest Hill to reorganize the foundation's international development program. Hill had visited the corn and wheat research stations of the Rockefeller Foundation in Mexico and pushed to bring the Mexican model to the rice fields of Asia. In 1955, the Rockefeller Foundation enlisted the services of the Cornell agronomist Richard Bradfield. As the newly appointed assistant director of the Rockefeller Foundation in 1955, Robert Chandler accompanied Bradfield to identify requirements of agricultural colleges in the Philippines, Japan, Burma, Taiwan, Thailand, Indonesia, India, and Pakistan and awarded grants for fellowships and specific research projects (Chandler 1992, 4). This was the beginning of the Rockefeller Foundation's action program for agriculture in Asia.

The Ford and Rockefeller Foundations promoted project-oriented research—a US answer to totalitarian Soviet science—in the shadow of the Sputnik (Cullather 2010, 162). Given the Ford Foundation had an endowment four times larger than the Rockefeller Foundation and the latter's experience in staffing international programs since 1913, the two foundations cemented collaboration by 1958. In January 1959, Bradfield—while in Asia for the Rockefeller Foundation—stopped in the Philippines to explore the proposal of setting up a rice institute. He noted that L. B. Uichano, then dean of the UP College of Agriculture at Los Baños, expressed enthusiasm for the establishment of such an institute (Chandler 1992, 8). Between June and September 1959, the Ford and Rockefeller

Foundations reached an agreement for the establishment of the IRRI.[18)]

Three factors influenced the collaboration between Cornell and the UP College of Agriculture at Los Baños. First, Cornell had some involvement with the Philippines dating back to the colonial period. Several students from the College of Agriculture had been trained in Cornell. Second, the College of Agriculture was devastated during World War II and was consequently isolated from international developments in agriculture. Third, the ECA became directly involved with the College of Agriculture in what was then known as the Los Baños Technical Assistance Project. Cornell became involved soon after. With the strengths of Cornell—known for its extensive research program in all branches of agriculture—and the needs of the college at Los Baños in mind, a contract was signed on July 1, 1952 that introduced the land-grant concept of university service, as adapted to the Philippine context. The land-grant concept emphasized experimentation toward finding solutions to common problems that beset Philippine agriculture (Turk 1974, 30).

Between 1955 and 1960, the UP College of Agriculture had already established a niche for itself in training undergraduate students from Southeast Asia, particularly Indonesia. At the time, the Faculty of Agriculture (affiliated with Universitas Indonesia) was in dire need of research staff.[19)] As a way out of the situation, Sukotjo, director of the Agricultural Experiment Station at Bogor, approached the Rockefeller Foundation with a proposal to train Indonesian undergraduate students overseas. The foundation brokered an agreement with Indonesian and Filipino officials for training Indonesian undergraduates from the College of Agriculture, Bogor, at Los Baños and pledged US$120,000.[20)] By 1957, the first cohort of 12 Indonesian students from the College of Agriculture at Bogor arrived in Los Baños for training, some of them funded by the International Cooperation Administration (ICA) of the US government.[21)] The Rockefeller–ICA joint initiative to train Indonesian agricultural science undergraduates in the Philippines was intended to deepen friendship among Asian nations.[22)] The most significant episode for the UP College of Agriculture at Los Baños was the founding of the IRRI.

18) The Ford Foundation had allotted US$250,000 for land purchases and architectural fees, whereas the Rockefeller Foundation had advanced US$165,000 to meet the operational costs for 1960 (see Turk 1974, 187).

19) University of the Philippines: College of Agriculture, Indonesia Scholarships, Record Group (RG) 1.2, Finding Aid (FA) 387A, Series 242 D, Box 12, File 98, Rockefeller Archive Center (RAC).

20) Letter from J. C. Harrar, Rockefeller Foundation, to Dr. Vidal Tan, President of UP, November 9, 1955, FA 387A, RG 1.2, Series 242 D, Box 12, File 98, RAC.

21) Correspondence between Robert Chandler and George Trduerger, May 13, 1957, FA 387A, RG 1.2, Series 242 D, Box 12, File 99, RAC.

22) Correspondence between Robert Chandler and George Trduerger, May 13, 1957.

In 1960, the island of Luzon was viewed as the most logical choice for the establishment of the IRRI (Chandler 1992, 188). The Philippines was a rice-producing country where demand for the crop far outstripped supply. Average production figures were low, and there was a dearth of indigenous agricultural research.[23] Los Baños had been a pilgrim destination since pre-Christian times. The IRRI's proximity to Mount Makiling—a sacred site since pre-Christian times—cast a spiritual aura on the institute that the discovery of miracle rice only confirmed (Cullather 2004, 237). Chandler never explicitly invoked Makiling's legends, but an imprint of these legends may be echoed in the vernacular names the Filipino press attached to the IRRI's first varieties, for example, IR8 or "miracle rice."

The Rockefeller Foundation selected the world-renowned modernist architect Ralph Walker to design the IRRI buildings. Constructed completely out of imported materials, the sprawling one-story aluminum-and-glass structures featured modular walls to encourage an egalitarian office culture (Cullather 2010, 163). Facing the IRRI laboratory building was an experimental farm that replicated climatic conditions across Asia (see Fig. 4).

Given the historical context that led to the establishment of the IRRI, what was the focus of the institute? The focus included: (a) developing well-adapted high-yielding varieties of rice suited to tropical climates; (b) genetic study of mutation; (c) research on the physiology of growth, nutrition, and reproduction of rice; (d) studies on the physical composition, soil chemistry, and microbiology of paddy soils; and (e) observing the effects of water and temperature on plant growth. Chandler and his team collected 10,000 varieties of rice worldwide, recorded the characteristic features of each strain, and placed the varieties in cold storage for future use by scientists.[24] During the early years (1960–64), research scientists affiliated with the IRRI undertook investigations on tropical varieties of rice which were unreasonably tall and leafy and susceptible to lodging (when plant stems are weak to the point that they can no longer support the grain, causing the plant to fall over). Tropical varieties were susceptible to rice stem borer attacks that reduced yields. Scientists at the institute attempted to identify rice strains resistant to borer attacks and use these strains in developing new high-yielding hybrid varieties.[25] The IRRI maintained a program to evaluate the efficacy of insecticides used against stem borers.

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23) NSDB Role in Science Progress in the Philippines, University of the Philippines [Undated], FA 387 A, RG 1.2, Series 242, Box 1, File 1, RAC.

24) IRRI: Brief Description of Training Program, November 2, 1962, FA 388, RG 1.3, Subseries 242 D, Box 17, File 168, RAC.

25) IRRI, Proposal to the US Agency for International Development [Undated], FA 388, RG 1.3, Series 242 D, Box 17, Folder 171, RAC.

Fig. 4 The IRRI Building in the Distant Background (1963). Scientists and trainees were expected to wade through the slush of the experimental farm. During the early years of the IRRI, before power tillers were developed, carabaos were used to prepare the experimental plots.
Source: IRRI Archives.

During the 1960s, the IRRI established a regional research program and convened periodic conferences that focused on problems of international economic importance, including one that focused on rice blast disease, a leading cause of global food insecurity.[26] Senior scientists from the institute trained agricultural educators from Thailand, Pakistan, and Indonesia.

Under the vision of Jacob George Harrar, who became president of the Rockefeller Foundation in 1961, the IRRI devoted its attention to developing high-yielding varieties of rice suitable for tropical climates. Southeast Asia in general suffered a serious deficit in rice production. The Asian farmer had a "rice complex" that was comparable to the "cotton complex" of the American South.[27] The rural population of Asia depended excessively on rice not only as a source of income but also as the main source of food. The IRRI sought to discourage the excessive dependence on rice by undertaking research

26) Draft of a Proposal to the Ford Foundation for Support of Certain Phases of the Training and Regional Program of the IRRI [Undated], FA 388, RG1.3, Series 242D, Box 17, File 164, RAC.

27) Letter from Norman Efferson, Louisiana State University Agricultural College, to the Rockefeller Foundation, August 27, 1963, FA 388, RG 1.3, Series 242 D, Box 17, File 171, RAC.

in leguminous crops such as mung, cowpeas, and soybean that could correct dietary deficiencies.[28)]

The first decade of the IRRI (1960–70) reflected the imprint of Chandler's ideas. The IRRI defined the global food problem in Malthusian terms. The task for the institute was to determine how global food production would increase to keep pace with the ever-rising population (Oasa and Jennings 1982, 39). Between the two alternatives of either increasing the yield per unit area or addressing inequities in rural society, IRRI scientists opted for the former. Chandler was concerned about low rice yields and slow adoption of agricultural techniques. His concern alluded to the reluctance of farmers to adopt technological advances. At the same time, he dismissed farmers' concerns about the costliness of technology as an "excuse" (Oasa and Jennings 1982, 39). In doing so, Chandler accepted inequality in rural society as a given. Research had to eliminate constraints imposed upon higher yields. From the inception of the IRRI, Chandler elected to avoid incremental agricultural improvements and instead go for the big jump strategy that emphasized technology as a catalyst to increase crop productivity (Cullather 2004, 239). Chandler wanted to take plant genetics to its frontiers to show the world that higher yields were possible (see Fig. 5).

Filipino agronomists critiqued the big jump strategy. Dioscoro Umali, dean of the College of Agriculture at UP, noted that high-yielding varieties of rice were contingent upon expensive inputs such as fertilizers and herbicides (Cullather 2004, 240). Shallow-rooted dwarf varieties of plants were dependent on precise hydraulic management that most farmers were unaware of. Farmers were forced to discard nearly all the traditional practices and adopt new techniques for planting, weeding, irrigation, harvesting, and threshing. New chemicals and irrigation would require access to credit networks that local farmers did not have. If adopted, high-yielding rice varieties would radically disrupt the social environment in which the crop was grown. Umali tried to rescue the straightforward objective of increasing rice production from the ballooning expectations that clustered around high-yielding varieties of the crop.

During the formative years of the IRRI (1960–70), crop yields did rise but slowly. The growth of agricultural production across Asia was marginal (less than 3 percent) and barely in line with population growth (Umali 1972). In organizing and institutionalizing the sharing of technology in rice production, the IRRI's role was limited to assembly and dissemination of knowledge but did not take into account the adaptation of a given technology to suit the needs of specific countries. Despite these shortcomings, the

28) The Improvement of Grain Legumes Production: Communication from the IRRI [Undated], FA 388, RG 1.3, Series 242 D, Box 17, File 170, RAC.

Fig. 5 Mechanized Paddy Threshers (1960s)
Source: IRRI Archives: Early Field Experiments and Machines.

achievements of the IRRI are significant. The institute placed increased emphasis on international scientific exchanges and cooperative research programs between the Philippines and other Southeast Asian nations. Within the IRRI, a logic different from the stereotype of the Asian farmer as traditional was meant to operate: scientifically ordered spaces within the institute would be populated with an interdisciplinary phalanx of scholars who would work on global issues such as food insecurity. During the 1950s and 1960s, Filipino scientists such as Umali pursued their careers within the confines of national science. But by the 1970s—with the IRRI's introduction of the Liaison Scientists Program—Umali officiated as the IRRI's liaison scientist in the People's Republic of China. He coordinated between international aid agencies such as the FAO—in his capacity as assistant director general and regional representative for Asia and the Far East—and the National Agricultural Research System of China in formulating a national rice production strategy.

"No Variety of Want Is More Individualized than Illness": The Philippine Medical Association, Socialized Medicine, and Anti-Communist Propaganda

During the early years of the Cold War (1946–47), the American Medical Association (AMA) used socialized medicine as a political weapon to disparage President Truman's proposal for compulsory national health insurance. The AMA suspected physicians who advocated universal health care of being Communists. At the time, opponents of national health insurance focused on maintaining the professional independence of doctors. Medicine became a blazing focal point in the fundamental struggle to determine whether the United States would become a free or a socialist state (Warner 2013, 1452–1453). The Philippine Medical Association (PMA) during its early years (1939–46) was an affiliate of the AMA.[29] Affiliation with the AMA conditioned PMA physicians to be skeptics of the state-centered approach to public health. During the 1950s, the PMA was faced with the dilemma of meeting the goals of the Philippines' rapidly expanding public health program without compromising on professional standards.

The year 1949 was significant for the working class in the Philippines as President Quirino recommended before Congress the passage of a legislation providing prepaid medical services to rural populations (Department of Health 2014, 3). At the time, a faction within the PMA expressed concern that Quirino's proposal would lead to the growth of socialized medicine, defined as the total mobilization of medical care under government control (Torres 1949, 249–255). Luis Torres, a PMA physician also affiliated with the Philippine Federation of Private Medical Practitioners, contended that socialized medicine claimed to provide a panacea to the public health problem through the taxation system. But for every peso spent on health care, the proposal to extend prepaid health care to the rural population would entail additional administrative expenditure, for example, 190,000 government employees for a population of 18 million people (Torres 1949, 249–255). One of the weaknesses of socialized medicine, according to Torres, was that it promised too much. The taxpayer made undue demands on doctors' time and disrupted the doctor-patient relationship. Furthermore, Torres noted that doctors would not be able to maintain confidentiality of patients' records under a system of socialized medicine, given insurance claims. He warned that socialized medicine sounded the death knell for

29) The Philippine Islands Medical Association, precursor of the PMA, was founded in 1903 as an affiliate of the AMA. By 1921, Filipino physicians had become members of the association. By 1932, private practitioners had splintered from the Philippine Islands Medical Association and founded the Philippine Federation of Private Medical Practitioners, although many members of the federation continued to hold membership of the former. In 1939, the Philippine Islands Medical Association was renamed the PMA to reflect its nationalist orientation.

democracy in the Philippines. But PMA members—particularly Rodolfo Gonzalez, the incoming PMA president (1950)—did not subscribe to Torres's views.

In 1950, Gonzalez noted that the Philippines suffered an acute shortage of hospital beds for poor patients, estimated at 8,500 for a population of 18 million people (Gonzalez 1950, 187–191). The government did not have enough funds to establish more hospitals, which in Gonzalez's view led to a vicious cycle. He argued that the less the state took care of the health of the masses, the more difficult it would be for people to engage in productive work, especially agriculture and industry. The less the productivity of the people, the lower would be the state income and the harder it would be for the government to carry out its social amelioration program. Gonzalez appealed to PMA members to help the government by maintaining "charity beds" in private hospitals. Gonzalez's views with respect to greater state intervention in public health were shared by then Health Secretary Salcedo (1950–53), who was also the president of the PMA between 1952 and 1953.

At the inaugural address of the First Southeast Asian Medical Conference in Manila on May 8, 1951, then incoming PMA President Eugenio Alonso criticized shortcomings of the Quirino administration's proposal to provide prepaid medical services to rural areas. He pointed out that no variety of want was more individualized than illness. The illness of a wage earner from tuberculosis or the failing health of children due to malnutrition was a problem that needed treatment of individual patients (Alonso 1951, 455). Alonso shed light on the contradiction that although 700 million pesos had been spent by the government on public health by 1951, 90 percent of patients did not see a doctor. He contended that medical inadequacies could be remedied through amelioration of people's living conditions. He questioned the feasibility of undertaking nutrition research in the Philippines, or educating people about the nutritive value of food, at a time when people did not have enough to eat. Given the lack of consensus within the PMA on the question of expanding rural health care, the association was faced with a dilemma. At the heart of the matter was how to hold the association together when there were so many private practitioners who were fearful of increased competition from the state. One way out of the dilemma was to benefit both private and government practitioners.

In 1951, as the president of the PMA, Alonso proposed major changes in the organization of health work, i.e., decentralization of health activities to rural areas (Stauffer 1966, 96). His underlying rationale was that with the decentralization of the government's health activities, government physicians would be sent to rural areas. In the process, the scope of state medicine would be expanded, a prospect he hoped would appease government physicians. Alonso hoped that private physicians would like the proposal to dispatch government physicians to more rural areas and free the cities and

towns for private practice. But neither of the two camps liked Alonso's proposal. Government physicians were reluctant to get transferred to remote areas, whereas private physicians were apprehensive of increasing state presence in public health (Stauffer 1966, 96).

In 1952 the Quirino administration, despite opposition from sections of the PMA, succeeded in passing Republic Act 747, "An Act to Regulate the Fees to Be Charged against Patients in Government Hospitals and Charity Clinics Classifying Patients According to Their Financial Condition" (Republic Act 747, 1952). The Act established a classification system for individuals who would be eligible for free treatment in government hospitals. A year later, the Quirino administration liberalized the classification system such that Filipino families with a monthly income of less than 100 pesos qualified as indigents and were eligible for free hospitalization (Stauffer 1966, 127). Nearly 90 percent of Filipinos qualified as indigents under the Act. Subsequent to the passage of Republic Act 747, there was a rapid construction boom of public hospitals. Many small hospitals, acquired through pork-barrel funds, could not be staffed by government doctors (Stauffer 1966, 128).

Public spending on health acquired a new lease of life during the Magsaysay era (1953–57). During his election campaign, Magsaysay made many promises for a better quality of life in the barrios and repeatedly reminded the PMA about expanding medical care to rural areas. He appealed to the association to abandon its "mercenary" zeal and instead return to its "missionary" zeal of service (Stauffer 1966, 123). In line with its preelection promises, the Magsaysay administration had to increase public spending on health and, in turn, increase taxation. Physicians united under the umbrella of the PMA to resist what they interpreted as "socialized medicine" and the deterioration of professional standards, given that a majority of physicians recruited to the Rural Health Units were political appointees (Editorial 1959). The PMA bargained for a subsidy to be provided to Filipino physicians who elected to set up practice in rural areas (Icasiano 1955, 230–233). The then president of the association, M. C. Icasiano, warned the Magsaysay government that medical services in rural areas should not be disbursed as a matter of charity but must be extended on the basis of self-help such that barrios could independently support private practitioners.

During the Garcia presidency (1957–61), Rodolfo Guiang—a private practitioner from Pangasinan and a member of the PMA—proposed an Indigency Plan that was intended to meet the increasing demand for medical care in the Philippines and free densely populated urban areas for private practice (Stauffer 1966, 96). The plan would screen the population to identify those who could be given free medical treatment due to their inability to pay. While working out details of the PMA Indigency Plan with the

Department of Health, private physicians realized that the Garcia administration was less cooperative than they had anticipated. The association subsequently began to use socialized medicine as a weapon to break the monopoly of state medicine in dealing with the indigent population of rural Philippines. In 1960, an editorial in the *Journal of the Philippine Medical Association* noted that "socialization of medicine" was one of the many insidious manifestations of the socialist-Communist monster that was a danger to Philippine democracy (Stauffer 1966, 129). Although the government gave assurances of cooperation with the Indigency Plan, it failed to support the plan financially. The association subsequently worked on the Indigency Plan as a voluntary project.

Until the early 1960s, socialized medicine was a recurring theme in the PMA annual meetings. In 1961, Diosdado Macapagal was elected president of the Philippines. He introduced a comprehensive Five-Year Integrated Plan for the country's socioeconomic development, proposing improvement of various public services, including the delivery of health care (Department of Health 2014, 104). In 1962, then Health Secretary Francisco Duque designed a plan that would extend medical services to the needy at no additional cost. The PMA labeled the proposed scheme "socialized medicine" that stifled physicians' individuality and removed incentives for professional advancement (Guiang 1962).

Between 1949 and 1962, the PMA focused on the type of medical care most suitable for the Philippines. In its early efforts to achieve satisfactory distribution of physicians across rural areas, the association advocated that government physicians be sent to rural areas while freeing urban areas for private practice. But the plan did not work, due to mutual distrust between private and government physicians. The association was successful in thwarting any plans for expanding the state's role in Philippine public health. First, it launched a propaganda campaign through journal articles and newspapers that enlightened the Filipino public regarding the importance of treating diseases at the individual level. Second, the association preyed on the public's worst fears regarding the loss of doctor-patient relationships and the erosion of professional standards associated with the expansion of public health services. At the same time, it tapped into the Philippine political leadership's fear of Communism and portrayed socialized medicine as a threat to the nation's democracy. In a rather demagogic manner, the association used socialized medicine to stifle any debate amongst physicians regarding nationalized health care.

Conclusion

This article does not chronicle the successes or failures of individual disease control programs as they were implemented in the Philippines. Rather, it seeks to understand

the niche that applied sciences, particularly nutrition, agriculture, and medicine, occupied with respect to national reconstruction in the aftermath of Philippine independence in 1946.

The lingering question as to whether Philippine science was a variant of postcolonial science more generally, or whether it was imbued with a distinctly national flavor, cannot be easily answered. It entails situating the "postcolonial" in Philippine science. Science was the raison d'être of the modern nation-state. In other words, the phenomenon called state building by modernization theorists was the identification of the state's projects as uniquely modern: state building crucially depended on the principles of science and technology (Abraham 1997). In the Philippine context, institutions such as the PRR-1 atomic reactor and IRRI belonged to the postcolonial space.

This article highlights three discerning features of postcolonial Philippine science. First, science was packaged as a comprehensive program of delivery intended to address the basic needs of people. Second, Philippine presidents understood science in terms of balancing national needs and nurturing the country's Cold War ambitions as the leader of the free world in Southeast Asia. But the Philippines' aspirations as leader of the free world in Southeast Asia were contingent on the availability of US technical assistance. For instance, the Bataan rice enrichment experiment failed to turn into an international model of rice enrichment due to other Asians' suspicion of Filipinos. As the Philippines was drawn into the US orbit during the Cold War, the Philippine government became less free to reject technical assistance agreements which mandated the involvement of private American corporations. Third, science in postcolonial Philippines was statist, i.e., conducted on behalf of the people but at the discretion of the state. The Philippines inherited colonial scientific bodies such as the Bureau of Science—which drew on the models of similar institutions extant in the US—although the emphasis during the 1950s shifted from basic to applied research.[30)]

Given the emphasis on packaging science as a comprehensive program of delivery, and the emphasis on applied over basic research, one may infer that Philippine science was a variant of postcolonial science in Southeast Asia and shared parallels with Nehruvian India and Soekarno-era Indonesia (Arnold 2013; Neelakantan 2015b). What distinguished postcolonial Philippine science from its Indian and Indonesian counterparts was its dovetailing with US objectives of subverting the spread of Communism in Southeast Asia. For instance, Magsaysay had to emphasize the geopolitical significance of the Philippines —as being in the frontline against Communism in Southeast Asia—while requesting US aid for malaria eradication during the 1950s. In contrast, India and Indonesia sought to

30) For a comparison with Indonesia, see Messer (1994) and Goss (2011).

achieve a delicate equilibrium between increased receptiveness to foreign aid and maintaining their respective political sovereignty (Arnold 2013, 361; Bu and Yip 2015, 6). A mobilization mentality suffused the practice of science in the Philippines during the 1950s such that the pursuit of knowledge led to new unresolved questions associated with the Cold War, such as socialized medicine—expanding health care access to the entire population—resulting in political deadlocks. These deadlocks, in addition to institutional bottlenecks that seemed almost insurmountable during the 1950s, have stymied the implementation of health legislation to the present.

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