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The Making of a Frontline Laboratory: The United States Naval Medical Research Unit No. 2 and Wartime Colonial Medicine

Hohee Cho
University of Oxford

Abstract

This paper examines the establishment and significance of the United States Naval Medical Research Unit No. 2, today called the Naval Medical Research Unit INDO PACIFIC. During the Pacific War, the unit was located close to the frontlines as an experimental medical research institution. Headquartered in Guam, with a short-lived branch in Okinawa, the unit's innovative establishment marked the US Navy's first attempt at medical research near overseas combat zones. After the war, the Navy expanded medical research to establish four more NAMRUs worldwide, serving as a key institution for medical intelligence. This paper argues that NAMRU-2 was a significant element of American interests in the Pacific, exemplifying the intersection of wartime strategy, military medicine, and colonial medicine. By investigating the unit's establishment, operation, and postwar legacy, this paper highlights NAMRU-2's role in consolidating US medical influences in the Pacific and advancing medical knowledge under wartime conditions.

Keywords

NAMRU-2, Medical Research, Military Medicine, Animal Research, Okinawa, Guam

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Introduction

Safeguarding service personnel requires more than the treatment of injuries. In 2024, Sidney Hinds of the United States Naval Medical Research Command noted that it includes predicting potential illnesses and creating countermeasures. The Naval Medical Research Unit INDO PACIFIC (previously No. 2), he argued, was at the center of navigating the evolving disease landscape of the world.[1] In other words, responding to battlefield injuries was only part of the unit's contribution to American military strength. Instead, it also carried out research on medical environments, prevented diseases, and developed treatments. Such a holistic approach to military medicine, spanning preventive, curative, and research fields dates back to the Pacific War, when it became more prominent as

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* Dr. Hohee Cho is a Research Associate at the Pandemic Sciences Institute and the Faculty of History, University of Oxford. This research has been generously supported by the Moh Family Foundation and the Pandemic Sciences Institute.

1 Sidney Hinds, "NAMRU INDO PACIFIC Monitors Infectious Disease for Public Health and Military Readiness," accessed September 27, 2024, https://www.pacom.mil/Media/News/News-Article-View/Article/3859046/namru-indo-pacific-monitors-infectious-disease-for-public-health-and-military-r/

the US military institutionalized medical research. The first exemplary case in the US Navy was the Naval Medical Research Unit No. 2 (NAMRU-2).

NAMRU-2 was formally set up in January 1944 by the US Navy to study diseases of significant interest to the military in the Pacific region. The main unit was based in Guam, with a short-lived branch in Okinawa.[2] The unit primarily engaged in preventive medicine and animal research, having research laboratories at the core of the unit. The unit facilities were in superb condition with excellent staff members. While NAMRU-2 moved its location around the Pacific over the years, its pioneering work in Guam led to the establishment of five more medical research units around the globe on each continent.

Despite its significance, the historiography directly concerning the history of NAMRU-2 and other overseas Naval Medical Research Units is thin, mostly concerning the period after the 1950s. Meng-Chih Lee wrote about NAMRU-2's influence on Taiwan's public health in a short article focusing on the period when the unit's headquarters were in Taipei from 1955 to 1979.[3] Frank L. Smith III examined the presence of NAMRU-2 in Indonesia, where it had a detachment from 1970 and then its headquarters between 1991 and 2010. Smith focused on the political backfire surrounding East Timor, showcasing the unit as a site of contention and cooperation in science diplomacy.[4] Scholars such as Jiyoung Park have recently examined medical entomology in Korea and the supporting role that NAMRU-2 in Taiwan played on it.[5] Other works, such as Sophan Ear's paper on medical surveillance, are about the contempo-

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2 C. C. Shaw, "Biomedical Research Renders Its Mite to Naval Might," *Military Surgeon* 111, no. 1 (1952): 5-6.

3 Lee Meng-Chih 李孟智, "Meiguo haijun di'er yanjiusuo yu Taiwan gonggong weisheng" 美國海軍第二研究所與台灣公共衛生, *Taiwan weizhi* 台灣衛誌 32, no. 1 (2013): 1-5.

4 Frank L. Smith III, "Advancing Science Diplomacy: Indonesia and the US Naval Medical Research Unit," *Social Studies of Science* 44, no. 6 (2014): 825-47.

5 Park Jiyoung 박지영, "Bogeonhakja Ju Inho-ui gamyeombyeong maegae gonchung yeongu-wa Migun-ui jiwon, 1945-1969" 보건학자 주인호의 감염병 매개 곤충 연구와 미군의 지원, 1945-1969, *Uiryo sahoesa yeongu* 의료사회사연구 12 (2023): 5-39.

rary medical activities of NAMRU-2.[6]

These existing works only briefly mention, if at all, the origins of the Navy's overseas medical research unit. Most of them acknowledge NAMRU-2's connections with the Rockefeller Foundation, but there are varying accounts of who funded, directed, and managed the daily operations of the unit. This leaves a significant gap in the literature about US military medicine in the Pacific War and the immediate postwar years. This paper, therefore, contributes to the historiography of military medicine in the Pacific War by exploring some basic but essential questions about the history of NAMRU-2 during the war. Why did the US Navy launch a medical research program in the Pacific in the middle of a war? How did the institution operate? What kind of research did it carry out?

This paper contends that, as an institution, NAMRU-2—despite its humanitarian and scientific functions—essentially served to extend the imperial strength of the US. It frames the US as an imperial power, which turned the Pacific Basin into an "American lake" following the Pacific War.[7] This approach builds upon the existing literature on US military medicine and tropical conditions in the Pacific. Anne Perez Hattori offers the most extensive medical history of Guam under the US Naval Government, from colonization3 in 1898 until the Japanese occupation of the island during the Pacific War in 1941. While many authors tend to treat the military's public health efforts as an exemplary case of modernization, Hattori explores the tensions and ambivalence surrounding public health programs between the Chamorro people and the American authorities.[8] Similarly, Warwick Anderson's book analyzed the intersection of military medicine, tropical medicine, and the Rockefeller Foundation's

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6 Sophal Ear, "Towards Effective Emerging Infectious Disease Surveillance: Cambodia, Indonesia, and NAMRU-2" (2011), Available at SSRN: https://ssrn.com/abstract=1984963 or http://dx.doi.org/10.2139/ssrn.1984963.

7 Ham M. Friedman, *Creating an American Lake: United States Imperialism and Strategic Security in the Pacific Basin, 1945-1947* (Greenwood Press, 2000).

8 Anne Perez Hattori, *Colonial Dis-Ease: US Navy Health Policies and the Chamorros of Guam, 1898-1941* (University of Hawai'i Press, 2004).

works in the Philippines. He demonstrates how the US Army's medical programs racialized and colonized Filipino bodies from the Spanish-American War in 1898 to the outbreak of the Pacific War.[9] Following Hattori and Anderson's framing of the US military medicine in occupied territories, this paper thus positions the US Navy's medical activities in Guam as a form of colonial medicine.

Planning a Medical Research Unit for the Pacific

The central figure in institutionalizing medical research in the Navy was Thomas Milton Rivers, today known as the father of modern virology.[10] Having served in the First World War, Rivers foresaw a medical need within the military as the Japanese Empire expanded in the Pacific. Even before the US officially joined the Second World War in the Pacific, or the Pacific War, Rivers joined the Naval Reserve. At the time, Rivers was the Director of the Rockefeller Institute's affiliated hospital, the Rockefeller Hospital. According to Rivers, he persuaded members of the hospital and laboratories to join the Naval Reserve with him, organizing a Rockefeller Hospital Naval Research Unit in 1940. The Rockefeller Hospital consequently started accepting patients from the US Navy. The deal was that the Navy would benefit from the medical service of the hospital at the cost of "a dollar a year," and the hospital would conduct research on diseases of interest.[11] Service for the nation and the desire for research met the Navy's need for hospitalization.

The Americans considered the tropical island environment of the Pacific a novel and hazardous zone for its troops to operate in. Following the Pearl Harbor attack, the US entered the war and sent military units to

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9 Warwick Anderson, *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines* (Duke University Press, 2006).

10 David M. Oshinsky, *Polio: An American Story* (Oxford University Press, 2005), 23.

11 Thomas M. Rivers and Saul Benison, *Tom Rivers: Reflections on a Life in Medicine and Science, An Oral History Memoir* (MIT Press, 1967), 320-21.

the Pacific. While the British controlled the Asian front lines, the US oversaw the South Pacific Area and the Southwest Pacific Area. The successful campaigns on Midway and the Solomon Islands led the US to adopt an "island-hopping" strategy until it reached Japan.[12] It was during this part of the war that most US troops were first exposed to the environment of tropical islands. Here, US Forces encountered alarming diseases, such as malaria, which caused five times more casualties than in combat. From the perspective of the Americans, tropical islands were dangerous, and their indigenous peoples were carriers of disease. As Judith Bennett noted, such a dominant idea of a diseased environment in the Pacific led the US military to manipulate the ecological landscape.[13]

The US directed various research programs to better understand and manage the risks of operating in the tropical conditions of the Pacific. One of the most significant works was the anti-malarial program, which was a biomedical research project that involved institutions such as the National Research Council or the Rockefeller Foundation.[14] In 1942, the US Navy commissioned the Naval Medical Research Institute, which became its largest biomedical research facility at the Naval Medical Center in Bethesda, Maryland.[15] Similarly, the US Army set up a Medical Research and Development Board under the Surgeon General to direct all medical research concerning the Army during the war. The board worked with the National Research Council and other agencies, and one of its other main concerns was the threat of biological warfare

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12 Sandra Wilson, Michael Sturma, Subrahmanyan Arjun, Dean Aszkielowicz, J. Charles Schencking, *The U.S. and the War in the Pacific, 1941-45* (Routledge, 2022), 40-41.

13 Judith A. Bennett, *Natives and Exotics: World War II and Environment in the Southern Pacific* (University of Hawai'i Press, 2009), 49-72.

14 Leo B. Slater, "Malaria Chemotherapy and the 'Kaleidoscopic' Organisation of Biomedical Research during World War II," *Ambix* 51, no. 2 (2004): 107-34.

15 David E. Goldman, ed., *The Naval Medical Research Institute, 1942-1962* (Naval Medical Research Institute, 1966), 1; Cdr. Dominic J. Deriso and Robert de Gast, "The Naval Medical Research Institute (Pictorial)," accessed September 27, 2024, https://www.usni.org/magazines/proceedings/1965/june/naval-medical-research-institute-pictorial.

with Japan.[16]

As the war expanded and the military set up research facilities, US troops in the South Pacific started facing medical problems. The idea for NAMRU-2 began as an effort to deal with these problems. Ross McIntire, the Surgeon General of the US Navy, invited Rivers to a committee in July 1943 to discuss two diseases that concerned the Navy: scrub typhus and infectious hepatitis. The committee despatched Rivers to the South Pacific to assess the feasibility of establishing a medical research unit close to the frontlines to study these diseases. Rivers speculated that McIntire may have felt that the Navy should promote medical research further when the US Army's medical research was receiving great publicity.[17] This was around the time when the US was fighting in the Solomon Islands and New Guinea, about a year since the Guadalcanal landing in August 1942.[18] The re-occupation of the Solomon Islands and New Guinea by the Allies was considered a "turning point" in the war.[19]

Rivers made his first trip to the South Pacific to search for an ideal site for the research laboratory. There were two main conditions for the location. One was the closeness to the battlefront, and the other one was the proximity to large hospitals to have enough patients to study. The research laboratory was envisioned to be fully equipped for "very thorough" research and to be mobile enough to respond to changes in frontline conditions.[20] When Rivers inspected the South Pacific, it was al-

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16 *USAMRMC: 50 Years of Dedication to the Warfighter, 1958-2008* (Online Source, 2008), 1-13.

17 Rivers and Benison, *Tom Rivers*, 329-30.

18 Annie Kwai, *Solomon Islanders in World War II: An Indigenous Perspective* (ANU Press, 2017); Martin Gibbs, Brad Duncan, Lawrence Kiko, Stephen Manebosa, "World War II in the Solomon Islands: Conflict and Aftermath," in *Multivocal Archaeologies of the Pacific War, 1941-45*, edited by Ben Raffield, Yu Hirasawa, Neil Price (Routledge, 2023), 45-48.

19 "Solomons Campaign May Be Turning Point in Pacific War," *The Washington Post*, November 8, 1942; "Increased Threat to Rabaul: Turning Point in Pacific War," *The Times of India*, August 18, 1943.

20 Captain Thomas M. Rivers, (MC)-V(S), USNR to the Commander South Pacific, Mobile Naval Medical Research Laboratory in the South Pacific Area, November 22, 1943, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, Rockefeller Archive Center (RAC).

ready decided that the laboratory would be an integral establishment with specialized personnel.[21] For the search, Rivers left New York in October 1943 for San Francisco, where he boarded the ship to Pearl Harbor in Hawai'i. From Pearl Harbor, he passed through Palmyra, Canton (Anglo-American Condominium), Wallis (French Territory), Suva (Fiji), Noumea (New Caledonia), Efate (New Hebrides, today's Vanuatu), Espiritu Santo (New Hebrides), Tulagi (Solomon Islands), Lunga (on Guadalcanal, Solomon Islands), and Banika (of Russell Islands, Solomon Islands). He returned to New York in December 1943.[22]

During this lengthy trip, Rivers also paid attention to the medical problems in each place he passed through. In San Francisco, Rivers met with medical officers to discuss problems such as malaria and filariasis. At Pearl Harbor, he met with medical officers to discuss dysentery in Canton islands, typhus and plague in Maui, dengue in Honolulu, and the possibility of mongoose as an "animal reservoir" of typhus. Upon arrival at Wallis Island, a French territory, Rivers was shocked to witness some US troops "fraternizing with the natives after dark." He noted that many of the Indigenous islanders were infected with filariasis and that many US troops had contracted filariasis on Wallis.[23] Passing through Suva, Rivers arrived at Noumea, New Caledonia. He visited the US Naval Mobile Hospitals and studied the construction style and materials of the hospital buildings. Rivers was then given orders to move up north to Espiritu Santo, New Hebrides, where he visited the Base Hospitals and the malaria control unit.[24]

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[21] From the Commander South Pacific to the Chief of Naval Operations, Mobile Naval Medical Research Laboratory for South Pacific Area, undated, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

[22] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, Rockefeller University Records (RU), Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC. 1-2.

[23] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 2-5.

[24] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 5-6.

From New Hebrides, Rivers proceeded to the Solomon Islands, a British Protectorate, which the Allied Forces recovered from the Japanese during the campaign from 1942 to 1943.[25] His first destination was Tulagi, the Protectorate government's capital, which had been an important base for the US Navy since the first landings.[26] Rivers traveled on board the ambulance ship, USS Rixey, where he learned about the activities of hospital ships. Rivers toured around Guadalcanal, visiting military hospitals and malaria control units.[27] His last destination in the Solomons was Banika Island in the Russell Group. After surveying the conditions of the island and meeting malaria control unit officers, the Base Medical Officer suggested Rivers Lingatu peninsula would be a good place for the laboratory, which was near Mobile Hospital No. 10. With the enthusiastic support of the Commanding Officer of Banika, Rivers came to agree that Lingatu was the best potential location for the research laboratory.[28]

In addition to searching for a laboratory location, Rivers looked for his staff and diseases of concern. He was very impressed by the work done by the malaria control units, especially with Commander J. J. Sapero. Sapero was headquartered in Espiritu Santo with about 65 officers and 350 enlisted men to direct the malarial control program with the support of about 4,000 men fighting to suppress mosquitos in the region. Rivers argued that malaria was "the number one problem" in the South Pacific, making the region a great place for malaria research. He eventually concluded that the problems in the South Pacific were best addressed locally. Other diseases he considered important to the US troops to require research include bacillary dysentery, which caused problems "each

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25 Clive Moore, *Tulagi: Pacific Outpost of British Empire* (ANU Press, 2019), 373-413.

26 *Solomon Islands Campaign I: The Landing in the Solomons, 7-8 August 1942* (Publications Branch Office of Naval Intelligence, United States Navy, 1943) [published online 2017], 1.

27 Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 7-8.

28 Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 8-9.

time a push is made on a new island" in the region. Infective hepatitis and filariasis were problematic "everywhere" he went. Scrub typhus was a potential threat. The inability to diagnose these infectious diseases in a laboratory complicated disease problems in the Pacific. This reinforced Rivers' view that it was of vital importance for the US to develop accurate laboratory diagnostic capabilities in the region.[29]

Rivers reported that everyone he met on the South Pacific tour was "without exception" enthusiastic. It was agreed that malaria research should be included in the research unit and that Sapero should be part of the unit. All materials for construction, research, and equipment were to be sourced from the US, not locally. On his way back, Rivers met with Admiral Halsey in Noumea. They agreed that a "Mobile Naval Research Laboratory" would be established in Banika and that this laboratory should follow the frontline whenever it moves. Halsey even supported "experimentation on human volunteers." When Rivers met Admiral Nimitz during his stop over at Pearl Harbor, Nimitz discussed the problem of the disposal of dead bodies. Nimitz, who had just returned from Tarawa, Gilbert Islands (today's Kiribati), was so "deeply engrossed" with the Battle of Tarawa that he asked Rivers to talk to McIntire, the Surgeon General of the US Navy, about the problem of disposing of large numbers of dead bodies on very small islands.[30] The battle was one of the bloodiest fought by the US Marines, claiming more than a thousand American lives.[31] With Nimitz's support, the establishment of NAMRU-2 was approved by the Secretary of the Navy in January 1944.[32]

In April 1944, the Chief of Naval Operations decided that NAMRU-2 would be dispatched in June 1944. Whereas Rivers suggested Lingatu on Banika, Solomon Islands, the decision was made for the NAM-

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[29] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 9-15.

[30] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 16-19.

[31] Ira Wolfert, W. Richardson, *The Epic of Tarawa* (Odhams Press, 1945), 86.

[32] Rivers and Benison, *Tom Rivers*, 334-35.

RU-2 to go to Noumea, New Caledonia, where a large US base was. By the time NAMRU-2 was ready to be despatched, the frontline of the war had moved. Authorities agreed that the maximum effect of medical research would only be gained when research was placed as close to the fighting front as possible.[33] On June 23, 1944, NAMRU-2 was commissioned at the Rockefeller Institute for Medical Research with its administrative office at the Institute.[34] This made sense as Rivers, the Commanding Officer who organized the unit, was still the Director of the Rockefeller Institute Hospital. At this stage, the unit's purpose was to study all diseases that might be of potential threat to the military in the Pacific.[35]

NAMRU-2 was very well-supported by the Navy from the beginning. Rivers testified that McIntire wrote a hand-written letter to the Commander of the Naval Supply Base to "Give Rivers whatever he wants." This allowed Rivers to acquire everything that he wanted for NAMRU-2. He chose the same equipment he used at the Rockefeller Hospital, which he knew was of the top quality by experience. According to Rivers, it was a privilege that no one in the Navy enjoyed before. As a result, Rivers had "some of the most beautiful laboratories" anyone had seen. Rivers was also given the authority to choose his own staff. Going through the Navy's personnel files, Rivers chose a group of medical officers "as topnotch a group of investigators and physicians as anyone could find."[36] The Navy had an understanding with the Rockefeller Hospital for staffing NAMRU-2 that many of the staff were directly drawn

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[33] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, National Archives and Records Administration, College Park, Maryland (NACP), 4-5.

[34] History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP. 11.

[35] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2, Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983, Box 228 History of NAMRU-2 Guam, NACP. 1.

[36] Rivers and Benison, *Tom Rivers*, 336-37.

from the Rockefeller Hospital.[37] Sapero joined NAMRU-2 and interviewed some laboratory technicians at the Naval Medical Center with Rivers. Before moving to its final destination, Guam, NAMRU-2 officers and enlisted personnel received training at the Rockefeller Institute and the Naval Medical Center in Bethesda.[38]

Setting Up in Guam

By the end of 1944, NAMRU-2 was eventually based in Guam, the largest of the Mariana Islands. Guam had been under the US Navy's control since 1898 when the American insular empire was acquired through the Spanish-American War. The island had a relatively large population of about 22,290 in 1940 and an existing infrastructure set up by the Naval Government. Based on the occupation history, strategic location, climate, and infrastructure, Guam was set to be the "focal point for central administration of all Central Pacific islands" when it was recovered in 1944.[39] Guam was also "a focal point of American relations with Japan." Before the Pacific War, the US had agreed to disarm the western Pacific in return for Japan respecting China's territorial integrity. However, the treaty was broken, and Japan expanded its empire to the Caroline and Marshall Islands.[40]

Under these circumstances, Franklin D. Roosevelt proposed to fortify Guam in 1939, but the House of Representatives rejected the fortifi-

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[37] Letter to Homer F. Swift, September 7, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F2, RAC.

[38] History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP. 19-20.

[39] Attachment to the Memorandum to Captain Bingham, September 27, 1944, RG313 Entry No. P31 General Administrative Files, ca. 1944-1951, Box 9 EG54-1 Guam April 15, 1944 through December 31, 1944 (1 of 3), NACP.

[40] Walter Lippmann, "Today and Tomorrow: Guam as a Diplomatic Instrument," *New York Tribune*, January 19, 1939, OF 18g Department of the Navy, Guam 1933-45, Franklin D. Roosevelt Presidential Library (FDR).

cation plan.[41] The US did not strongly fortify Guam despite the view that it was of strategic significance.[42] Indeed, A. G. Hopkins explained how Guam was put under the Navy's control along with American Samoa, not the Interior Department like Puerto Rico, for financial reasons, not defence. The Naval Government maintained an "indirect rule" policy that prevented local institutions from change and assimilation.[43] As a result, the island fell under Japanese occupation in December 1941, shortly after the Pearl Harbor attack. The recovery of Guam in August 1944 subsequently bore a symbolic importance as "the liberation of the first American territory to fall to Japanese aggression."[44] The decision to place NAMRU-2 in Guam was made soon after the Navy reoccupied Guam.

The process of setting up the unit in Guam involved a significant amount of animal research and support from the Rockefeller Foundation in various ways. Before the main unit of NAMRU-2 at the Rockefeller Institute relocated, advance echelons were first sent to the South Pacific to assist the Navy's tropical disease control. Advance Echelon No. 1 passed through the Solomon Islands to introduce DDT in the region before proceeding to Guam to set up the unit.[45] On Guadalcanal, the advance echelon studied insect control and helped the First Marine Division's "indoctrination" of DDT. Their main research was on aeroplane spraying techniques in tropical conditions. Experiments with different planes led the NAMRU-2 to devise a method using larger and faster aircraft, the torpedo bombers. As the First Marine Division departed for the Peleliu campaign in September 1944, Advance Echelon No. 1 helped

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41 "Guam and the Budget," OF 18g Department of the Navy, Guam 1933-45, FDR; "Guam Action Means Strength, Not Weakness," March 2, 1939, OF 18g Department of the Navy, Guam 1933-45, FDR.

42 Memorandum on Guam, December 8, 1941, OF 18g Department of the Navy, Guam 1933-45, FDR.

43 A. G. Hopkins, *American Empire: A Global History* (Princeton University Press, 2018), 503-4.

44 From Franklin D. Roosevelt to King George VI, August 16, 1944, OF 18g Department of the Navy, Guam 1933-45, FDR.

45 History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP. 39.

prepare DDT spraying planes. The Peleliu campaign was reportedly the first time DDT was used under combat conditions.[46] It was around this time that the British Army started air-spraying DDT at the Burma front as well.[47] The Navy used the same air-spraying technique during the Okinawa campaign, which proved to be highly successful in killing mosquitos. It was on the DDT dispersal plane that NAMRU-2 had its only fatal casualty, Lieutenant Maple, when the plane crashed on April 11, 1945.[48]

Malaria and mosquitos were major subjects of study because the advanced echelons sent to the Solomon Islands were all engaged in mosquito research. Advance Echelon No. 2 discovered the "most significant" new species of mosquitoes as they passed through the Solomons, New Guinea, and the Philippines, although they did some research on scrub typhus in Papua New Guinea as well.[49] Advance Echelon No. 3 conducted field trials of mobile aerosol ground generators for DDT in Guadalcanal and Florida Group of the Solomon Islands between November 1944 and April 1945 until they joined the main unit in Guam.[50]

The main unit of NAMRU-2 finally departed the US in December 1944 and set up in Guam with 44 officers and 251 enlisted men. Officers specialized in research areas of virology, bacteriology, parasitology, pathology, entomology, mammalogy, biochemistry, malacology, aquatic ecology, acarology, and statistics. Many of the officers were reportedly "leaders" in their respective fields. The construction of the unit's build-

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[46] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP. 3.

[47] Mark Harrison, *Medicine and Victory: British Military Medicine in the Second World War* (Oxford University Press, 2004), 219.

[48] Letter to the Surgeon, HUSAFPOA, Report on Tests with DDT Aerosol Bombs, May 21, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

[49] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 1-3.

[50] History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP. 6.

ings took nearly four months, and NAMRU-2 was fully functioning by May 1945.[51] The construction took longer than expected because of heavy casualties during the Iwo Jima campaign when all available Seabees (the nickname for the Naval Construction Battalion) were engaged in constructing Fleet Hospitals in Guam.[52] The final chosen site for NAMRU-2 had 24 acres of land with the sea on the west, the Fleet Hospital 111 on the east, and Fleet Hospital 103 on the north. As expected, it was placed near the Fleet Hospitals so that the unit would have easy access to the hospitals to draw clinical materials.[53] NAMRU-2 had 62 buildings, 12 fully equipped laboratories, special wards, and facilities for water, sewage, electricity, and enjoyed the luxury of air conditioning.[54]

Animals were at the center of NAMRU-2's activities. From the first South Pacific tour, Rivers noted the significance of animal research. For example, mammals, birds, ticks, mites, and more were required just to study scrub typhus. Rivers expected the research of diseases in the Pacific would require a "large number of fertile eggs and experimental animals," which would be difficult to source from the Pacific Islands and impossible without air-conditioned buildings.[55] When NAMRU-2 was moving to Guam, all the initial colonies of experimental animals were brought from the US.

The care for animals was taken very seriously. NAMRU-2 personnel experienced an extended layover at Pearl Harbor. This meant that the ship carrying NAMRU-2's animals, equipment, construction materials,

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[51] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 7-8.

[52] From Thomas M. Rivers to Frank L. Horsfall Jr., March 12, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

[53] Richard E. Shope to the Medical Officer in Command, US Naval Medical Research Unit Number Two, Report on Activities of First Echelon of NAMRU #2, January 27, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F5, RAC, 1-11.

[54] Rivers and Benison, *Tom Rivers*, 340.

[55] Thomas M. Rivers, Report on Trip to South Pacific in Connection with the Establishment of a Research Laboratory in that Area, 15-17.

and provisions would arrive in Guam before the personnel did. With only four personnel keeping the animals, moving the animals ashore became a big concern. Rivers sent a small number of staff from Pearl Harbor by air transport to manage the situation in Guam. Still, the animals arrived before the staff did. This was because the animals were transferred to a ship that left for Guam earlier than planned out of fear that the animals might be affected by heat during an extended layover at Eniwetok. Although the journey lost two hens and 28 mice, the decision to transfer ships saved many lives of the precious animals. As soon as the ship arrived in Guam, the first thing they did was to build hen houses and sheep pens before unloading the animals. Securing the animals was so important that the personnel stayed on board the ship until all animals were safely ashore.[56] After setting up in Guam, hamsters were delivered frequently, and guinea pigs reproduced at a record pace.[57]

Animals proved to be useful not only in research but also as a powerful tool for negotiations. NAMRU-2 had fresh eggs produced by the chickens they had. Fresh eggs were given to the Seabees as a token of appreciation for constructing animal houses and laboratories and clearing the jungle. Even when NAMRU-2 negotiated to borrow a jeep from the Medical Supply Depot, "two dozen fresh eggs figured in the background of the transaction."[58] This is another case of Americans craving fresh eggs during the war, as Phillip Rutherford discussed in his article about the "egg mania" among US troops in the Pacific Islands.[59] Such an interesting story underscores the resourcefulness of a research laboratory on the front lines.

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[56] Richard E. Shope to the Medical Officer in Command, US Naval Medical Research Unit Number Two, Report on Activities of First Echelon of NAMRU #2, January 27, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F5, RAC, 1-11.

[57] From Thomas M. Rivers to Richard E. Shope, May 22, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

[58] Richard E. Shope to the Medical Officer in Command, US Naval Medical Research Unit Number Two, Report on Activities of First Echelon of NAMRU #2, January 27, 1945, 1-11.

[59] Phillip T. Rutherford, "On Arms and Eggs: GI Egg Mania on the Battlefields of World War II," *Food and Foodways* 25, no. 2 (2017): 123-41.

In addition to working with the experimental animals, NAMRU-2 collected specimens and animal knowledge in the Pacific. Entomologists searched for insects that carried parasites or transmitted diseases. For example, there was a typhus outbreak in Guam. However, no fleas were found in the rats, and the potential threat of an endemic flea-borne typhus was ruled out. This meant that the first reported typhus fever in Guam was likely an epidemic of louse-borne typhus. Investigations suggested that the patient was probably infected through body lice on the clothing of a Japanese that the patient killed in a cave.[60] Other examples of animal research include snail studies on specimens collected by NAMRU-2's branch on Okinawa, filaria worms acquired from autopsies of local people, and rabbits with coccidiosis.[61]

NAMRU-2's nucleus colony of animals at the setting-up stage consisted of mice, hamsters, guinea pigs, rabbits, sheep, and chickens. The cost of supplying these laboratory animals was covered by a grant from the International Health Division of the Rockefeller Foundation.[62] Indeed, the Rockefeller connection was very important to the operation of NAMRU-2. The unit's scientific library was also obtained with the grant awarded by the Rockefeller Foundation. Journals and periodicals of interest were posted on a weekly basis from the US.[63] Other materials, such as antigens, were also sent to Guam upon request.[64] While the sources indicate that the unit was commissioned at the Rockefeller Foundation, the official website of the Bureau of Medicine and Surgery of the US Navy

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60 Report of Investigation of Case of Typhus Fever, March 17, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

61 From Thomas M. Rivers to Richard E Shope, May 22, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

62 History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 29-30.

63 Mildred R. Lewis, A History of US Naval Medical Research Unit No.2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941–1983 Box 228 History of NAMRU-2 Guam, NACP. 8.

64 From Thomas M. Rivers to Frank L. Horsfall Jr., 12 March 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

recognizes that NAMRU-2 was established "under the Rockefeller Foundation."[65] Not to mention, Rivers was the director of the Rockefeller Institute for Medical Research and the affiliated Rockefeller Hospital, and half of the staff of NAMRU-2 were drawn from either the Rockefeller Institute or the Rockefeller Foundation.[66]

Another Rockefeller connection was made through Winthrop Rockefeller, the son of John D. Rockefeller Jr., the founder of the Rockefeller Foundation, who was hospitalized in Guam in April 1945. He was injured during a Japanese kamikaze attack on the ship he was on for the Okinawa landing. Rivers personally inspected Winthrop Rockefeller's conditions and wrote to John D. Rockefeller Jr. immediately.[67] Although NAMRU-2 was a separate unit, Rivers recognized Winthrop Rockefeller on the casualty list and was with him within two hours after his landing on Guam.[68] In the correspondence following Winthrop Rockefeller's hospitalization, John D. Rockefeller Jr. noted that Guam was the best place to set up the research laboratory, adding that the value of the research done at NAMRU-2 would be too great to estimate.[69] In a letter to Rivers, he also praised the unit for what it would do "not only for the wounded men, but for the future control of some of these tropical diseases," which "fires the imagination and warms the heart with gratitude that the institute is so ably represented in so promising an endeavor."[70] Although Winthrop Rockefeller's hospitalisation in Guam was not directly at

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65 Navy Medicine, "Naval Medical Research Unit INDO PACIFIC," accessed September 27, 2024, https://www.med.navy.mil/Naval-Medical-Research-Command/R-D-Commands/Naval-Medical-Research-Unit-INDO-PACIFIC/.

66 From Thomas M. Rivers to John D. Rockefeller Jr., April 10, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

67 From Thomas M. Rivers to John D. Rockefeller Jr., April 10, 1945.

68 John Kirk, *Winthrop Rockefeller: From New Yorker to Arkansawyer, 1912-1956* (University of Arkansas Press, 2022), 142-46.

69 From John D. Rockefeller to Thomas M. Rivers, April 18, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

70 From John D. Rockefeller Jr. to Thomas M. Rivers, May 15, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

NAMRU-2, the correspondence shows that NAMRU-2 received full support both from the Navy and the Rockefeller family.

Frontline Activities

The history of NAMRU-2 in Guam is an account of colonialism and military control. As Anne Perez Hattori argued, healthcare, especially for the Indigenous people, was more than a benevolent act but that of military intervention and an exercise of power.[71] The Naval authorities framed American "colonialism" in Guam as an act of benevolence—a duty to provide adequate healthcare to the people of their occupied territories.[72] The idea that Guamanians were "very loyal to the United States" justified civilian healthcare activities.[73] NAMRU-2's activities, too, should be understood as part of the Naval Government's attempts to gain colonial knowledge and control occupied territories. As Guam's rehabilitation plan clearly notes, civilian healthcare was made to facilitate military operations and kept at a minimal level.[74]

Being a naval unit, NAMRU-2 served duties in civilian care in addition to medical research, especially during the early period when laboratories were under construction. This was both for humanitarian purposes and to collect research data beneficial to American troops. According to the Naval Government, Indigenous health conditions when the US recovered Guam were so poor that "a tremendous amount" of care was needed. The military conducted 30,825 surgeries and 100,035 medical

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71 Hattori, *Colonial Dis-Ease*, 10-11.

72 Anne Perez Hattori, "The Cry of the Little People of Guam: American Colonialism, Medical Philanthropy, and the Susana Hospital for Chamorro Women, 1898-1941," *Health and History* 8, no. 1 (2006): 7.

73 D. J. Callaghan, Memorandum for Miss LeHand, September 24, 1940, OF 18g Department of the Navy, Guam, 1933-45, FDR.

74 Operational Directive Number 7 for Military Government of the Commanding General Tenth Army, January 21, 1945, RG313 Entry No. P31 General Administration Files, ca.1944-1951, Box22 QA Army 1945, NACP.

treatments between August and November 1944.[75] One of the unit members, Lieutenant Commander H. M. Zimmerman, performed all autopsies at the Civilian Hospital of Guam even after the opening of his own laboratory attached to NAMRU-2. He performed 248 autopsies on Guamanians and signed all death certificates of the deceased. This work allowed NAMRU-2 to learn about the health conditions in Guam.[76] These autopsies were performed by the military authority on the local population with the specific purpose of research. Such autopsies and public health works in the context of wartime territorial occupation may be regarded as a process of "colonizing the body" of Guamanians, to use David Arnold's expression.[77]

It was around this time that extensive work on hookworm and intestinal parasites was done on both military personnel and the indigenous population. Historically, hookworm campaigns were one of the Rockefeller Foundation's main public health programs.[78] NAMRU-2 staff, mostly experienced in the Rockefeller circles, likely possessed significant expertise in hookworm infections. On the day NAMRU-2 landed on Guam, Rivers received a report that at least 75-100 babies less than one year old were in critical condition due to hookworm. Rivers recalled how difficult it was to believe that infants were so critically infected. Until that point, it was believed that hookworm infection was caused by walking barefoot on infested soil. Babies did not walk. Then, some naval personnel were found with hookworm eggs in their stools. The type of the hookworm indicated that they were infected in Guam. Noting that the in-

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75 Rehabilitation of Guam, March 6, 1945, RG313 Entry No. P31 Box 9 EG54-(1) January 1, 1945 through June 30, 1945, NACP.

76 Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 9.

77 David Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century India* (University of California Press, 1993), 1-10.

78 For Rockefeller Foundation activities, see John Farley, *To Cast Out Disease: A History of the International Health Division of the Rockefeller Foundation, 1913-1951* (Oxford University Press, 2004).

fected personnel's duties were washing soiled blankets and the clothes of hospital patients, NAMRU-2 started an experiment. The result was that the blanket an infected baby slept in for 24 hours kept moist for five days returned 20,000 infected larvae. This was the first case of finding a fomites-borne infection of hookworm that was not known before, "the first important contribution" of the unit. He added that Guamanians were "intensely clean people" and the wartime conditions in refugee camps created the situation.[79]

NAMRU-2 was interested in the diseases prevalent among the civilian population because civilian diseases could be dangerous to the US troops. There were no human cases of filariasis in Guam, so the filariasis survey was done on the Japanese prisoners of war on the island. The infected prisoners of war were separated from contact with the Indigenous Guamanians.[80] Tuberculosis was the main cause of death in Guam. The Indigenous population suffered from "a tremendous amount of hookworm," bacillary dysentery, and amoebic dysentery. Encephalitis was not serious, and ascaris pneumonia was probably over-diagnosed. Rivers also noted that the civilian medical problems in Guam were quite similar to those in Tinian in early 1945.[81]

The management of the civilian population in Guam was informed by the US military's experience in Tinian in early 1945. In the civilian camp on Tinian, Camp Churo, there were 8,572 Japanese and 2,295 Koreans, including 4,981 children under the age of fifteen. The majority of the Japanese were reportedly from Okinawa. The Koreans were brought to Tinian by the Japanese South Seas Development Company as laborers. During the early period of US occupation in 1944, the Tinian people had problems with dysentery, malnutrition, pneumonia, tetanus, beriberi, and,

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79 Rivers and Benison, *Tom Rivers*, 341-42.

80 Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 13.

81 From Thomas M. Rivers to Commander James J. Sapero (MC), USN, February 11, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

importantly, intestinal parasites. Epidemiology Unit No. 105's survey showed that about 30-50% of the civilians in Camp Harbor were infected with intestinal parasites. To tackle the problem, the Navy in Tinian planned to roll out a mass treatment program for hookworm and ascaris, noting the "high incidence of death from ascaris pneumonia and encephalitis" in Guam.[82] These disease conditions were probably why there was an overdiagnosis of ascaris pneumonia in Guam.

Living conditions were dire in the Japanese-occupied islands in the Pacific, according to US sources. Even near the end of the Pacific War in August 1945, the Japanese held 40% of the islands. The US only controlled 13% of the major islands in the Central Pacific. In the islands still held by the Japanese troops, garrisons were starving. Most Japanese garrisons would rather choose death, either by disease or starvation, rather than surrender to the US. The US forces noted that the fate of the Korean laborers in the Japanese-controlled islands, who had "no means to escape," would be similar. There was a high chance that they would die before surrendering.[83] Perhaps this is the reason why the US propaganda towards Japan included a promise of care for children and sick people.[84]

The expectation was similar when the US offense moved into the northern Pacific Islands and Japan. Preparing for the potentially life-threatening conditions in Japan, NAMRU-2 set up a "baby brother" branch to proceed to Okinawa.[85] Although it was set up too late to participate in the Iwo Jima campaign, NAMRU-2 was in time for the Okinawa campaign. Known to be one of the fiercest battles in the Pacific War, Okinawa was "second to Guadalcanal" regarding difficulties for the medical units. In Okinawa, the medical team supported the combat units

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82 P. A. Surg. (R) Thomas S. Hershey, USPHS, Medical Problems in a Civilian Camp, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F3, RAC.

83 Guide to the Status of Central Pacific Islands, August 6, 1945, RG313 Entry No. P31 General Administrative Files, ca.1944-1951, Box 9 EG Pacific Islands-General (Confidential, 1945), NACP.

84 Translation: A Message from the President of the US to the People of Japan, Ross T. McIntire Papers, Box 6 Japan Memorabilia, FDR.

85 Thomas M. Rivers to Richard E. Shope, May 22, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

closely, sometimes even in caves, to stay within 500 yards of the battle-front.[86]

The military intelligence on Okinawa reported that the island was a "pest hole." Going into the "pest hole," NAMRU-2 had Commander Richard E. Shope lead ten officers and 20 enlisted men to form the Okinawa branch. The Okinawa branch went ashore on April 13, 1945 and set up laboratories near Nago. Just like in Guam, one of the officers, Lieutenant Commander E. L. Benjamin, conducted 200 autopsies on Okinawan civilians at the Civilian Hospital at Koza to investigate disease conditions the US troops would encounter.[87] The unit specifically tried to carry out "as many autopsies as possible on native infections" in Okinawa.[88] Similar to Guam, medical care for the Okinawan civilians was provided only "to the extent necessary to safeguard occupying troops from communicable diseases, to prevent chaos, and to meet minimum humanitarian standards" as a military government.[89]

In addition to civilian healthcare and autopsies, frontline activities involved a lot of animal research, just as the main unit did in Guam. A lot of the research focused on disease-vector animals. Officers not engaged in civilian work started activities with the Island Command of Okinawa on controlling mosquitoes and flies. The research found little malaria among the Okinawans and 4-6 new mosquito species. Instead, there was a considerable amount of filariasis. The unit collected birds, mammals, and ectoparasites on the islands and found no mites capable of transmitting scrub typhus and snails carrying schistosomiasis. An intestinal para-

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[86] From Don to Ross T. McIntire, June 5, 1945, Ross T. McIntire Papers, Box 6 Japan Memorabilia, FDR.

[87] Mildred R. Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 9-10.

[88] History of US Naval Medical Research Unit No. 2, December 31, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP, 55-56.

[89] Headquarters Tenth Army Office of the Commanding General APO 357, February 5, 1945, RG313 Entry No. P31 General Administration Files, ca. 1944-1951, Box 22 QA Army 1945, NACP.

site survey was done on "healthy civilians" and on the bodies subject to autopsies. Contrary to the initial expectation, Okinawa turned out to be relatively healthy. The Okinawa branch returned to Guam in July 1945.[90]

Reports from other islands indicate that the US authorities expected most Pacific Islands to be "pest holes." The Iwo Jima campaign reported a concern that local mites would transmit scrub typhus. However, several surveys showed otherwise: the mites in Iwo Jima could not transmit scrub typhus in Iwo Jima, the snails on Saipan and Tinian could not transmit schistosomiasis, and the mosquitoes on Rota were not malarial. Along with Okinawa, most of the northern Pacific Islands were not as medically threatening as expected. Still, NAMRU-2 continued research on various diseases in the main unit in Guam and another small branch in Leyte, Philippines, that was despatched in May 1945. Investigations include penicillin-resistant bacteria, influenza B outbreak, infectious hepatitis, outer ear infections, fungal diseases, dysentery, blood clotting, and various types of tropical skin conditions.[91]

There were still a couple of diseases that became problematic in Okinawa. One was the so-called "Okinawan fever" outbreak which happened during the Battle of Okinawa. Medical authorities initially feared that the "Okinawan fever" might be scrub typhus.[92] The fever was more threatening as all cases were infected in Okinawa by vaccinated personnel. Those who contracted the "Okinawan fever" returned to Guam for treatment, where NAMRU-2 quickly diagnosed the disease and rolled out medicine. Of the 24 cases, 21 turned out to be paratyphoid-A, and three were typhoid fever.[93] The fact that the northern Pacific region was seen as a "pest hole" and that the outbreak given the name "Okinawan fever" reflects the orientalizing perspectives of the military authorities, framing the Pacific Islands as reservoirs of disease. As Warwick Ander-

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[90] Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, 9-10.

[91] Lewis, A History of US Naval Medical Research Unit No. 2 Guam, Marianas Islands, 10-13.

[92] Shaw, "Biomedical Research Renders Its Mite to Naval Might," 6.

[93] Lewis, A History of US Naval Medical Research Unit No.2 Guam, Marianas Islands, 11.

son argued, the US colonial authorities actively cleansed the environment and bodies of their Oriental territories.[94]

The other disease, a bigger trouble to NAMRU-2, was the mosquito-borne Japanese B encephalitis.[95] An outbreak happened at the Okinawa military government hospital and nearby islands of Heanza and Hamahika after NAMRU-2's Okinawa branch returned to Guam. Between July and September 1945, there were 79 civilian cases in Okinawa, 35 civilian cases on Heanza and Hamahika, and 38 cases among the troops.[96] At the beginning of the outbreak in Heanza, the military government "immediately killed all domestic animals" and disinfected all houses with DDT at least twice each. The entire island was frequently doused in DDT by plane, and all potential mosquito breeding places were regularly oiled. This process was called the "clean up."[97] The occupying military took it imperative to "take all precautions for protection of troops against possible outbreak" of the disease.[98]

Controlling the disease necessitated studying and experimenting on its animal vectors. Consequently, NAMRU-2 staff visited Okinawa to collect live mosquitoes from Hentona, Okuma, Chizuka, Ogimi, and Shana Wan for research.[99] Back in Guam, the research on the disease's epi-

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94 Anderson, *Colonial Pathologies,* 1.

95 Letter to Sven Gard, August 9, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

96 Enclosure D, Evaluation of Mosquito Control Measures during Outbreak of Japanese B Encephalitis on Okinawa, October 8, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP.

97 Enclosure T, From A. B. Hardcastle to T. M. Rivers, Report of Activities from July 22 to August 5, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP.

98 Incoming Message, US Naval Communication Service CINCPAC and CINCPOA, Originator ISCOM Okinawa, Crypto Group 183-C, CBO DUNN, Grp. Ct. 193, Circ. No. PM 4454, July 17, 1945, RG313 Entry No. P31 General Administrative Files, ca. 1944-1951, Box 22 S37-Medicine (1944-1946, confidential) (1 of 2), NACP.

99 Enclosure F, R. M. Bohart, Report of Activities on Okinawa, August 19 to September 28, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP.

demiology required a lot of mice. As the amount NAMRU-2 required exceeded the capacity of the breeding stock they had, Rivers requested the George Williams Hooper Foundation at the University of California to send over about 2,000 mice.[100] The disease outbreak continued into 1946 when Rivers had to visit himself to investigate the situation.[101] The unit's research discovered that most Okinawan horses had sera antibodies as well as some goats, chickens, ducks, and crows on the island.[102] Afterwards, the NAMRU-2 team managed to transmit Japanese B encephalitis to mice through mosquito bites.[103] Although American colonial medicine during the Pacific War chiefly concerned safeguarding human lives, its practice invariably involved conducting studies on animals, insects, and their habitats.

Even in the postwar era, Okinawa and Guam remained strategically important bases for the US in the Pacific, located at a convenient reach from Northeast Asia. US troops continued to reside in Okinawa, functioning as a check to countries such as China and North Korea. The connection between Okinawa and Guam is represented by the recent relocation of US Marines stationed in Okinawa to Guam, which started on December 14, 2024.[104] Guam increasingly Americanized in the postwar years, with Nimitz advocating for Guamanians' citizenship in order to

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100 From Thomas M. Rivers to Karl F. Meyer, August 23, 1945, RU, Vice President, Thomas Milton Rivers, Series 2 FA 221 B3 F4, RAC.

101 From H. W. Smith to W. J. C. Agnew, October 2, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

102 Enclosure A, Lewis Thomas, John L. Peck, Horace L. Hodes, Progress Report on Antibodies for Japanese B Encephalitis Virus in Animals of Okinawa, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP.

103 Enclosure C, H. L. Hodes, H. S. Hurlbut, Experimental Transmission of Japanese B Encephalitis to Mice by Bite of Mosquitoes in Contact with Virus during Larval Stage of Their Life Cycle, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 History of NAMRU-2 Guam, NACP.

104 Emma Chanlett-Avery, Christopher T. Mann, Joshua A. Williams, "US Military Presence on Okinawa and Realignment to Guam (IF 10672)," *Congressional Research Service,* accessed April 9, 2019, https://www.marinecorpstimes.com/news/your-marine-corps/2024/12/16/us-marines-start-partial-transfer-from-okinawa-to-guam/

safeguard the Navy's interests.[105] It was indeed the Navy's attempt to strengthen the Naval base in Guam and to keep peace with the Guamanians after over half of the land was taken by the military for exclusive use.[106] The military still occupies 29% of the land in Guam and receives threats from North Korea and China as the "tip of the spear" of the US.[107] In addition to military interests, Guam also serves a crucial position in US capitalist strategy in Asia, as noted by Alfred Peredo Flores.[108] In this way, Guam continued to be at the center of US colonialism in the Pacific, and NAMRU-2, in the early years, served to consolidate US influences in the region by collecting colonial knowledge through medical research.

The Afterlife of NAMRU-2

After the Pacific War ended, NAMRU gradually evolved into an institution with an extended range of responsibilities around the world, moving beyond the Pacific. In September 1945, NAMRU-2 still had 432 staff in Guam and nineteen at overseas duties.[109] Unit members ultimately published about 140 papers in virology, microbiology, entomology, and pa-

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105 Anne Perez Hattori, "Teaching History through Service Learning at the University of Guam," *The Journal of Pacific History* 46, no. 2 (2011): 222; From Op 22 to Op 02, Island Government Matters Discussed at Recent Conference with Cincpac and Governor Guam, October 2, 1946, RG313 Entry No. P31 General Administrative Files, ca.1944-1951, Box10 EG54-1 Guam July 1, 1946 to December 1946, NACP.

106 Ross Dardani, "Popular Constitutionalism in the US Empire: The Legal History of US Citizenship in Guam," *Law & Social Inquiry* 49, no. 2 (2023): 1097-98.

107 Kevin K. W. Ho, "Guam," in *The Routledge Handbook of Comparative Territorial Autonomies,* edited by Brian C. H. Fong and Atsuko Ichijo (Routledge, 2022), 179; Elise Hu, "Trump's Rhetoric Renews Debate in Guam: Is Being 'Tip of the Spear' Worth It?" accessed September 27, 2024, https://www.npr.org/sections/parallels/2017/08/12/542998601/trumps-rhetoric-renews-debate-in-guam-is-being-tip-of-the-spear-worth-it.

108 Alfred Peredo Flores, *Tip of the Spear: Land, Labor, and US Settler Militarism in Guåhan, 1944-1962* (Cornell University Press, 2023), 2.

109 Report for Island Command War Diary for the Period from September 1, 1945 to October 1, 1945, RG52 Entry No. A1 1015 Research and Historical Files, 1941-1983 Box 228 NMRU-2 Guam War Diary, NACP.

thology through the research done while at NAMRU-2.[110] Following the achievements of NAMRU-2, the Navy expanded medical research in various forms. NAMRU-3 was established in Cairo, and NAMRU-4 was in Georgia, both in 1946.[111] NAMRU-2 did not remain the same. Guam's medical units were restructured after the war. The Island Command established a Medical Center as an umbrella institution that directed the Naval Hospital, which was in charge of service personnel and US citizens and the Public Health Administration, which managed Indigenous health.[112] NAMRU-2 changed into an integral part of the Naval Medical Center with a redesignated name of the US Naval Institute of Tropical Medicine and the School of Tropical Medicine. The new institute would extend the functions beyond research to include teaching.[113]

The Naval Medical Center served as a training ground for future Naval Medical Officers. Those graduating from the Naval Administration course at Stanford University were assigned to serve in the Pacific. A six-week course on tropical medicine was part of the training.[114] Officers then proceeded to their assigned commands in the US territories in the Pacific, including Yap, Ponape, Palau, Majuro, Kwajalein, Truk, Saipan, and American Samoa.[115] The first cohort started this training program in

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110 Rivers and Benison, *Tom Rivers*, 335.

111 Shaw, "Biomedical Research Renders Its Mite to Naval Might," 6-8.

112 From Planning Division to the Personnel Division, Chart, November 29, 1945, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

113 From the Chief of the Bureau of Medicine and Surgery to the Secretary of the Navy via the Chief of Naval Operations, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

114 From Robert V. Schultz to M. D. Willcuttes, June 25, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

115 Attachment: Graduates of the School of Naval Administration, Stanford University, California, From the Chief of Naval Operations to the Chief of Naval Personnel, August 1, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

October 1946.[116] The school's first group of instructors includes Sapero, who led NAMRU-2's malaria research, and Victor G. Heiser, who was from the International Health Board of the Rockefeller Foundation.[117] The opening of the school was, according to the Surgeon General, a showcase of the "general development in progress and of the large aims."[118] By the end of 1946, most officers retired from the military, and the Institute of Tropical Medicine significantly lacked staff to carry out research duties.[119]

The records indicate that NAMRU-2 was decommissioned in 1946. However, "the scientific impetus of NAMRU-2" carried on in the Navy, which continued to conduct tropical medicine research in the Pacific after 1946. The Navy cooperated with Johns Hopkins University to conduct a controlled study of filariasis among the American Samoan population. Civilian medical programs in Tinian continued with a leprosarium. USS Whidbey, a field laboratory ship, carried out medical surveys among the Pacific Islanders. The Epidemic Disease Control Unit continued operations through USS LSIL 1091 in the Korean War, which happened between 1950 and 1953.[120] Later, NAMRU-2 was recommissioned in 1955 in Taipei, moved to Manila in 1979, then to Jakarta in 1991, and is now operating in Singapore under the name of NAMRU INDO PACIFIC.[121]

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116 From Wilbur E. Kellum to Ross McIntire, October 4, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

117 From J. J. Sapero to the Chief, Personnel Division, August 29, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

118 From H. W. Smith to Thomas M. Rivers, August 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

119 From L. B. Marshall to M. D. Willcutts, December 10, 1946, RG52 Entry No. A1 1012 Correspondence of the Medical Corps Branch, Box 59 Naval District and Intercenters 1946 US Naval Medical Centers, Guam, 1946, NACP.

120 Shaw, "Biomedical Research Renders Its Mite to Naval Might," 6.

121 Navy Medicine, "Naval Medical Research Unit INDO PACIFIC," accessed September 27,

In his reflections on NAMRU-2, Rivers remarked that the unit was "quite a gamble" to the Navy, as it had no precedent of operating a research unit close to the frontlines. No one knew whether doctors and scientists could conduct scientific research under military conditions. Neither could anyone predict whether the results of such research would be useful enough to justify the unit's existence. According to Rivers, NAMRU-2's establishment ultimately depended on Nimitz's approval, who was deeply saddened about the immense loss of life at the Battle of Tarawa.[122] The lessons learnt from Tarawa led the Marines to make improvements in every aspect of amphibious warfare, especially those on gunfire support.[123] This paper demonstrates that this improvement also included medical support. The gamble on medical research on the frontline and Nimitz's empathy reflect the "medical consciousness" among the Navy commanders, using Mark Harrison's expression to describe how the close relationship between medical and combat units helped the Allies to develop an advantage over the Axis powers.[124] Similarly, this paper contends that the US Navy's "medical consciousness" helped the US to understand and respond to the tropical island environments through NAMRU-2.

Since its first overseas unit was established in Guam, NAMRU units have become "the largest overseas military medical research facility in the world." The NAMRU network has now become an important institution in supporting the public health infrastructure of developing countries, extending the diplomatic power of the US.[125] As the first of the overseas units, NAMRU-2 was central in institutionalizing the medical

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2024, https://www.med.navy.mil/Naval-Medical-Research-Command/R-D-Commands/Naval-Medical-Research-Unit-INDO-PACIFIC/.

122 Rivers and Benison, *Tom Rivers*, 334-35.

123 Jeter Allen Isely, Philip A. Crowl, *The U.S. Marines and Amphibious War: Its Theory and Its Practice in the Pacific* (Princeton University Press, 1951), 192.

124 Harrison, *Medicine and Victory*, 283.

125 May Meliegy, "Navy Labs Play Public Health Role," *Bulletin of the World Health Organization* 85, no. 3 (2007): 165-66.

research tradition of the US Navy. As discussed in this paper, NAMRU served the dual role of meeting military and civilian needs from its inception. Moreover, NAMRU-2 allowed biomedical scientists to practice tropical medicine, conduct animal research, and "colonize" Indigenous bodies during wartime.

The activities of NAMRU-2 were essentially a form of colonial medicine. It directly supported military operations, racialized indigenous peoples, and collected scientific knowledge to aid American expansionism in the Pacific. It is also worth noting that NAMRU-2 had roots in the Rockefeller Institute with the generous support of the Rockefeller Foundation, which was also an "imperialistic" institution.[126] The conduct of NAMRU-2 reveals how military medical research was a vital component in the machinery of colonial and military power. Since renamed the Naval Medical Research Unit INDO PACIFIC, this institution continues to serve American interests in the broader Pacific region.

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[126] E. Richard Brown, *Rockefeller Medicine Men: Medicine and Capitalism in America* (University of California Press, 1979).

BIBLIOGRAPHY

Anderson, Warwick. *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines*. Duke University Press, 2006.

Arnold, David. *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century India*. University of California Press, 1993.

Bennett, Judith A. *Natives and Exotics: World War II and Environment in the Southern Pacific*. University of Hawai'i, 2009.

Brown, E. Richard. *Rockefeller Medicine Men: Medicine and Capitalism in America*. University of California Press, 1979.

Dardani, Ross. "Popular Constitutionalism in the US Empire: The Legal History of US Citizenship in Guam." *Law & Social Inquiry* 49, no. 2 (2023): 1082-1106.

Deriso, Cdr. Dominic J., Robert de Gast. "The Naval Medical Research Institute (Pictorial)," https://www.usni.org/magazines/proceedings/1965/june/naval-medical-research-institute-pictorial.

Ear, Sophal. "Towards Effective Emerging Infectious Disease Surveillance: Cambodia, Indonesia, and NAMRU-2." SSRN (2011), https://ssrn.com/abstract=1984963 or http://dx.doi.org/10.2139/ssrn.1984963.

Flores, Alfred Peredo. *Tip of the Spear: Land, Labor, and US Settler Militarism in Guåhan, 1944-1962*. Cornell University Press, 2023.

Friedman, Ham M. *Creating an American Lake: United States Imperialism and Strategic Security in the Pacific Basin, 1945-1947.* Greenwood Press, 2000.

Gibbs, Martin, Brad Duncan, Lawrence Kiko, Stephen Manebosa. "World War II in the Solomon Islands: Conflict and Aftermath." In *Multivocal Archaeologies of the Pacific War, 1941-45,* edited by Ben Raffield, Yu Hirasawa, Neil Price. Routledge, 2023.

Goldman, David E., ed. *The Naval Medical Research Institute, 1942-1962.* Naval Medical Research Institute, 1966.

Harrison, Mark. *Medicine and Victory: British Military Medicine in the Second World War*. Oxford University Press, 2004.

Hattori, Anne Perez. *Colonial Dis-Ease: US Navy Health Policies and the Chamorros of Guam, 1898-1941*. University of Hawai'i Press, 2004.

———. “Teaching History through Service Learning at the University of Guam.” *The Journal of Pacific History* 46, no. 2 (2011): 221-27.

———. “The Cry of the Little People of Guam: American Colonialism, Medical Philanthropy, and the Susana Hospital for Chamorro Women, 1898-1941.” *Health and History* 8, no. 1 (2006): 4-26.

Ho, Kevin K. W. “Guam.” In *The Routledge Handbook of Comparative Territorial Autonomies*, edited by Brian C. H. Fong and Atsuko Ichijo. Routledge, 2022.

Hopkins, A. G. *American Empire: A Global History*. Princeton University Press, 2018.

Isely, Jeter Allen, Philip A. Crowl. *The U.S. Marines and Amphibious War: Its Theory and Its Practice in the Pacific.* Princeton University Press, 1951.

Kirk, John. *Winthrop Rockefeller: From New Yorker to Arkansawyer, 1912-1956*. University of Arkansas Press, 2022.

Kwai, Annie. *Solomon Islanders in World War II: An Indigenous Perspective*. ANU Press, 2017.

Lee, Meng-Chih 李孟智. “Meiguo haijun di’er yanjiusuo yu Taiwan gonggong weisheng” 美國海軍第二研究所與台灣公共衛生. *Taiwan weizhi* 台灣衛誌 32, no. 1 (2013): 1-5.

Moore, Clive. *Tulagi: Pacific Outpost of British Empire.* ANU Press, 2019.

Oshinsky, David M. *Polio: An American Story.* Oxford University Press, 2005.

Rivers, Thomas M., Saul Benison. *Tom Rivers: Reflections on a Life in Medicine and Science, An Oral History Memoir*. MIT Press, 1967.

Rutherford, Phillip T. “On Arms and Eggs: GI Egg Mania on the Battlefields of World War II.” *Food and Foodways* 25, no. 2 (2017): 123-41.

Shaw, C. C. “Biomedical Research Renders Its Mite to Naval Might.” *Military Surgeon* 111, no.1 (1952): 1-14.

Slater, Leo B. “Malaria Chemotherapy and the ‘Kaleidoscopic’ Organisation of Biomedical Research during World War II.” *Ambix* 51, no. 2 (2004): 107-34.

Smith III, Frank L. “Advancing Science Diplomacy: Indonesia and the US Naval Medical Research Unit.” *Social Studies of Science* 44, no. 6 (2014): 825-47.

United States Army Medical Research and Material Command. *USAMRMC: 50*

Years of Dedication to the Warfighter, 1958-2008. Online Source, 2008, https://mrdc.health.mil/assets/docs/about/USAMRMC_history.pdf.

United States Navy. *Solomon Islands Campaign I: The Landing in the Solomons, 7-8 August 1942.* Publications Branch Office of Naval Intelligence, United States Navy, 1943 (published online 2017), https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/solomon-islands-campaign-i-the-landing-in-the-solomons.html.

Wilson, Sandra, Michael Sturma, Subrahmanyan Arjun, Dean Aszkielowicz, J. Charles Schencking. *The U.S. and the War in the Pacific, 1941-45.* Routledge, 2022.

Wolfert, Ira, W. Richardson. *The Epic of Tarawa*. Odhams Press, 1945.