

Dengue Fever, the Rockefeller Foundation, and Southeast Asia

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Introduction

This research project explores the history of dengue fever in the late nineteenth and early twentieth centuries, exploring how dengue was understood in a number of colonial societies across East and Southeast Asia. The RAC holds few files *directly* concerned with dengue fever, but as with other archives, much can be gleaned from reading the rich source material on disease, public health, and colonial governance 'against the grain.'¹ The materials at the RAC – in particular those pertaining to the International Health Division (IHD)² – provide a fresh perspective on dengue, infectious disease, and public health in Asia, and allow for a far more nuanced understanding of the medical environment.

As an ostensibly 'background disease,' dengue fever tends to attract less attention than various other infectious diseases, prompting the question of what variables and mechanisms determine a given disease's 'visibility.' This question, central to my doctoral thesis, had thus far mostly been considered from medico-scientific and governmental perspectives. The materials consulted at the RAC add to this body of sources, underscoring the role of philanthropy and private institutions in the shaping of health structures, the construction of disease 'hierarchies,' and the setting of priorities in clinical research. In this short paper, I consider the presence and absence of dengue in the documents of the Rockefeller Foundation, in part disentangling the disease from the sources that address an agglomeration of 'tropical fevers' and 'malaria.'³ My geographical focus is on two regions in Asia where the IHD was particularly active: the Philippines (under US occupation) and the Dutch East Indies (most public health work there concentrating on the island of Java).

Disease Visibility?

In 1916, Dr. Samuel T. Darling submitted a report on ankylostomiasis, or hookworm, disease and malaria on the island Java in the Dutch East Indies to Dr. Wickliffe Rose and Dr. Victor Heiser, respectively the first Director of the IHD and Director of the East of the IHD. Exploring the possibilities for – and efficacy of – future public health programmes, Darling briefly surveyed the current organisation and activities of the

Geneeskundige Dienst of the Dutch colonial government. On the prevailing health priorities he reported:

Very wisely the diseases regarded as of greatest importance, the spectacular ones, like cholera, small pox [sic] and plague receive much attention. ...Diseases that are not so spectacular such as malaria and ankylostomiasis received little attention.⁴

Given the prevalence of malaria throughout the region, including the Dutch East Indies, and the high mortality rates that resulted from infection, Darling's suggestion that the disease was 'not so spectacular' is perplexing, as is his association of malaria with hookworm disease, a widespread and debilitating disease, but one far removed from malaria in terms of mortality. Despite its endemic presence, Dutch officials did not prioritise malaria but rather they concentrated on the prevention and management of epidemic diseases such as bubonic plague, cholera, and other so-called 'spectacular' diseases. But if the principal "tropical" fever malaria was not considered 'spectacular,' where did that leave dengue fever – a disease itself utterly overshadowed by malaria?

Why do certain diseases attract more attention than others? Why, for example, is there widespread recognition of Ebola, HIV/AIDS, and malaria – while far fewer people are familiar with, say, river blindness or trypanosomiasis? Why are some diseases and not others the object of intense government intervention, eradication efforts, and worthy of generous amounts of research funding – if not dedicated scientific organisations? Why has a library's worth of scholarship been produced on the histories of bubonic plague, cholera, measles, malaria, smallpox, and influenza, but conversely little on beriberi, Rift Valley fever, and pink eye? In other words: why are some diseases so much more *visible* than others? The relative obscurity of dengue fever in colonial and medical archives raises the question of what processes and mechanisms determine the visibility of a given disease.

Mortality, morbidity, symptomatology, socio-cultural associations, and a disease's comparative endemicity may all function to make it more or less prominent on our collective radar. Conversely, however, they can also inhibit this visibility. Low mortality figures decrease a disease's position in the hierarchy, whereas significant morbidity and associated economic loss might increase it. As the historian David Arnold recently suggested, bubonic plague in British India introduced in 1896 sparked 'panic' and intrusive public health legislation throughout the subcontinent while its ultimate mortality was lower and drawn out over a longer period of time than that of the influenza pandemic of 1918/1919 which did not spark such a response. To borrow Myron Echenberg's expression: why was influenza 'the dog that didn't bark'?⁵ Dengue epidemics, in many localities, only became a concern when such significant portions of the population were affected that it hampered productivity and trade, or undermined military operations. Other conditions were freighted with specific cultural resonances – for example, leprosy and HIV/AIDS – prompting fears of moral degeneration (among other associations). Other diseases became an object of attention through the intervention of activists, lobbyists, and philanthropists.

The diseases that Darling considered not particularly spectacular, interestingly, were central to the public health work of the IHD. Economic and sustainable health interventions were key to the health activities of the Foundation's international programme. Through the demonstration of simple techniques of public health and personal hygiene – small interventions aimed at dispelling some of the most

widespread and endemic diseases – the IHD sought to contribute in a meaningful way to the health of populations overseas.

In part through the Rockefeller Foundation's activities, malaria *had* become an object of attention of the reformed *Dienst Volksgezondheid* of the Dutch East Indies – and in no small part through the work of the IHD's representative, Dr. John Lee Hydrick, in the intervening years. His demonstrations resulted in the foundation of a *Afdeeling Medische Propaganda* and a youth organisation, the *Gezondheids Brigades*. In one of the pamphlets issued by this organisation, malaria was introduced to a young audience:

We have all on occasion heard of Malaria, and we know more or less what is meant by it. Indeed, when one of our housemates or a servant has “fever,” we immediately say “Oh, he must have malaria” and we give him some quinine pills to take. However, not every fever is malaria. Still, malaria is a disease that is widespread, perhaps so widespread she might be considered a public disease. Perhaps even the most important public disease.⁶

Everyone living in the tropical colonies of The Netherlands was probably familiar with this fever, and its prevalence throughout the Southeast Asian archipelago made it, perhaps, ‘the most important public disease.’ Nevertheless, the casual ‘Oh, he must have malaria’ did not suggest the disease was of particular urgency. Nor was malaria presented as particularly lethal; a few quinine pills would do the trick. Strikingly, only two sentences into the article, the author warned that ‘not every fever is malaria.’ Without further elaborating on this point, however, one is left to wonder what other “fevers” the author had in mind. Despite its prevalence, malaria was not alone – so what other conditions were overshadowed by this ‘most important’ malaria? What was left unsaid?

It might be important to consider the question of whether malaria *Anopheles*-control had a ‘spill-over’ effect on the dengue vector, *Aedes*. Traditionally occupying different environs, Rockefeller reports by Hydrick as well other files routinely discussed ‘mosquito control’ in the most generic sense: often without any reference to malaria at all.

In the decades after World War II, the Rockefeller Foundation occasionally supported dengue fever research in various locales, including Indonesia. In a grant application of 1984 by David Morens, the history of dengue formed a brief part of the rationale for a clinical study. He stressed,

In Indonesia, febrile illness reported to be dengue was described as early as 1779. In modern times dengue has been documented in Indonesia since 1930 when, in the course of dengue transmission experiments Snijders et al reported that on Sumatra dengue had been considered endemic for an indeterminate period of time.⁷

This less than comprehensive account is in fact illustrative for brief histories of the disease in medico-scientific literature. The transmission experiments referred to, however, are an interesting addendum: the Dutch professor Emilius Paulus Snijders sought to transport dengue-infected mosquitoes to The Netherlands in order to conduct experiments on the disease and its transmission in a controlled, non-endemic, setting.

The IHD was aware of these experiments, as becomes apparent in the correspondence between Dr. Wilbur Sawyer – the head of the IHD’s laboratory service and later director of the IHD⁸ – and Dr. W. Schueffner, who was attached to Snijder’s workgroup at the Colonial Institute in Amsterdam. In July 1933, the latter informed Sawyer apropos their research:

‘First of all, the investigation in overlapping immunity between Dengue and yellow fever. Prof. Snyder [sic] had the opportunity to infect over sixty volunteers – students – with Dengue from Java and Sumatra. Twenty of them, some three till five times reinfected, (to strengthen the problematic immunity) from these reobtained the serum and could carry out the protection test with white mice. None of these sera showed any protective power, all the simultaneously vaccinated mice died!’⁹

Schueffner’s report of the research being done – on yellow fever and dengue cross-immunisation – was somewhat cryptic, but he concluded that the research suggested that no cross-immunisation between the two diseases occurred. The question of cross-immunisation had been debated since the discovery that dengue and yellow fever were transmitted by the same mosquitoes. There was a pressing question of why yellow fever had not made its way into Asia, where the same vector was present but instead spread dengue fever.

Dengue was not a medical priority in the Dutch East Indies, but RAC materials indicate its presence there. Brief sketches and outlines, unexplored comparisons drawn between this and that disease, and incomplete research are the norm: dengue fever circulated and was not ignored, but simply neglected in favour of more pressing health concerns. Another region in Southeast Asia where the Rockefeller Foundation was active, and where dengue was considerably more of a priority, was the neighbouring Philippine Islands.

Dengue in the Philippines

In the aftermath of the Spanish-American War, the United States suddenly came to possess an Asian colony. American troops, arriving in 1898, gradually took possession of the formerly Spanish Philippines, losing a considerable number of soldiers to new and unfamiliar diseases along the way. Health, hygiene, and sanitation, were intrinsic to the ‘civilising mission’ Americans took upon themselves in their new colony – as has been explored in depth by the historian Warwick Anderson in *Colonial Pathologies*. Albeit one of the less lethal diseases encountered, US troops were encumbered by dengue fever – causing a ‘small constant non-effective rate’ amongst the soldiers.¹⁰ In 1903, 171.4 cases per 1000 white soldiers were noted.¹¹ While the incidence of various infectious disease was drastically lowered over subsequent decades, dengue fever remained particularly prevalent, consequently becoming a topic of interest to medical scientists in the region.

In 1906, the US Army Board for the Study of Tropical Diseases assigned two of its members, Percy Ashburn and Charles Craig (both military physicians), to study an epidemic of dengue fever that affected over 800 military personnel at Fort William McKinley, just outside Manila. The pair of scientists made considerable progress in confirming various suspicions about dengue, most notably its ‘ultramicroscopic’ (viral) and mosquito-borne nature. Despite Ashburn and Craig providing the rationale for effective dengue-control efforts through mosquito-control, the Philippine health authorities did little with this newly acquired knowledge, despite the acknowledgment

that is was rampant in Manila. In one of the few historical overviews of dengue, ‘Dengue and US Military Operations from the Spanish-American War through Today’, the authors held that during ‘1902-1924, hospitalizations for dengue averaged 101 per 1,000 persons per year (range 12-213/1000/year), and the average hospitalization lasted 7 days’, and approximately ‘40% of newly arrived troops acquired dengue within 1 year.’

Notwithstanding its prevalence, dengue is only sporadically discussed in the files of the IHD. At the same time, the disease is not conspicuous in the papers of Victor Heiser, who was Director of Health in the Philippines between 1905 and 1915 before becoming Director of the East for the IHD. By 1928, as dengue incidence showed no improvement since the beginning of American occupation, the Bureau of Science appointed three physicians, again attached to the military, James Simmons, Joe St. John, and Francois Reynolds, to conduct a study of the disease. By then, nearly 200 out of every 1000 white soldiers in the Philippines contracted dengue fever every year – yet the very opening sentence of their 1931 report made it clear that dengue remained of secondary importance:

During the past thirty years the Medical Department of the United States Army has been actively interested not only in dengue but also in the similarly transmitted and more formidable disease, yellow fever.

Both diseases came to the military’s attention with the acquisition of Cuba and the Philippines; yellow fever for its ‘appalling mortality’ and dengue fever for its ‘extremely high morbidity rates.’ Later, the fact that both diseases were caused by the same vector also played a role: dengue’s prevalence in the Philippines augmented prevailing fears about the introduction of yellow fever in Asia following the opening of the Panama Canal – lingering suspicions that there might be some form of cross-immunisation between the two diseases also concerned scientists.

Simmons, St. John, and Reynolds began their account of dengue’s aetiology in the Philippines:

Although dengue has existed in the Philippine Islands for many years, there is no reliable information concerning the incidence of the disease or its spread among the native and white civilian inhabitants.¹²

For the military, however, detailed reports and statistics had been kept on the incidence of dengue, including its native personnel:

Since the first American troops arrived in the Philippines, dengue, because of its high morbidity and the resultant loss of time from hospitalization, has been a source of considerable economic loss to the Army.¹³

Economic loss, as I argue in my thesis, was a principal driver of dengue’s visibility, albeit usually temporary. The authors went on to assert that dengue incidence did not show any improvement, where other infectious diseases had been scaled back considerably over the last decades (see Figure 1).

That tropical ‘fevers’ continued to be misdiagnosed and misunderstood – as in the Dutch East Indies – was emphasised as late as 1934 in a report to the IHD by Paul Russell ‘one of the division’s leading experts on malaria.’¹⁴ Russell recounted how ‘[t]oward the end of 1933 reports began to drift in to my office that Davao was having

an epidemic of malaria.’ On closer examination of the blood smears of those affected, however, no malaria parasites were detected:

There have been in Davao the past two months numerous cases of minor respiratory fevers, perhaps some dengue, a few digestive disturbances and possibly other conditions causing headache and a rise in temperature with concomitant joint and muscle pains and occasional chilly sensations. ... It is barely possible that there has been an epidemic of an obscure 3-day fever, not dengue but of a similar nature. However, I believe it has most certainly not been malaria[.]¹⁵

Figure 1: Dengue in American Soldiers, Philippine Islands, 1902 – 1928.

Source: James Stevens Simmons, Joe H. St. John, and Francois H. K. Reynolds, *Experimental Studies of Dengue* (Manila: Bureau of Printing, 1931), 6, Rockefeller Archive Center, RF, Nelson C. Davis Papers, S3.3, B23, F210.

Russell concluded that malaria diagnoses had been made based on erroneous assumptions (specifically, deriving from blood platelet counts) by the local hospital technician. While he was unsure about what the epidemic had originally been, he felt it had not been dengue – although sporadic cases of that disease had also occurred in recent months. Echoing the Dutch warning that ‘not all fever is malaria,’ Russell’s report stressed the importance of proper diagnosis.

Little appears to have been done with the conclusions drawn by Simmons and his fellow researchers after 1931, and with the exception of scientific discourse dengue only occurs sporadically in the files held at the RAC. During World War II, however, dengue came back onto the radar of the military – ranking as the second-most important infectious disease in the Pacific theatre.¹⁶ Promoted to Brigadier-General, Simmons advised a Senate sub-committee in 1944 on wartime health and education, as well as disease prevention and epidemic control research. Confidently, he asserted that ‘[d]engue and sandfly fever have been annoying in certain regions,

but both can be controlled with our new insecticides and repellents.’ Probably referring to recent successes with DDT in malaria control, Simmons maintained that ‘great progress has been made since 1940 in our control of the insect-borne disease.’¹⁷

During the war, the Rockefeller Foundation supported research on dengue fever and other viral diseases. Serving in the US Army Medical Corps for the duration of the war, Dr. Albert Sabin – famous for developing an oral polio vaccine later on in his career – worked at the Rockefeller Institute at Princeton, together with other researchers such as Dr. Walter Schlesinger (who continued dengue research after the War). Their project focused on dengue fever and sandfly fever vaccine research.¹⁸

For their Japanese opponents, too, dengue was an object of military interest, as outbreaks were common in Taiwan from 1895 when they gained control of the island. Later dengue was to hinder Japanese military operations in Southeast Asia during the Second World War. Wartime research on dengue was prolific on both sides, and there was direct competition between American and Japanese researchers. Dr. Susuma Hotta managed for the first time to isolate a strain of dengue virus in suckling mice (after such experiments had repeatedly failed in other laboratory animals). Americans were aware of Japanese advances in dengue research, as was evidenced by a ‘confidential enemy translation’ of a research report by Captain Yutaka Nagaoka on preventive inoculation of dengue fever, which he based on observations and research of dengue in the Philippines over 1942.¹⁹ After the war, Sabin and his colleagues took over Japanese research, ferrying samples and papers across the Pacific, and ultimately collaborating with Japanese researchers.²⁰

Conclusion

Victor Heiser, a prominent figure in the medical history of the Philippines, reflected in his autobiography on both government and Rockefeller attempts to improve the health of the archipelago. In his chapter ‘Washing up the Orient,’ he remarked how certain activities were steered by public perceptions of health problems and what constituted ‘dirt,’ rather than by informed medical opinion. In Manila:

The citizens were being bitten continually by mosquitoes, and hence mosquitoes became, in their eyes, the paramount health problem. In reality the mosquitoes of Manila, though enormous in numbers, were negligible from a health point of view because they did not transmit any important disease there.

Dengue fever, rampant in the capital as Heiser would have known, was, then, not ‘any important disease.’ Indeed, he continued to insist that time devoted to mosquito control was time ill spent:

Water and soil pollution are the root causes of mortality in the tropics. We would have saved more lives in the end if we could have worked on these alone and disregarded the things which were merely irritations and not major public health hazards.

His insistence that mosquito control did not greatly contribute to the health of the city is poignant. Reluctant attempts to control mosquitoes did little to curb the presence of dengue, but preventing the introduction of other mosquito-borne diseases should have been a concern to him in his function as Director of Health. First of all, there was the ever-present threat of malaria in the region, furthermore there was widespread concern among contemporaries that yellow fever might be introduced into Asia with

the opening of the Panama Canal in 1914.²¹ As such, it is noteworthy that Heiser attached such little value to mosquito control in Manila.

Dengue fever was, ostensibly, not on Heiser's radar, nor did other health officials in the Philippines consider it a health priority during the early twentieth century. Likewise, in the Dutch East Indies dengue seldom made headlines. Dengue's position, in the shadow of various other 'tropical' diseases, is not necessarily surprising, but it is striking how it was a disease that became particularly visible in military circles – most major research projects were conducted in the Philippines under the auspices of army medical officers. Meanwhile, in the Dutch East Indies, dengue's potential to disrupt civil and military operations and economy had been noted as early as 1879, in a doctoral thesis by Gerrit Karssen – again, an 'Officer of Health' attached to the Dutch navy.²²

One important mechanism in 'making dengue visible,' which also shines through in the collections of the RAC then, was military disruption. IHD officers often collaborated closely with military health officials – as in both regions discussed here. As was noted by Gibbons et al., dengue would become 'second only to malaria as a tropical disease of military importance,' owing to how the disease 'profoundly affected operations because of the weakness and fatigue that persisted for weeks after the acute phase.'²³ The paradox at the RAC, as in medical and colonial collections elsewhere, is that the files available confirm that dengue was indeed a serious concern in the Philippines and the Southeast Asia region, while at the same time the disease remains obscure within these sources.

The history of dengue fever sheds much light on the development of the discipline of tropical medicine, and provides crucial insights into the practice of Western medicine in colonial Asia. At the same time, the mechanisms which make this and other diseases 'visible' can be explored in greater depth, and at the same time the historical 'construction' or 'framing' of this still obscure disease – often as a painful but benign 'fever' – allows for an analysis of how disease identities have been constituted. The materials consulted at the Rockefeller Archive Center add considerably to all these themes discussed in my thesis *Dengue Fever in Modern Asia*, and I would like to express my sincere gratitude for the support I received from The Rockefeller Foundation and the Rockefeller Archive Center in making this research visit possible.

¹ This phrase is borrowed from Ann Laura Stoler's study: *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton: Princeton University Press, 2009).

² This branch of the Rockefeller Foundation changed names several times, founded as the International Health Commission (1913), continuing as the International Health Board (1916), and finally operating as the International Health Division (1927). The acronym IHD is adopted throughout this paper for the sake of clarity.

³ I explore the issue of how 'fever' has become equated with malaria in some more depth in a forthcoming article in the *Journal of the Royal Asiatic Society Hong Kong Branch*, "Fever City: Dengue in Colonial Hong Kong". This article seeks to disentangle the history of dengue fever from medical histories of Hong Kong where such comparisons are drawn too readily.

⁴ S. T. Darling, "Report on Hookworm Infection Survey of Java", New York: International Health Board, 1918: Rockefeller Foundation (RF), Record Group (RG) 5, Series (S) 2.652, Box (B) 57, Folder (F) 364.

⁵ Myron Echenberg, "The Dog That Didn't Bark: Memory and the 1918 Influenza Epidemic in Senegal", in: David Killingray and Howard Phillipps eds, *The Spanish Flu Pandemic of 1918-19: New Perspectives* (London: Routledge, 2003), 230-238.

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- ⁶ “Jets over Malaria”, *Gazette van de Gezondheids Brigade*, July 1931: RF, RG5, S3.66L, B229, F2835.
- ⁷ David M. Morens, “Support of Prospective Cohort Studies of Dengue in Populations of Indonesian Children”, 1984: RF, RG1.14, S200.A, Br2403.
- ⁸ Angela Matysiak, *Health & Well-Being: Science, Medical Education, and Public Health* (New York: The Rockefeller Foundation, 2014), 118.
- ⁹ Schueffner to Sawyer, 24 July 1933, emphasis removed: RF, RG2, S02.1933/655, B90, F718
- ¹⁰ R. V. Gibbons et al., “Dengue and US Military Operations from the Spanish-American War through Today”, *Emerging Infectious Diseases* 18, no. 4 (2012): 623 – 630, 624.
- ¹¹ Vincent J. Cirillo, *Bullets and Bacilli: The Spanish-American War and Military Medicine* (New Brunswick: Rutgers University Press, 2004), 120-121.
- ¹² James Stevens Simmons, Joe H. St.John, and Francois H. K. Reynolds, “Experimental Studies of Dengue”, Manila: Bureau of Printing, 1931, 4: RF, Nelson C. Davis Papers, S3.3, B23, F210.
- ¹³ *Ibid.* 4; indeed, I explore dengue’s economic impact in my thesis as one of the principal drivers behind its visibility.
- ¹⁴ John Farley, *To cast out disease: a history of the International Health Division of the Rockefeller Foundation (1913 – 1951)* (Oxford: Oxford University Press, 2004), 17.
- ¹⁵ Paul F. Russell, “IHD, Philippine Islands, Malaria, Report first quarter 1934”, Manila: Bureau of Science, 1934: RF, RG5.3, S242I, B72, F881.
- ¹⁶ Gibbons, “Dengue and US Military Operations”, 625.
- ¹⁷ James S. Simmons, “Statement by Brig. General James S. Simmons . . . For Presentation on 14 December 1944, before the Senate Sub-Committee on Wartime Health and Education”, 1944, 8-9: RF, RG1.1, S200, B61, F732.
- ¹⁸ See the correspondence contained in “Dengue and Yellow Fever Studies (Interference Studies), 1944-1945”: RF RG5 S4 B9 F92.
- ¹⁹ Yutaka Nagaoka, “Dengue Fever Preventive Inoculation”, 1945: The National Archives (Kew), WO 208/2621.
- ²⁰ Goro Kuno, “Research on dengue and dengue-like illness in East Asia and the Western Pacific during the First Half of the 20th Century”, *Reviews in Medical Virology* 17 (2007): 327 – 241, 332 – 333.
- ²¹ That the Rockefeller Foundation shared this concern is demonstrated in, for instance, a report following a conference between Wickliffe Rose, William Gorgas, and others, in May 1916: RF, RG4, S1.1, B8, F93.
- ²² Gerrit Karssen (1879). *Denguis of Knokkelkoorts*. Doctoral thesis, Hoogeschool te Amsterdam. Amsterdam: Scheltema & Holkema, 1879.
- ²³ Gibbons, “Dengue and US Military Operations”, 625.