

MONSOONS, MOSQUITOES AND MALARIA: ALFRED RUSSEL WALLACE IN THE MALAY ARCHIPELAGO

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Abstract

Alfred Russel Wallace, although much less celebrated than Darwin, is the co-founder of the theory of evolution based on natural selection. It was during his expedition to the Malay Archipelago (1854-1862) that Wallace began to theorize that the survival of a particular species may be attributed to both its strength and robustness. We explore in this paper Wallace's experience in this region and his own importance in the realm of scientific discovery. The first section of this paper describes Wallace's expedition to the Malay Archipelago, focusing on his first encounter with the harsh monsoon climate, the mosquitoes, and the local diseases, particularly malaria. This section examines Wallace's personal experience with malaria, along with its remedy quinine, and the historical and geographical perspectives of such in the mid-19th century Malay Archipelago. Additionally, a medical analysis of symptoms as described by Wallace in his diary will be interpreted with an attempt to understand how Wallace "self-diagnosed" and "self-treated" the many diseases he encountered during his expeditions in the field. The second section discusses Wallace's favourable evaluation of the tropics as a location for the settlement of 'white' men at the peak of colonialist expansion. This section examines his advocacy of potential settlement in the Malay Archipelago through Wallace's 'journalistic' activities. Therein, Wallace attempted to alleviate prevailing fears of establishing a colonial presence in this region by explaining his own afflictions through the 'miasma' theory. We conclude by evaluating the sincerity of Wallace's advocacy of colonial settlement in the Malay Archipelago.

Keywords: Wallace, Malaria, History of Medicine, Malay Archipelago, Colonialism

Introduction

This paper has two purposes; the first is to use Wallace's biography, especially the sections reflecting his health condition during his expedition to the Malay Archipelago and to illuminate the history of malaria in this region during the mid-19th century. The second purpose is to assess the central role of health issues as an argument to support British colonial expansion in the tropics. This is accomplished by analysing Wallace's testimony on the value of these regions in providing a healthy and prosperous life for colonial settlers in the Malay Archipelago.

Forty seven years after his expedition to the Rio Negro and the Amazon and thirty six years after his return from the Malay Archipelago, Wallace produced two successive essays to explain the causes of tropical diseases, including malaria, while at the same time attempting to disprove the popular myth of white men's inability to live and work in the tropics (Wallace, 1898, p. 3). When he arrived in Singapore in 1854, the 31 year old Wallace had already experienced four years of living in the Amazon, had survived ten days in an open boat following a shipwreck in the Atlantic Ocean, and suffered numerous exposures to malaria (Wallace, 1889, p. 274-275). This brief review of Wallace's adventurous life affirms his excellent and robust health during his defining years as a great naturalist and co-founder, along with the more celebrated Charles Darwin, of the theory of evolution based on natural selection (Darwin, 1859).

The period between Wallace's return to England in 1862 and the publication of his two papers advocating the emigration of Europeans to the tropics in 1898 and 1899, constituted a turning-point in the history of malaria. It was a period of unprecedented scientific discovery that revolutionized medical thought regarding the cause and the modes of transmission of the disease. In 1880, the French doctor Alphonse Laveran discovered plasmodium in human blood. In 1898, the British doctor Ronald Ross demonstrated the role of the *anopheline* mosquito in the transmission of plasmodium from bird to bird, and was shortly thereafter awarded the Nobel Prize for Physiology or Medicine in 1902. A year later, the Italian doctor Giovanni Grassi and his team confirmed the transmission of Plasmodium from human to human via mosquitoes (Packard, 2007, p. 115). Coincidentally, Wallace wrote his two articles about diseases in the tropics during the same years (1898-99) when fundamental facts about the cause and transmission of malaria were discovered.

Wallace, Monsoon, Mosquitoes and Malaria

Historical evidence has shown that the influence of climate and monsoons on malaria epidemics is extremely complex. Rainfall leads to the formation of ground pools turn into breeding sites for mosquitoes, therefore promoting the transmission of malaria. Nonetheless, drought may also contribute to the

transmission of malaria as it causes naturally flowing water to stagnate (Reiter, 2001). Indeed, this theory was not yet established in the mid-19th century. Wallace observed he had “lived for months together in or close to tropical swamps, both in the Amazon valley, in Borneo and in the Moluccas, without a day's illness; but when living in open cultivated marshy districts I almost invariably had malarial fever, tho I believed the worst types of these fevers are due to unwholesome food” (Wallace, 1899, p. 667). This astute and empirical observation turned out to be correct as confirmed through modern scientific theories. Indeed, the introduction of plantation agriculture in the tropics had led to the alteration of land use via ecological transformation which, in turn, promoted the transmission of malaria (Packard, 2007, p. 88).

From his correspondences and book, we know that Wallace suffered several episodes of malaria. One of these legendary malarial crises took place in Ternate (Wallace, 1905, p. 361-363), the city from which Wallace sent his seminal paper on the theory of evolution to Darwin. Although malaria had been recognised since antiquity, its diagnosis prior to the mid-19th century was purely clinical (Bynum & Porter, 1993). Therefore, each of these fevers may have also been caused by gastro-enteritis or another type of infection, as until the mid-19th century doctors could not always distinguish malaria from typhus or yellow fever (Cohen, 1983).

In his correspondences, Wallace described various dwellings he used during and between his expeditions. When he first arrived in the region, he stayed in a colonial house owned by a Jesuit father in Bukit Timah (on the island of Singapore), which at this time was part of the Straits Settlements. Therein, he may have been provided with quinine. Wallace's books and correspondences confirm that he used quinine, also known as *Jesuit's powder*, to treat his own malaria crises as well as his servants' fevers during the entire duration of his exploration of the Malay Archipelago (Wallace, 1869/2008, p. 163). During his visit to Malacca, Wallace and his two Portuguese servants were afflicted by fever. In his letter from Singapore, dated 26 September 1854, Wallace wrote, “After a fortnight's residence one of my Portuguese servants was seized with fever, and I was obliged to return with him to Malacca, where the other was also taken ill, and then I caught the fever. I recovered by a liberal use of quinine” (Wallace, 26 September 1854). On his journey through the different islands of the archipelago he stayed in colonial bungalows, longhouses and sometimes in rudimentary huts. Indeed, over a span of eight years living in the Malay Archipelago, Wallace suffered from many other diseases, namely fevers (then still considered as a full disease and not a clinical symptom), diarrhoea (most likely waterborne), leg inflammations and ulcers from insects bites (i.e. mosquitoes and sand-flies), boils, wounds and sores of the feet, and incapacitating Achilles' tendinitis (Wallace, 1869/2008, p. 230). In February 1858, during his stay in Ternate, Wallace and all his men were grounded due to

either malaria or dysentery (Ibid., 351): "I was suffering from a sharp attack of intermittent fever, and everyday during the cold and succeeding hot fits had to lie down for several hours, during which time I have nothing to do but to think over any subjects then particularly interesting me" (Wallace, 1905, p. 361). It is during this "fateful malaria crisis" that Wallace thought of Malthus and his "Principles of Population," leading to the fundamental question that gave rise to the theory of evolution through natural selection. Wallace inquired, "Why do some (animals) die and some live? And the answer was clearly, that on the whole the best fitted live" (Wallace, 1905, p. 362). The Malay Archipelago is thus one of the cradles of the theory of evolution. The following three nights after his fits of fever subsided, Wallace completed the writing on his revolutionary discovery and sent the letter to Darwin (Wallace, 1858). Everyone knows what followed: Darwin would become the world renowned icon for the theory of evolution, while Wallace would remain unknown to the lay public for a long time.

Would Wallace have survived all these diseases, especially malaria, if he had lived in the wilderness of the archipelago without the care and support of his loyal Malay assistant Ali? According to the Harvard zoologist, Thomas Barbour, who met Ali during his travel to Ternate in 1907, Ali was a faithful companion and assistant to Wallace. After receiving a photograph Barbour had taken of Ali, Wallace wrote back to confirm that Ali had not only been his technical assistant for the collection of specimens as well as a personal adviser to guide him through the network of local people, but had provided him with vital care he required during his many malarial attacks (Barbour, 1950, p. 36).

Had quinine really saved Wallace's life? Probably so, as empirically the prophylactic use of quinine has been proven efficient in many cases. At this time, the efficacy of quinine to treat malaria was determined solely through empiricism, and was not yet understood scientifically. However, many other factors might have contributed to his 'survival' of malaria. Wallace had been affected by malaria several times while exploring the Amazon, and according to his own descriptions the quinine used to treatment his fever did not seem to be effective (Wallace, 1889, pp. 234-235). Thus, the type of fever most likely to have afflicted Wallace was what doctors typically describe as a 'tertian' fever, which is associated with malaria caused by *Plasmodium Falciparum*, *Plasmodium Ovale*, or *Plasmodium Vivax*. *P. Falciparum* can be excluded from this list with a high degree of confidence as Wallace would have little chance of surviving this often fatal infection given the medicine of his day. One may consider that Wallace was infected by a *P. Vivax* for the following reasons: first, the profile of his fever cycle, as *P. Vivax* causes shivering and fevers almost every day. This is suggestive of a *P. Vivax* type that is also known to subside spontaneously but relapse frequently. We know that Wallace survived each malaria crises in the Amazon and his fevers relapsed several times during his expedition to the Malay Archipelago. Indeed, it is

impossible to confirm this parasitologic diagnosis based solely on the content analysis of his correspondences, but Wallace was certainly infected by a mild form of Plasmodium and certainly not the Falciparum type that would have been lethal.

In contrast to British medical thinking at that time, quinine was used exclusively as a curative treatment in the French colonies, where abstinence of sex and drink, hard labour, regular exercise, rest, and good hygiene were recommended as prophylactic measures against malaria. Without proper prophylaxis, newly arrived Frenchmen lacked proper protection and often succumbed to their first attacks of malaria (Cohen, 1983, p. 26). That was the case of the French naturalist Henri Mouhot, who perished on November 10th, 1860 three days after entering a coma due to ‘jungle fever’ (Mouhot, 1864/2001, p. 160) despite the use of curative quinine that was likely provided by his friend from Bangkok, the British doctor James Campbell, while exploring Cambodia and Laos between 1858 and 1860 (Mouhot, 1864, 2001, 254-255).

A final question remains regarding Wallace’s confrontation with malaria: How did he obtain quinine? Unfortunately, it is impossible to provide an accurate response to this question. What history teaches us is that quinine—also known as cinchona—has been used to treat fever since the mid-17th century. The first local seeds of *cinchona* were obtained from trees imported to Java in 1858 (Bergman, 1948, p. 99). Wallace may have had access to these local remedies or perhaps obtained the powder from either England or India via Singapore, with the latter being the port of entry for Europeans to the Malay Archipelago (Wallace, personal communication, September 26, 1854). Further research is needed to find out whether Wallace, through his connection to the Dutch assistant Resident or Resident in Java, (Wallace, 1869/2008, pp. 75-76) had benefited from the colonial health care system established by the Dutch in the East Indies (Boomgaard, 1993). On the other hand, there is no evidence that Wallace or his servants made use of any traditional medicine to cure their ailments. Boomgaard noted that “...the European doctors and surgeons, although themselves certainly not entirely free from “magical” influences in the early years, objected predominantly to the non-secular aspects of Oriental medicine” (Boomgaard, 1993, p. 83). In the mid-19th century, while Wallace was exploring the jungle of the Malay Archipelago, Western medicine was little better than local indigenous medicine in terms of explaining the cause of malaria. Lay people and British doctors, for example, still believed that the malaria epidemics that broke out in 1857 and 1860 were caused by miasma, which was central to the social construct of health and mortality in England (Nicholls, 2000).

The Tropics: “Legendary Paradise for White Men”

In the two letters he wrote for *The Daily Chronicle* (Wallace, 1898, p. 3) and for *The Independent*, (Wallace, 1899) Wallace shared his views on the impact of diseases on

the lives of “white men” living in the tropics. The content of these two papers will be analysed presently in order to reveal Wallace’s perception of the pathogenesis of malaria and other diseases. Wallace’s skills in writing papers for lay audiences have been well documented. According to Smith, Wallace’s motivations for publishing in popular journals like the *Literary Gazette* were twofold: The first was most likely to maintain some visibility in London while roaming the jungle of Sarawak; The second was simply financial, in order to compliment his meager income from selling specimens gathered during his travels. He had begun these “journalistic” activities upon reaching Singapore in 1854 (Smith, 2008). While he used his writing skills to publish in newspapers for monetary purposes, the already well-established, senior Wallace later wrote about social and economic issues. Wallace advocated the expansion of the British Empire to colonize the tropics in order to harvest economic returns. “The more favourable portions of the tropics, extending about 15 deg. on each side of the equator, afford, I believe, the most healthy and the most enjoyable abodes for man, where with the least labour he can obtain the greatest amount of the necessaries, the comforts, and the luxuries of life, and can at the same time develop and cultivate his higher nature(...)They must be gradually occupied by white men in co-operative association to establish permanent homes, which, surrounding by the glories of tropical vegetation, may in time become something like the legendary paradise” (Wallace 1898, p. 3).

The arguments given by Wallace to reassure potential British colonists wishing to settle safely in the tropics are diverse, but of highest value was his own experience as survivor of malaria during his stay in these regions. He also proposed some possible causes of the disease: “I have lived for months together in or close to tropical swamps, both in the Amazon valley, in Borneo and in the Moluccas, without a day’s illness; but when living in open cultivated marshy districts I almost invariably had malarial fever, tho I believe the worst types of these fevers are due to unwholesome food” (Wallace 1899, p. 667). Wallace’s beliefs fit well within the contemporary medical theories of malaria, also known as ague, marsh, or jungle fever. The “miasma” theory for fever and malaria was still pervasive at the end of the 19th century, with the role of mosquitoes in malaria transmission established by Ross and Grassi in 1898 and 1899 (Packard, 2007, p. 115). It is not surprising then that Wallace had not considered any link between monsoons and mosquitoes in the malaria pandemic: “Still more commonly associated with the tropics are the various forms of malarial fevers, but these also are in no sense due to the climate, but simply to ignorant dealing with the soil” (Wallace, 1899, p. 667).

Conclusion

This study of Wallace’s biography, with particular focus on diseases which he had contracted during his expedition to the Malay Archipelago, illuminates a few

aspects of the history of medicine in Southeast Asia during the colonial period. First, the study of Wallace's biography reveals that the high prevalence of malaria in the tropics remained a constant threat to newcomers, whether they were Europeans—like Wallace and other explorers, or indigenous people who had migrated within the archipelago, such as Ali and other servants of Wallace. Thus, the extent and severity of the disease posed a serious threat to imperial expansion in this region of the world. We have also learned that quinine was used for both prophylactic and curative purposes by European explorers. Although the type and amplitude of the quinine trade was not the purpose of this study, one may speculate as to the considerable network and contacts Wallace had established in the region and infer that the supply of quinine may have been obtained through a number of possible sources. These sources of quinine included either England or India in the early 19th century (via the port of Singapore and later from Java, as discussed above), traders or other explorers who ventured into this region in the mid-19th century, and finally the health system established by the Dutch in the East Indies during this period.

One may judge Wallace's advocacy of European settlement in the tropics as sincere and that his arguments to this end were based on medical theories of the time that consider miasma the sole cause of malaria. Can Wallace be blamed for not being aware of the revolutionary discoveries of the disease in the late 19th century? If we consider the slow dissemination of knowledge due to the long period necessary for new discoveries to enter mainstream medical thinking and practices in the late 19th century, one would certainly forgive his ignorance of these facts. However, with this in mind, and considering the colonial expansion of the British Empire during the same period, we can still understand Wallace's enthusiasm in advocating for the settlement of European colonists in the Malay Archipelago, a region that he considered a *legendary paradise*.

Acknowledgements: Agustina Grossi for editing and proofreading and Ryan Crowder for a critical review and editing of the manuscript.

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