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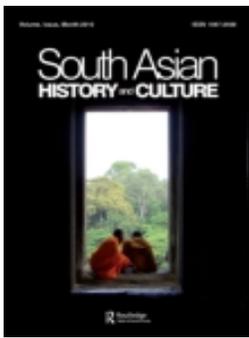
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Quinine, mosquitoes and empire: reassembling malaria in British India, 1890–1910

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The drug quinine figured as an object of enforced consumption in British India between the late 1890s and the 1910s, when the corresponding diagnostic category malaria itself was redefined as a mosquito-borne fever disease. This article details an overlapping milieu in which quinine, mosquitoes and malaria emerged as intrinsic components of shared and symbiotic histories. It combines insights from new imperial histories, constructivism in the histories of medicine and literature about non-humans in science studies to examine the ways in which histories of insects, drugs, disease and empire interacted and shaped one another. Firstly, it locates the production of historical intimacies between quinine, malaria and mosquitoes within the exigencies and apparatuses of imperial rule. In so doing, it explores the intersections between the worlds of colonial governance, medical knowledge, vernacular markets and pharmaceutical business. Secondly, it outlines ways to narrate characteristics and enabling properties of non-humans (such as quinines and mosquitoes) while retaining a constructivist critique of scientism and empire. Thirdly, it shows how empire itself was reshaped and reinforced while occasioning the proliferation of categories and entities like malaria, quinine and mosquitoes.

Keywords: constructivism; empire; quinine; mosquitoes; malaria

This article explores how knowledge and practices involving malaria – its explanations and solutions – were reassembled in British India, between 1890 and 1910. During these years, government officials lamented often about an enduring slump in the wider imperial economy of quinine. This resulted apparently from an excessive supply of cinchona barks from Dutch Java into the European markets, overproduction of quinine and a consequent shrinking of demands. This period, as well, witnessed unprecedented rigour in the government's efforts to distribute and enforce the consumption of quinine. British India had emerged, by the 1910s, as the world's largest quinine-consuming market. Meanwhile, the corresponding diagnostic category malaria itself underwent radical transformations. By the turn of the century, malaria had been redefined as the name of a mosquito-borne fever disease in various circles.

This article combines insights from new imperial histories, constructivism in the histories of medicine and debates concerning non-human agency in science studies to pursue three overlapping concerns: first, it locates the production of historical intimacies between quinine, malaria and mosquitoes within the exigencies and apparatuses of imperial rule. In so doing, it explores the intersections between the worlds of colonial governance, medical knowledge and pharmaceutical business. Secondly, it outlines ways to narrate

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characteristics and enabling properties of non-humans (such as quinine and mosquitoes) while retaining a constructivist critique of scientism and empire. Thirdly, it shows how empire itself was reshaped and reinforced while occasioning the proliferation of categories and entities like malaria, quinine and mosquitoes.

These three broad and overlapping themes are fleshed out in the following sections: the section ‘Pure quinine and its disease’ sets the scene by summarizing the ways in which quinine (the quintessential cure) and malaria (the corresponding disease-causing entity) shaped understandings concerning one another in the nineteenth century. It hints, as well, at how the question of manufacturing ‘pure quinine’ held together and yet exposed tensions between various imperial actors. The section ‘Within the reach of the poorest’ explores the reconstitution of quinine in the 1890s and early 1900s through processes of circulation and distribution in British India. Quinine, in turn, seemed capable of inspiring a series of transformations. The section ‘War of mosquitoes’ examines, how meanwhile, mosquitoes had emerged as a subject of enduring attention in the disparate fields of the entomological laboratory, sanitary governance, plantation economy and vernacular literature. In so doing, it explains the reconfiguration of malaria into a mosquito-borne fever disease at the turn of the century. The section ‘Countable and the accountable’ further elaborates the ways in which such unprecedented focus on mosquitoes augmented malaria to a position of overwhelming public spectacle. The final section ‘Experimental demonstration camps’ analyses how and to what effect quinine emerged, in response to such wider enthusiasms, as an object of enforced consumption in various parts of British India.

‘Pure quinine’ and its disease

Through much of the nineteenth-century malaria continued being defined as an ‘imponderable, invisible, imperceptible’ and yet mobile and commodious disease-causing entity. It could be invoked anywhere to explain a range of quotidian and spectacular conditions including goitre, idiocy, dysentery, bronchitis, fevers, dullness, general aching and delayed healing of wounds. Simultaneously, however, there were attempts to *reduce* malaria to particular forms of smell, colour, objects, diseases and chemicals.¹

In various nineteenth-century correspondence involving botanical explorers, forests, plantations, medical journals, the bureaucracy, improvements, land, factories and laboratories in British India – the drug quinine (extracted from the barks of cinchona plants) and the disease-causing entity malaria appeared *actively* and variously to define one another. For instance, the integration of cinchona plants within the wider colonial plantation economy, mid-nineteenth century onwards, converged with unprecedented associations of malaria with colonial lands, landscapes and people.² Besides, in various subsequent moments, the figure of quinine was often invoked as a pharmacological agent in quick fix diagnostic tests to retrospectively ascertain the malarial identity of a malady. Thus, the recommendation of quinine could precede and enable the act of determining the nature of disease.³

Conversely, the ‘purity’ of allegedly dubious versions of quinine could, as well, be verified by observing how patients confirmed as ‘malarial’ responded to it.⁴ The careers of malaria and pure quinine in nineteenth-century British India were thus often locked in symbiotic bonds of co-determination. These categories were deployed as invariable concomitants; the presence of one seems to have implied the presence of the other. While coming into being inseparably and discursively as quintessential cure and disease, these performed the function of delimiting one another in a range of medical journals and official publications.⁵

Like the diagnostic category malaria itself, 'purity' of cheap quinine remained a contentious issue throughout the period. Governmental paranoia about the proliferation of immensely adulterated versions circulating as 'pure quinine' in the market (through slippages in the process of distribution) presented merely one part of the story. Even within the sanctified confines of various state-endorsed quinine factories, the process for manufacturing 'cheapest possible pure quinine' remained ever contested and elusive.

As a cherished object of manufacture, 'pure quinine' commanded the attention of a myriad of actors: travelling geographer-botanists, European drug-manufacturing families, the office of the Secretary of State for India, Dutch experts on cinchona plants in Java, private investors in cinchona trade and managers of government plantations in Jamaica, Ceylon, Java, Nilgiris and British Sikkim.⁶ Maintenance of a consensus between these disparate voices regarding a credible method for producing 'pure quinine' was difficult. The question of 'pure quinine' cemented varying degrees of bonds and conflicts between these dispersed actors; exposing thereby the depths, expanses and 'tensions of empire'.⁷

'Pure quinine' figured as one of the many issues in which coalesced talk about altruistic charity and profit-making motivations. In relevant correspondence, quinine seldom presented itself as an object by itself, but rather as a commodity, which acquired identity only when referred in conjunction with a brand name indicating its manufacturer; for instance, Herring's quinine, Howard's quinine, Whiffen's quinine, Bengal Government's Mungpoo quinine, Gammie's quinine, Madras Government's quinine, De Vrij's solution, etc. These manufacturers themselves were caught up in shifting equations of authority in the overlapping worlds of pharmaceutical business and medical relief. Accordingly, the processes recommended by them acquired varying degrees of respectability.⁸

'Within the reach of the poorest'

The resident manager of the government factory at Mungpoo (British Sikkim), J. A. Gammie's claim in 1889 of having invented a process for manufacturing 'cheapest possible pure quinine' was considered credible by many in relevant circles.⁹ It is beyond the scope of this article to explore how and why it was achieved. However, in the following decades, quinine continued being supplied from the government factory at Mungpoo at a price higher than the standard market rates.¹⁰ While the government never ran out of excuses justifying this, officials seemed more perturbed about a glut in the export of cinchona from the Dutch East Indies into the European market resulting in overproduction of quinine, shrinking demands and an enduring slump in its market prices.¹¹ Under such circumstances, British India retained its relevance in quinine trade as one of the most significant quinine-consuming colonies in the world. While British India kept on returning dwindling figures concerning cinchona plants and quinine production, by the early 1910s it accounted for about one-sixth of the world's annual quinine consumption, emerging as one of the world's most dominant importers of the drug.¹² This section explores how quinine was reconstituted through the government's efforts to distributing, popularizing and ensuring its consumption in British India. Constitution of quinine was not confined within the walls of factories and laboratories. Quinine was transformed through the processes and predicaments of circulation.

In successive programmatic statements from the early 1890s, the government invoked various categories to describe the rigour, extent and depth of its efforts to distribute quinine beyond the hospitals, factories, urban and military enclaves. While trying to reach out to what they described as 'remote districts', 'the poorest', 'poorer classes', 'the interiors', 'small road side stations', 'the general public', 'the Santhal Parganas', 'remote' locations

'beyond the reaches of the market', the government of Bengal (followed by almost every other province in British India) introduced the 'pice-packet system'.¹³ 'Packing factories' were set up in the reformatories in Calcutta, Hazaribagh, Mandalay, Rangoon and Aligarh, where delinquents received government quinine and distributed it into five grain packets worth 1 pice each.¹⁴ But who could be trusted to act as go-betweens, as 'vending agencies' among the intended consumers in the 'interiors'?

The purchase and consumption of quinine, officials suggested, could not appear as an outcome of rigorous punitive imposition but of voluntary appreciation. The arrival of quinine then must not be projected as an exceptional event in the life of communities inhabiting the 'interiors', but accommodated instead within the prevailing rhythms of the everyday as an effortless and routine process. Thus, the 'vending agencies' had to be recruited from among those, who the state considered, were 'in daily touch with the great mass of people'¹⁵; sales had to be conducted at sites where the 'poorer classes in the interiors' were likely to frequent 'in ordinary course of business'.¹⁶

The village post office, with their supposedly deep and intricate network, emerged as one such 'popular place of meeting, where people assemble(d) to hear the news and discuss matters of common interest'.¹⁷ The postmasters and the postal peons, it was hoped, would be able to conduct sales of quinine right at the 'doors' of the consumers, without interfering with their 'ordinary duties'.¹⁸ Unlike the equally ubiquitous lower-ranked policemen and subordinate revenue officials, who, officials thought, commanded 'constant fear', postmen were believed to 'exercise no authority', were 'poor men as a rule' and who would be induced by a little commission 'to pushing the sales'.¹⁹ The postmen were also instructed to disseminate awareness and information about quinine among the potential consumers by distributing notices printed in a range of vernacular languages including Bengali, Marathi, Gujarati, Kanarese, Sindhi, Tamil and Burmese.²⁰

The state's efforts to distributing quinine were hardly subsumed by epistolary networks. The 'pice-packets' enabled a flexible 'system', which could enlist, whenever required, a variety of familiar figures including forest officers, police constables on beat-patrol, released convicts, 'respectable shop-keepers', stallholders, railway stationmasters at 'small roadside stations', vaccination establishments, dispensaries, indigo and tea planters, political agents to the native states, patels of villages, salt licensees, village headmen, schoolmasters and chowkidars.²¹ Such arrangements of governing a 'thing – in-motion', it appears, conjured-up fetishist intimacies between quinine and the 'people' inhabiting the interiors.²² Quinine was thus projected as compatible with the prevailing bonds of a shared language, locality, community and the rhythms of daily life. Apart from resulting in such a communalization of quinine, exigencies of circulation reconfigured some of its physical attributes.

While quinine changed hands during the course of circulation, the government adopted a series of measures to protect its promised 'purity'. These measures, in turn, reconstituted some of government quinine's physical features. To distinguish it from allegedly adulterated versions available in the bazaars, for instance, most of the quinine manufactured by the government in Madras was coloured pink from 1893 to 1904.²³ Besides, a variety of government stamps, i.e. a seal of the 'royal arms' or a seal bearing the mark of the packing factory, were attached upon firmly closed covers or a certificate endorsing the quality of the drug were enclosed in the packets to guarantee purity of the product.²⁴ Further, a network of post officials, chemical analysts, police inspectors and legal clauses appear to have been in place to detect, report, investigate, convict and punish acts of fraud in relation to quinine.²⁵ However, the image of 'quinine' as a profitable commodity seems to have excited the imaginations of a range of players in marketplaces across British India, despite such networks.

Such efforts towards ‘popularization’ of quinine were hardly absolutely original. Bengali advertisements published in almanacs and newspapers, for instance, reveal how the state was both drawing upon and reinforcing regular vernacular routes of circulation. These routes were being traversed already by imported European goods including quinine and its indigenous substitutes like *Atyashcharya Batika* (the most wonderful pill), *Sarvajvarankusha* (the cure of all fevers),²⁶ *Dasyadi Pachan*,²⁷ Sarkar’s tonic,²⁸ *Chaitanya batika* (Chaitanya pills)²⁹ and *Bijoy batika* (Victory pills), among others. However, what was unprecedented was the rigour and regularity with which the state’s programmes since the 1890s were envisioned. Quinine in the ‘interiors’ figured as an agent of empire, the arrival of which both mobilized and was predicated upon a series of transformations. When, at least momentarily, prisons became packing factories, juvenile delinquents became convict labourers, released prisoners turned into reformed volunteers, when post offices became dispensaries, when peons became vaccinators, an entire network of *mofussil* appeared co-opted into the state’s regime of distribution as ‘vending agents’. Quinine emboldened the government with an object (and an objective) with which to reach out to the interiors. Government correspondence, in turn, described quinine and the ‘interiors’ as considerably distant, different and yet intimately adaptive with one another. As a ‘commodity in motion’, therefore, quinine was reconfigured while impacting variously upon entangled historical processes.

‘War of mosquitoes’

Even as the state arranged for the travel of quinine from government factories to the ‘doors’ of potential consumers, the corresponding diagnostic category, malaria, itself underwent considerable mutations. The increasing recognition of ‘germs’, by the early 1900s, as the generic cause behind almost every form of disease resulted in a series of nosological reconfigurations. In this process, the category ‘malaria’ was retained, but redefined in various quarters as the name of a fever disease caused by parasites. Although the redefinition of ‘malaria’ from a generic cause of many diseases to an insect-borne fever disease was far from complete in the first decade of the twentieth century, it appeared more associated with parasites, insect vectors, fevers and blood samples than ever before. This was not achieved in a day or by the brilliance of any particular individual or the initiative of any specific institution. These reflected the scientific investments and political priorities of an entire generation. The initiatives of Ronald Ross constituted a crucial moment in that history.

Ronald Ross’ microscope-based findings in the late 1890s (endorsed subsequently by his British collaborators and Italian detractors), attributed anopheles mosquitoes as the vector transmitting malarial fever between human bodies. However, the process of acquiring wider currency and credibility was longer and more eclectic than most laboratory-centric teleological histories would allow.³⁰ The event of ‘discovery’ and its recognition, this section argues, reflected enduring prejudices which insects attracted in a variety of sites. Contentious laboratory speculations were validated and re-inscribed retrospectively through elaborate efforts of application on the ‘fields of practice’ and sustained considerably by articulations in the realms of plantation economy and literary production.³¹ This section weaves colonial medical entomology with the asymmetrical worlds of imperial power, imperatives of commercial plantations and human prejudices.³²

A range of visitors to Ross’ laboratory in Calcutta in the late 1890s, from J. W. Daniels to Leonard Rogers, were deeply impressed with him but left unmoved by the hypothesis. Studying the suburbs of Calcutta, Rogers found the presence of anopheles mosquitoes in ‘inverse proportion to the amount of fever’.³³ Despite such informed scepticisms, by

the early 1900s, Ross mobilized unforeseen funds from the British state and the industry to employ his findings to restricting malaria. A series of campaigns or what he termed 'mosquito brigades' and 'malaria expeditions' were launched, proclaiming the goal of suffocating and exterminating mosquitoes. Initiated in 'cantonments, towns, plantations' across Sierra Leone, Lagos, Cape Coast Castle in the West coast of Africa, such efforts were extended subsequently to Ismailia, Hong Kong, Staten Island, Havana and Mian Mir in British India among many other locations.³⁴ Ross' expeditions, among other features, consisted in revisiting locations established firmly as 'malarial' in the prevalent medical geographies and finding evidence in favour of the theory he was so keen on establishing.³⁵ Through such 'expeditions', Ross prophesied, 'the winged insects will vanish as if by magic'.³⁶

Insects had variously attracted the attention of British officials in India from the late eighteenth century: as objects of collection, cataloguing and exchanging,³⁷ as items of commerce,³⁸ as means of punishing suspected criminals³⁹ and rarely yet strikingly as sources of food.⁴⁰ However, in proposing his hawkish measures, Ross seemed to echo and appeal to some of the contemporary biases of the British Indian government involving insects. From the 1860s, insects were projected as notorious destroyers of commercially relevant vegetation: preying on 'woods and forests', inflicting agriculture with plant diseases and most consistently as detrimental to the tea, cinchona, coffee, sugarcane and cotton plantations.⁴¹

Collecting and cataloguing insects on behalf of the Asiatic Society, the Bombay Natural History Society and the Europe-based imperial museums continued. However, plantation history, the 1890s onwards, seemed particularly keen on funding travel to research insect pests that affected vegetation. In September 1894, E. C. Cotes, the Deputy Superintendent of the Indian Museum was deputed to a tour of almost every province in British India. Over a period of three years, Cotes was expected to study and report on the various insects, which were alleged to destroy agricultural crops and commercially valuable plants. It is revealing to note that the Indian Tea Association elaborately sponsored his extensive entomological tours.⁴² The Department of Economic Entomology was instituted in 1902. E. P. Stebbing, the erstwhile Deputy Conservator of Forests, was appointed the first Economic Entomologist to the Government of India.⁴³ Earlier in February 1901, Stebbing was ordered by the Inspector General of Forests to 'conduct investigations regarding insects injurious to forests'.⁴⁴ In the same year, on insistence from the United Planters' Association of South India, George Watt, the Reporter on Economic Products, was deputed for six months to 'investigate' the relation between 'plant diseases' and 'insect pests'.⁴⁵ On similar insistence from the planters' community, the Mysore durbar appointed a Mycologist and an Entomologist towards supervising the protection of Sandal trees.⁴⁶

To encourage institutionalized killing of insect pests, the Deputy Superintendent of the Indian Museum, E. C. Cotes was deputed to the United States to study insecticides and other appliances geared towards the 'destruction' of insects.⁴⁷ The Central Provinces prohibited by law the slaughter of 'insectivorous birds'.⁴⁸ Besides, the importation into British India of 'natural enemies' of insect pests, i.e. lady birds from Hawaii and hyacinths like *Azolla* and fishes like Millions from other parts of the United States, etc. were recommended.⁴⁹ Ross' proposals were thus not an isolated plea for killing mosquitoes. Having converged with some of the broader priorities of the government, Ross' suggestions were worded with recurrent military metaphors: 'waging war against mosquitoes', 'crusades', 'flags', 'volunteers', 'brigades', 'gangs', 'expeditions', etc.⁵⁰

Apart from colonial governments, as hinted already, Ross' expeditions were funded extensively by the industry particularly, the Liverpool Chamber of Commerce, the

Steamship Owners' Association, Ship Owners' Association and the West African Trade Association.⁵¹ The project of 'exterminating' mosquitoes involved the enlistment of a range of commodities: nets, Keating's insect powder, quicklime, charcoal and gallons of phenyl, kerosene, oil and petroleum, among others. Killing mosquitoes further required support from 'insectivorous' plants, fishes and birds. Mosquitoes mobilized the preoccupation of a hierarchy of regular and part-time participants: 'commissioned' district level officials serving the municipal and public works departments, Indian troops serving in Hong Kong, the police, assistant surgeons, hospital assistants, peons, 'daily-recruited local labour' and a range of 'native agents' including village headmen, workmen, 'gangs of coolies', 'sweepers', convict labour, tinsmith, etc.⁵²

Such extensive recruitments metamorphosed mosquitoes into subjects of unprecedented attention, observation and interest, beyond the usual confines of entomological laboratories and naturalists. In January 1902, the Government of Bombay declared to offer four prizes for a year's observations on the distribution and habits of mosquitoes in certain towns in the Presidency. The prizes ranged from Rs 100 to Rs 400, respectively. The competition was not restricted to the government servants. The Bombay Natural History Society was requested to adjudicate the prizes.⁵³ Circulars were distributed among 'certified sanitary inspectors' regarding measures relating to the 'extermination' of mosquitoes.⁵⁴ Dissemination of knowledge about mosquitoes was attempted 'among the population', 'among the uneducated masses' and 'beyond the services'. Teachers in the 'public schools' were instructed to 'impart their scholars the rudiments of the malaria doctrine'.⁵⁵

In certain ways, the organization of 'mosquito brigades' and firmer entrenchment of Ross' theory involving the insect vector of malaria appeared symbiotic processes. The mosquito brigades occasioned a spectacular network of correspondences, reports, recruitments, travels, subscriptions, fund collections, methods and personnel between various sites in British India, British Western and Central Africa, Hong Kong, Havana, New York, Dutch Java and German Africa.⁵⁶ The launch of 'expeditions' to 'exterminate' mosquitoes in these locations reaffirmed their notoriety as malarial landscapes. Equally, such elaborate mobilization of disparate actors seems to have played a part in providing retrospective legitimacy to Ross' 'malaria doctrine'. In his book on the 'Mosquito brigades', Ross referred to the 'investigations' he had led on the fields of Sierra Leone or Robert Koch's efforts in certain 'German tropical possessions' or the 'American campaigns' described by L. O. Howard. These, Ross acknowledged, provided as much recognition to his theory as the accomplishments attained within the enclosed spaces of the laboratory.⁵⁷ By 1904, earlier detractors and sceptics like Leonard Rogers had revised their opinions.⁵⁸

In apparent contrast to such grim images, the deeply layered world of literary production, for instance, in Bengali, featured mosquitoes as ubiquitous objects of fun, satire and irritation. Mosquitoes featured in the works of a range of authors: from a novel written by civil servant cum writer of fantasies Trailokyanath Mukhopadhyaya in the 1890s to some of Rabindranath Tagore's poems during 1940–1941. Painful, irritating, yet funny encounters between human skin and mosquitoes' sting remained an enduring theme in a range of fables, fantasies and poetry.⁵⁹ As well, certain recurrent tropes appeared to amicably speak to, draw upon and reinforce the more prosaic worlds of bureaucratic correspondence. In the 1880s, mosquitoes began figuring in texts like *Moshari Rahasya (Mystery of the Mosquito Curtain)* as a metaphor for domestic scandals, corruptions and decadence.⁶⁰ Decades later, 'Moshari' (Mosquito) figured as the name of an elusive serial killer in a detective fiction *Mashar Hul*, i.e. *The Sting of Mosquitos*.⁶¹

Moreover, Ross' insistence on a war on mosquitoes was parodied variously, for instance, in pamphlets like *Moshar Juddho (The War of Mosquitoes)* published in 1921.⁶²

The possible transformation of mosquitoes into deadly and invincible enemies to humans was sarcastically hinted at in the first of the legendary Ghana-da stories written by Premendra Mitra. Published in 1945, it was titled 'Moshā', i.e. 'Mosquito'.⁶³ Insufferable mosquito-bites featured in Annada Sankar Ray's poem 'Kaduni' ('The Tearful') as the nemesis of Japanese soldiers stationed in North-eastern India during World War II.⁶⁴ Earlier, an illustrated anthology of Bengali short stories published in 1911 depicted the stomach of mosquitoes as a stage where bitter human animosities could be enacted. Such literary images caricatured, mimicked and sustained suggestions about a potentially harmful, non-human world of quotidian insects. As a recurrent trope and a subject of enduring concern, mosquitoes thus held together disparately dispersed worlds of entomological laboratories, literary production, field-work and plantation economy.

Countable and the accountable

The emergence of mosquitoes to significance in the vocabulary of public health administration altered considerably the meaning of the word malaria. Indeed, 'malarial fever' in the 1900s, it was argued in certain quarters, differed radically from what was understood as malaria in much of the nineteenth century. Writing in December 1901, John H. McCollom, a professor of contagious diseases at Harvard University, for instance, considered the retention of the term malarial to refer to the disease described by Ross and his collaborators as a 'misnomer'. Instead, he proposed the name 'gnat (mosquito) fever'.⁶⁵ For others like Patrick Manson, the establishment of mosquitoes as the vector for transmitting malarial parasites between human bodies represented a moment for rectifying prevailing diagnostic 'ignorance' and acknowledging what malaria really meant. Writing in April 1907, Manson recalled how in the nineteenth century an enormous variety of diseases, ranging from black water fever to sleeping sickness, were mistakenly clubbed under 'a very big name – malaria'. Since the early 1900s, Manson argued, 'the great block of African disease, called malaria', had gradually 'disintegrated into a number of independent, essentially different diseases'.⁶⁶

However, the mutation of the diagnostic category malaria remained incomplete in the early 1900s.⁶⁷ In clinical deployments, for instance, it retained much of the elasticity ascribed to it in the nineteenth century. Malaria continued being invoked to explain a variety of maladies including chronic dysentery, diarrhoea, pulmonary tuberculosis, chronic gastritis,⁶⁸ syphilis, phthisis,⁶⁹ pneumonia, gastric and anaemia.⁷⁰ Such conditions, it was suggested, could manifest in the body two, ten or even fifteen years after it had encountered malaria.⁷¹

Similarly, malaria sustained its prior associations with urban insanitation, poverty, the labouring classes, agricultural stagnation and racial degeneration.⁷² By the mid-1900s, however, parasites, fevers, blood samples and most significantly mosquitoes were compatibly accommodated within such prevailing definitions.⁷³ Mosquitoes now emerged as the defining feature that shaped the malarial identity of most of these situations. Mosquitoes, malaria and these situations appeared congenial with one another and inseparable. Earlier etiological judgments were reiterated and retrospectively justified by an invocation of the spectre of mosquitoes. For example, their abilities to 'encourage the growth of mosquitoes' reconfirmed the status of stagnant 'trivial puddles' as sources generative of malaria.⁷⁴ In the 1900s, schemes of agricultural improvements were emphasized yet again as the 'sovereign remedy' of malaria. Such continuing faith was, however, restored on the basis of a novel explanation. It was hoped, they could 'obliterate all the conditions under which the mosquito can survive'.⁷⁵

Mosquitoes were thus centrally and emphatically inscribed into the existing medical ecologies of malaria. Colonial bureaucrats often explained the proclivity of certain poorer groups of people to malarial diseases by asserting the attributes they apparently shared with mosquitoes. Senior bureaucrats and persistent aides of Ross, Captain S. R. Christophers and Dr C. A. Bentley, for instance, argued that anopheles mosquitoes were bred and the urban industrial labourers dwelt under ‘analogous conditions’.⁷⁶ ‘Urban mohullas swarming with the lowest classes living in a very overcrowded and squalid condition’, bad housing and impure water supply figured as shared habitats of mosquitoes, malaria and urban industrial labourers.⁷⁷ Similarly, the category ‘parasites’ was incorporated into the discourse of racism, and as a way of stereotyping ‘primitives’ and ‘aboriginals’ as immune from the effects of malaria. It was argued that malarial parasites and ‘primitives’ were happily and conveniently wedded with one another. Bentley described ‘primitives’ as ‘parasite laden races’. Malaria parasites, Bentley continued, were ‘as natural among primitive races as flea infestation is to a dog’.⁷⁸

The increasing recurrence of mosquitoes and parasites in the literature about malaria transformed it into a more visible, tangible and precise phenomenon than ever before. Reports on malarial fevers began listing different varieties of the anopheles mosquito. Such varieties were attributed to cause different degrees of malarial fevers. Different ‘kinds of malaria’, i.e. malignant tertian, benign tertian, quartan, it was suggested, could be associated with precise varieties of anopheles mosquitoes, i.e. *A Fuliginosus*, *A Rossii*, *A Listoni*, etc.⁷⁹ In the process, as early as 1903, fever patients at the penal colony of the Andamans were required to get their blood samples microscopically tested for malarial parasites on an everyday basis.⁸⁰

Mosquitoes and parasites made malaria quantifiable. Malaria could now be expressed as a number that had to be counted, controlled and compared. For example, the ‘spleen rates’, which were supposed to reflect the intensity of incidence of malaria in any particular locality began, since the early 1900s, to carry the claim of mathematical accuracy and precision. The precise ‘percentage of infected children’ could now be confirmed from the occurrence of parasites in samples of blood (apart from measuring the size of spleens). Such figures enabled the comparison of ‘endemicity’ in the villages in the Dutch East Indies, Lagos, Sierra Leone in West Africa or the Duars in British India in a commensurate register.⁸¹ Further, diagnosis on the basis of the detecting parasites in blood samples resulted in the quantification of losses incurred from malaria. Writing in 1904, Ronald Ross, for instance, reported that ‘a total of about 250,000 days were lost to the public service as a result of this malady among the European troops (in India) alone . . . 676 men or over 1% of the strength were constantly sick from malarial fever’.⁸² Efficiencies of various anti-malarial actions could now as well be expressed in terms of numbers. ‘Diminishing the number of mosquitoes’ figured as a consistent feature of anti-malarial measures initiated in West Africa or British India.⁸³ Reports on anti-mosquito projects, for instance, often bore such statements: ‘In Sierra Leone six men can clear 50 houses and remove 10 cartloads of broken bottles and empty tins daily’.⁸⁴ Performances of the colonial governments in tackling cases of malaria could now more effectively be judged.

Although frequent references to mosquitoes and parasites delimited the category in various ways, malaria nonetheless acquired unprecedented visibility in course of the 1900s in the official registers. Mosquitoes, parasites, blood samples and fevers: these newer tangible, precise and even numerable indicators appear to have suited the managerial instincts of the colonial governments. These empowered them with more definite targets against which to act as accountable agents.⁸⁵ The first decade of the century, for instance, witnessed

overwhelming energy across the empire in convening high-profile conferences, committees and funds towards studying and managing malaria.⁸⁶

The list of academic and administrative committees set up in the early 1900s for the enhancement of knowledge on malaria included the Society for the Study of Malaria set up in Italy in 1898, Malaria and the Tsetse Fly Committee of the Royal Society, The Drainage Committee of Bengal, The Anti-Malarial League of Greece and the Malaria Advisory Committee of the Government of India. Books on malaria written by colonial officials witnessed unforeseen circulation. Captain S. P. James wrote a pamphlet titled 'Causation and prevention of malaria' in 1903. Within a year two editions of 5000 copies each were sold out. James received an honorarium of Rs 750 from the Government of India in recognition of the success of his book.⁸⁷ In the same era, anti-malarial projects provided occasions to test the fundraising abilities of various members of royal families. The raising of subscriptions in support of the Anti-Malarial League of Greece, for instance, was personally supervised by the King of Greece and Princess Christian of Great Britain.⁸⁸ In July 1903, the British Colonial Office proposed the setting up of a 'general fund' for 'promoting researches into the origin and propagation of malarial diseases'. This was conceived as a consolidated fund for the British Empire. Contributions were solicited 'from various parts of the Empire'. The Lords Commissioners of the Treasury were instructed to contribute £500 per year for five years from the Imperial Funds on behalf of the Exchequer-aided colonies and protectorates. Similarly, a sum of £1500 a year for five years was to be made available on behalf of the Crown colonies. In addition, both the Governments of Gambia and Sierra Leone promised to each contribute a sum of £100 per year to the fund for five years, while the Governments of Gold Coast and Southern Nigeria each promised a sum of £200 and the Governments of British India and Lagos promised amounts of £500 and £150, respectively.⁸⁹

Amid such workaholic ambience, the figure of quinine was hardly banished as an irrelevant relic from an obsolete past; never rejected as unsuitable to address the 'new disease' emergent from redefinitions of 'malaria'. On the contrary, quinine distribution and killing mosquitoes, often literally, happened hand in hand.⁹⁰ In fact, the government prioritized quinine distribution over other concerns. There were attempts, for instance, to divert funds from the 'Indian People's Famine Trust' to aid the distribution of quinine in the villages of Ajmer- Merwara province in British India.⁹¹

Indeed, along with shifts in insights about malaria, the status of quinine appeared almost equally malleable. Having been variously projected as an antiperiodic febrifuge, a prophylactic tonic, an antiseptic or a germicide in different moments in the nineteenth century,⁹² quinine was ascribed, by the mid-1900s, the newer trait of being 'inimical to the *plasmodium malaria* parasites in the blood of man'.⁹³ Writing in 1902, Patrick Manson hinted at the relevance of quinine in diagnosis of malarial infections in contemporary clinical practice.⁹⁴

The establishment of mosquitoes and parasites as subjects of enduring attention thus stoked unprecedented enthusiasm for anti-malarial schemes. It was alleged by certain sections of the 'Indian public' and 'native editors' that beneath these altruistic efforts the government was involved in a 'secret conspiracy' to push the sales of quinine. It was further alleged that the government was selling quinine at Rs 6 per pound more than the market rates to replenish an otherwise bankrupt exchequer.⁹⁵ Indeed, officials were 'certain' that recommendations extracted through zealous initiatives like the 1909 Imperial Malaria Conference at Simla would augment the demand for quinine and ensure its greater consumption in British India.⁹⁶ Such hopes reflected the government's concern with addressing a continuing slump in the quinine trade:

. . . Possibilities in the direction of any permanent improvement in price . . . one being . . . constantly increasing the consumption of quinine, combined with the opening up of the world's dark places, which is so steadily going on year by year, month by month, almost day by day, may in the end lead to consumption overtaking supply . . .⁹⁷

'Experimental demonstration camps'

Quinine widely emerged as an object of enforced consumption in British India in the late 1900s. Wider governmental alacrity in addressing questions concerning malaria was reflected in a series of *strategies* in ensuring greater consumption of quinine. These, in turn, manifested in firmly punitive, carefully accommodative and exhaustively pedagogical efforts to access and regulate incompletely colonized bodies. While detailing such various faces of imperial bio-power, this final section suggests how, in the process, quinine itself underwent considerable reconstitutions. These efforts should not, however, be explained as immediate expressions of an overwhelming economic logic. Although regimes of bio-power and economic exigencies conversed they were not reducible to one another. Taken together, they considerably constituted what functioned as empire in British India in the late 1900s.

In the official itineraries of quinine, high schools, military barracks and especially prisons featured among inescapable sites. Quinine began to figure as a necessary element in the inmates' timetable, through which stricter discipline could be mobilized. Official correspondence cherished them as enclosed and 'analogical' spaces, where 'regularly ordered' bodies under 'skilled control' could be conveniently accessed.⁹⁸ Quinine thus seemed to reveal a hierarchy of disciplinary institutions in British India. High schools like the Delhi Normal School, for example, compelled staff and the pupils to consume bi-weekly doses of seven grains of quinine.⁹⁹ At the same time, meticulously monitored and intensely regimented 'quinine parades' organized daily in some prisons among the inmates, officials, cooks, sweepers and hospital attendants were projected as inspirational for other institutions.

'Quinine parades' were daily conducted under the supervision of the jailor and the hospital assistant in every prison in Punjab. They oversaw the accuracy of dosage, prevented any act of tampering, made sure that wastage by spillage could be reduced to a minimum and that 'each prisoner actually swallowed the quinine'. The jailor was responsible to ensure the presence of all prisoners in their respective yards, enclosures and cells prior to every 'quinine parade'. He counted all prisoners who actually received the mixture. This number was supposed to correspond to that at count out in the morning or lock up in the evening. Finally, the jailor had to certify under his signature in the hospital assistant's journal the number of prisoners who had been dosed. Quinine was then distributed among the officials, cooks, sweepers and hospital attendants.¹⁰⁰

The question of quinine enabled officials to project prisons as ideal sites which guaranteed freedom from malaria. Death rate from malaria among prisoners was shown as one-fifth of what it was among the 'general population'. Out of every 1000 victims of malaria, it was suggested that merely one could be considered a prisoner. In the abstruse logic of medical governance, jails were projected as a model that should be replicated everywhere to ensure the safest and most beneficial abodes for colonial subjects. A 'free man' appeared more vulnerable to malaria than a prisoner. 'Why is it that a disease which is so rarely fatal to a prisoner should be so often fatal to a free man?' – Official files wondered. Confinement within the prison, it was argued, provided the inmates a position of 'greater advantage'. Lives in the prison were projected as 'regularly ordered', more regimented and ideal for the disciplined distribution of quinine.¹⁰¹

Prisons were compared to the barracks, which housed the native army. In both these sites, bodies of men were subjected under ‘skilled control’. However, most stringent measures of distributing quinine, it was argued, were more plausible in the jails than in the regimental lines. This seemed to explain how the prisoners appeared more protected from malaria than the soldiers, despite the former’s ‘inferior physique’ and ‘lower social status’.¹⁰²

Enforced consumption of quinine was pursued by officials beyond the prisoner’s cell and the native soldier’s bunk. The ‘Special Anti-Malarial Measures Act for India’ of 1907, for instance, recommended mandatory consumption of quinine in ‘highly malarious areas’, and ‘removal of houses inhabited by persistently infected individuals from the neighbourhood by bodies of disciplined men and government institutions’.¹⁰³ Besides, denial of ‘casual leave’ was proposed in Punjab for government servants who refused to consume quinine regularly.¹⁰⁴ Quinine, however, was not enforced exclusively through punitive measures or in situations of confinement. The ‘free and unindentured’ labourers in the Duars plantations, for instance, were persuaded not through codified contracts. Instead, 5 grain doses of quinine were ‘served out’ to them while conducting everyday acts of leaf-weighing or at muster by the managers’ ‘moral force of personal influence’.¹⁰⁵

The state’s intent to persuade its subjects into consuming quinine was evident in a range of accommodative gestures. During ‘quinine parades’, quinine was served by a ‘high caste Hindu convict warder’; during ramzan, in the Punjab prisons, quinine was distributed only after sunset; the standard dosage of quinine was often relaxed to prevent ‘unpleasant consequences’ among female prisoners.¹⁰⁶ Further, to make quinine more ‘attractive’ and ‘palatable’ to suit the ‘taste’ of prospective consumers, various innovations were prescribed. The usually bitter and cumbersome quinine solutions were to be remade into more manageable forms of pills, compressed tablets; made tastier by coating such tablets with sugar and sold under the cover of chocolate and sweetmeat. Particularly, to attract the children, solutions of quinine were sweetened with syrup and sugar, while powdered forms were often blended with condensed milk.¹⁰⁷ Thus, where British Indian subjects could not be regimented into consuming regular doses of quinine, the drug itself was repackaged to reach out to them.

Quinine became the focus of various pedagogical programmes. The statistical officer to the government, S. P. James, for example, proposed in 1909 an exhaustive pedagogical network, the ‘experimental demonstration camps’. The ‘primary objective’ was to ‘devise a scheme for increasing enormously the demand for quinine in the small villages’ in British India. The camps were designed to ‘demonstrate to the people’ the benefits of the drug and the ‘correct way in which to use it’.¹⁰⁸ In every ‘selected area’ of a district, each camp, consisting of a hospital assistant and a compounder, was supposed to operate for a period ranging from six weeks to two months. At any given period, its operations were expected to remain confined to a ‘population’ not exceeding 2000 people. Visits to every house were to be occasioned with a prepared ‘little lecture’, inducing the inhabitants to convince themselves and their neighbours about the merits of consuming prophylactic doses of quinine every night. S. P. James had an estimate of the numbers of people who could be reached out through such camps. If a camp remained for two months each in areas inhabited by 2000 people, James speculated, 12,000 people could be ‘educated’ annually by each camp. If every province consisted of a minimum of 30 districts each with a camp of its own, James thought, ‘the number of people educated annually’ could amount to 360,000. Once a camp was set up in each district of British India, James hoped, about ‘3 million people per annum would learn thoroughly the benefits to be derived from quinine, where to obtain

it and how to use it'. James considered such acts of 'teaching the people' more relevant than instructing them 'in the arts of reading and writing'.¹⁰⁹

Besides, vernacular booklets on malaria were recommended as parts of the primary school curriculum. The 'future citizens of the Empire', once exposed to such 'lessons on quinine', were expected to inspire their relatives into consuming the drug.¹¹⁰ Such conception of the relaying of internalized 'lessons' by diligent pupils of 'empire' to their closer associates were variously replicated. Apart from binding themselves into consuming 15 grains of quinine per week, the members of the 'Gurdaspur quinine distribution society', for instance, pledged to induce as many as possible to become members of the society. Branches were set up in various villages, tehsils and districts. Every member had to pay a subscription of six annas and join by a contribution of Rs 1-2-0.¹¹¹ In an earlier published correspondence, the possibility of organizing 'popular lectures by Hindu and Mohamedan leaders' was considered a judicious way of preaching and 'popularizing the use of quinine'.¹¹² Similarly, having described malaria as 'a question of highest national importance', Herbert Risley, the President of the 1909 Imperial Malaria Conference, urged landholders, bankers, professors, merchants, lawyers, schoolmasters, journalists, doctors and 'influential' operators in the subdivisions to enthuse greater participation in anti-malaria programmes. If Risley was speaking to whomever he considered the 'natural leaders' of the 'people',¹¹³ colloquial official leaflets continued to address the individual, empowering them with immediate access to 'self-treatment' through the medium of quinine.¹¹⁴ The drug quinine and the efforts to enforce its consumption in British India therefore revealed the various depths and reaches of the imperial state. However, quinine itself hardly figured as a passive, rigid and unchanging object. While its continuing relevance and resilience was recurrently underscored, it kept changing hands, reconstituting itself considerably in the process.

Conclusion

Quinine and mosquitoes represented two most recurrently visible public faces of malaria in British India between the late 1890s and the 1910s. This article has explored the production of inseparable and mutually reinforcing narratives about insects, disease and drugs. It has shown, for instance, how bureaucratic and managerial visions concerning killing mosquitoes and distributing quinine crystallized and disseminated understandings of malaria. In sharp contrast to conventionally teleological histories, it has suggested ways in which a problem could be defined and sustained through efforts at solving it. Quite literally, malarial infections continued to be diagnosed in clinical practice in the early 1900s from how the suffering body responded to quinine. Besides, as this article has argued, quinine distribution and killing mosquitoes were often pursued together by the same groups of people. Overwhelming governmental alacrity in killing mosquitoes enthused strategies for enforcing the consumption of quinine across British India.

Unlike Timothy Mitchell's understanding of 'techno-politics', the case of malaria in British India in the early 1900s does not reveal any deliberate belittling or effacement of non-human agency.¹¹⁵ On the contrary, the empire appears to have thrived on scientific accounts which upheld and advertised straightforward, uncontaminated non-human agency. This article has studied the making of such scientific narratives. It has not considered whether anopheles mosquitoes indeed transmitted malarial parasites between human bodies or whether quinine indeed cured malaria. It has instead examined the entangled processes and perceptions through which mosquitoes and quinine could be endowed with enduring attributes in the imperial archive. In so doing, it has explored the incessant traffic

between the imperial worlds of pharmaceutical business, vernacular markets, colonial governance and scientific knowledge in British India. It has tracked how imperial investments were geared towards ‘maintaining’ the image of quinine as a valuable drug while it circulated through a range of sites including colonial factories, prisons, military barracks, high schools, government offices, post offices, imperial conferences, bazaars, legal codes and primary school curriculums.¹¹⁶ Efforts to project quinine as compatible with the familiar icons, figures, tastes and languages of intended consumers, this article has argued, communalized the drug. Similarly the image of mosquitoes as a potential disease-causing pest was sustained and reinforced by interactions between the worlds of colonial laboratories, plantation economy, field programmes and vernacular literary production.

This article has argued further that it is possible to narrate various enabling properties of quinine and mosquitoes without remaining confined exclusively within the discourses of either scientific realism or uncontaminated materiality. Straightforward and scientifically endorsed trajectories (i.e. quinine cures malaria; mosquito transmits malaria) are not the only ways in which the characteristics of quinine and mosquitoes could be conceived. In the process of being produced as medically ordained straightforward subjects, as flexible objects of knowledge, figures of governance, deployed metaphors or valued commodities, quinine and mosquitoes were able variously to ‘effect a difference’ in numerous situations. This article has shown how quinine and mosquitoes could emerge as historical agents while being constituted by discursive regimes occasioned by empire.

While these capabilities of non-humans are inconceivable without the possibilities enabled by empire, the empire itself could have hardly remained a distant, overarching and imposing entity independent of the script it mobilized or indirectly authored. Production of quinine, as we have hinted, was one of many ways in which the empire could be held together as a profit-making mission couched by benevolence. Enduring debates and contentions among various constituents about quinine production, in turn, exposed several fault lines and tensions of empire. In many ways, quinine seems to have been a metaphor for empire: bitter, expensive and transformative, which could be mutated variously to appear as charitable, reasonable and even palatable.

A plethora of efforts towards enforcing the consumption of quinine in British India, cemented the empire, yet again, as a ‘commodity spectacle’.¹¹⁷ These efforts reinforced various fragments of imperial bio-power: utilitarian governance, pedagogical machineries, rule of law and strictures of incarceration. While claiming to produce ‘future citizens of the Empire’, such facets, continued simultaneously to flirt with diverse visions of ‘self-treatment’ and nationhood. As a tool to nurture regimented and productive subjects in the prisons, high schools, barracks, families, congregations, plantations, public offices, quinine must have informed what Stoler and Cooper call the ‘embourgeoisement of imperialism’ in the late nineteenth and early twentieth centuries.¹¹⁸

Empire was shaped as well by what Nicole Shukin calls a ‘zoopolitics’ involving insects, particularly mosquitoes.¹¹⁹ Regimes of governing human bodies extended over to and were integrally tied with sustained investments in knowing, observing, exchanging, maiming, classifying, delimiting and narrating mosquitoes. Such widespread efforts metamorphosed mosquitoes into subjects of empire. Engagement with mosquitoes indicated the depth and extent of empire. In anthropomorphic accounts, mosquitoes symbolized colonial poverty, insanitation, recalcitrance and redundant excesses. Yet, mosquitoes commanded continued attention as an object of imagination, an excuse for intervention and commerce and a mirror against which humanity could be defined. Thus, mosquitoes appeared not merely to justify imperial rule, but figured as well its subjects.

Thus, the reassembling of malaria in British India in the 1900s does not inspire a simplistic reduction of agency to intentional human subjects alone. Bruno Latour recently extended the definition of agency to include any ability to ‘modify a state of affairs by making a difference’.¹²⁰ Such ability appears to have been distributed among a hierarchy of humans and non-humans across an imperial apparatus. Interactive networks explored in this article, for instance, between insects, insecticides, tinsmiths, coolies, sweepers, itinerant parasitologists, parasites, vernacular fiction writers, entrepreneurs, royal families, bureaucrats, commodities, government factories, post offices, peons, bazaar vendors, policemen, outposts, jailors, inmates and soldiers, may be said to have constituted an imperial apparatus. However, contrary to Latour’s insights, relations between these variously enlisted actors were neither symmetrical nor accessible transparently in scientific texts.¹²¹

Giorgio Agamben proposes a ‘massive partitioning’ between ‘apparatuses’ and ‘living beings (or substances)’ and explains subjectification as a result of interactions between them.¹²² Instead, this article draws upon Viveiros De Castro to define imperial apparatus as an ‘inter-subjective field of human and non-human relations’.¹²³ Within such an apparatus, human–non-human binaries were often transgressed: quinine seemed to acquire life-like relations with ‘people’ inhabiting the ‘interiors’; insects emerged as the focus of projects that mobilized a series of labourers and commodities; parasites and ‘primitives’ as well as the urban poor and mosquitoes, it was claimed, shared analogous attributes. Empire, as this article has argued, could neither precede nor outlive nor be delineated from the discourses about science and non-humans that it occasioned. Imperial texts, authorities and materials, one might recall following Donna Haraway, were indispensable to and ‘becoming with’ one another.¹²⁴ This article has relocated empire, science and the non-humans in a shared and immanent field of co-constitution.¹²⁵

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Notes

1. For details, see Deb Roy, “Mal-areas of Health”; and Worboys, “Germs, Malaria and the Invention of Mansonian Tropical Medicine,” 186–8. For a recent work on the management of malaria in twentieth-century British India, see Bhattacharya, “The Logic of Location,” 183–202.
2. For perceived shifts in the geographies of malaria, see, for instance, Fayrer, “Malaria,” 16–17.
3. For instance, Home Department (henceforth Home), Sanitary Branch (henceforth Sanitary), August 1882, 97–103 A. “Report on Epidemic Remittent and Intermittent fever occurred in the city of Amritsar fever in the Autumn of 1881” (NAI). See also, Mukhopadhyay, *Saral Jvara Chitiksa*, 103–6.
4. General Department, Industry and Science Branch, 5 July 1872. Dated Calcutta, 6 July 1872, J. Ware Edgale, Officiating Junior Secretary to the Government of Bengal to Inspector General of Hospitals, Lower Provinces. (West Bengal State Archives, henceforth WBSA.)
5. See Deb Roy, “‘An Unseen, Awful Visitant’,” 64–6.
6. Deb Roy, “On Quinine and Questions of Authority.”
7. See Drayton, *Nature’s Government*, especially 208–20.
8. Ibid.

9. Home, Medical Branch (henceforth Medical), January 1889, 38–41 A. No. 43c, dated Mungpoo, 2 July 1888. J. A. Gammie, to Secretary, Government of Bengal, Financial Department (NAI); Finance Department, Miscellaneous Branch, File M Q/1, Pros 1–13 August 1888. No. 28 Q dated Calcutta, 18 February 1888. George King to the Secretary, Government of Bengal, Financial Department (WBSA).
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12. Revenue and Agriculture, Economic Products Branch, April 1896, 10–12 C (NAI); Revenue and Agriculture Department, Agriculture Branch, 44–71 A, September 1908, Dated 25 July 1907. W. R. Dustan, Imperial Institute, London to J. Wilson, Secretary, Government of India and dated 22 September 1907, Report drafted by C. A. Innes, p. 24 (NAI); Revenue and Agriculture, Agriculture, March 1912, 22 B. “Note on Cinchona policy” (NAI).
13. See, for instance, Home, Medical, October 1897, 285–97 A. “Enclosure No. 1,” Rangoon dated 30 October 1894 (NAI).
14. Home, Medical, July 1893, 59–63A. Dated Calcutta, 12 November 1892. E. Hutton, Post Master General, Bengal to All Postal Officials, Bengal Circle; Home, Medical, December 1895, 105–8 A. Dated 23 October 1895. Secretary, Government of the North-Western Provinces and Oudh to Postmaster General, North-Western Provinces; Home, Medical, March 1895, 16–18 A. Dated Rangoon, 30 October 1894. Proceedings of the Chief Commissioner of Burma in the General Department (NAI).
15. Home, Medical, August 1905, 67–8 A. Dated 22 June 1905. L. J. Kershaw, Officiating Secretary to the Chief Commissioner of Assam to the Secretary, Government of India (NAI).
16. Home, Medical, July 1892, 38–40 A (NAI).
17. Ibid.
18. Revenue and Agriculture, Economic Products Branch, November 1897, 8 B. Dated Ootacamund, 31 August 1897. W. Standen, Director of the Government Cinchona Plantations, Nilgiris to Secretary to the Government, Revenue Department (NAI).
19. Home, Medical, November 1893, 78–9 B. Dated Madras, September 9 1892. Surgeon General W. F. Defabeck to the Secretary to Government, Revenue Department (NAI).
20. Home, Medical, September 1904, 49 B; Revenue and Agriculture, Agriculture, July 1892, 25–8 A. Dated Nungumbakum, 9 February 1892. W. F. deFabeck, Surgeon General, Madras to the Secretary, Government, Revenue Department; Home, Medical. March 1895, 16–18 A. Dated Rangoon, 30 October 1894. Proceedings of the Chief Commissioner of Burma in the General Department (NAI).
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22. For things-in-motion, see Appadurai, *The Social Life of Things*, 5. For commodity fetishism, see McClintock, *Imperial Leather*, 207–25.
23. Revenue and Agriculture, Economic Products Branch, September 1904, 7 A. “Notes,” Telegram from Secretary of State for India, dated 23 August 1904 (NAI).
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26. “Sarvajvarankusha,” *Education Gazette and Saptahik Vartabaha* (9/3/1888): 733. [UJPL, 6/7, Hites Ranjan Sanyal Collections, henceforth, CSSSC].
27. Nandi, “Malaria Jvarey Dasyadi Pachan,” 70–2.

28. "Nalhati Pharmacy," [Box 5/8, CSSSC].
29. "Noakhali Haldar and Co's famous Chaitanya Pills" [Box 5/2, CSSSC].
30. Bynum, "Mosquitoes Bite More Than Once," 47–8. For a straightforward but detailed narrative, see Waller, *The Discovery of the Germ*.
31. The expression "fields of practice" had been attributed to the "leading Italian authority on malaria," Professor Celli. Dated 30 September 1904, His Majesty's Secretary of State for India. No. 153 (Revenue). "Notes," Home, Medical. June 1905. 200–4 A.
32. Being sensitive to the historical specificities which shaped medical knowledge about mosquitoes around the 1900s, this article distances itself from the methods adopted in significant ways by historical demographers and environmental historians like McNeill in his *Mosquito Empires* and Webb in *Humanity's Burden*, 32–49. See also, Dobson, "Marsh Fever." These scholars have projected the association of malaria with anopheles mosquitoes as a timeless truth and have retrospectively explained early modern events and mortalities in light of contemporary knowledge about malaria. Such practice of deliberate anachronism requires specific skills. However, this article intends to raise and explore distinctly different questions.
33. Home, Medical, May 1899, 156–9 A. Dated Calcutta, 23 January 1899. Dr Daniel's Report to the Secretary of the Malaria Investigation Committee of the Royal Society, London; Rogers, "The Relationship of Water supply," 474–6.
34. Home, Medical, December 1901, 69–72 A (NAI); Ross, *Mosquito Brigades*.
35. Ross, *Mosquito Brigades*, 69; For greater detail, see Swellengrebel, "How the Malaria Service in Indonesia Came Into Being," 148–50; Western and Frenkel, "Pretext or Prophylaxis?" 214–17.
36. Home, Medical, December 1901, 69–72 A, Dated 2 October 1901. Ronald Ross to the Under Secretary of State for India (NAI).
37. Horsfield and Moore, *A Catalogue of the Lepidopterous Insects*.
38. Helfer, "On the Indigenous Silkworms of India."
39. Chevers, *A Manual of Medical Jurisprudence for India*, 260, 350, 386, 564–7.
40. Holt, *Why Not Eat Insects?* 36–48.
41. Thompson, *Report on Insects*; Revenue and Agriculture, Agriculture, August 1894, 18–34 A (NAI); Atkinson, "On Pests Belonging to the Homopterous family," 121–3; Revenue and Agriculture, Agriculture, April 1892, 29 B; Revenue and Agriculture, Economic Products Branch, October 1904, 10 A (NAI).
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50. Ross, *Mosquito Brigades*, VI, 88; For political implications of the deployments of military metaphors vis-à-vis insects, see Russell III, "Speaking of Annihilation."
51. Anonymous, "The Malaria Expedition to West Africa," 36–7; Home, Medical, July 1909, 56–7 A. "The Committee of the Liverpool School of tropical medicine" (NAI).
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53. Home, Medical, April 1903, 2–3 A. Dated Bombay Castle, 17 March 1903 (NAI).
54. Home, Medical, September 1901, 139 A. Circular no. 2109A–S (NAI).
55. Ross, *Mosquito Brigades*, 72–3.
56. MacGregor, "The Fight Against Malaria," 152–60; Ross, *Mosquito Brigades*, 64, 69, 70.

57. Ross, *Mosquito Brigades*, 61–3.
58. Rogers, “Special Report on Fever in Dinajpur district,” 51.
59. See, for instance, Mukhopadhyaya, *Kankabati*; Thakur, “Likhi Kichu Saddho Ki” (How shall I write?), [poem written in 1941] *Rabindra Rachanabali*, 55; Rabindranath Thakur, “Moshok Mangal Gitika,” (Ode to Mosquitoes), [poem written in 1940] *Rabindra Rachanabali*, 55–6.
60. Saphari, *Mashari Rahasya*; see also, Mukhopadhyaya, *Korakey kit*.
61. Ray, *Mashar Hul*.
62. Bhattacharya, *Moshar Juddha*.
63. Mitra, “Mosha” (“Mosquitoes”). Originally published in the special Puja edition of *Alpana* (Deb Sahitya Kutir) in 1945. See also, Sengupta, “Sadhanbabu’s Friends.”
64. Ray, “Kaduni” (“The Tearful”).
65. McCollom, “The Role of Insects,” 183.
66. Manson, “The Malaria Parasite,” 226–8.
67. Many senior officials associated with the “mosquito brigades” were not entirely convinced with Ross “discovery” in the early 1900s. See Bynum, “An Experiment that Failed.”
68. Anon., “Latent Malaria,” 100.
69. Manson, “The Diagnosis of Malaria,” 1378.
70. Anon., “The Diagnosis of Latent Malaria,” 768.
71. *Ibid.*
72. Home, Sanitary, May 1910, 189–231 A. “Notes,” *Proceedings of the Imperial Malaria Conference*, October 1909, S. R. Christophers, “On malaria in the Punjab” and Dated Simla, 11 June 1909, J. T. W. Leslie to Secretary to the Government of India; Home, Sanitary, April 1910, 47–67 A. Dated 29 November 1909, A. W. Chaplin, Chairman, Duars Branch, Indian Tea Association to L. J. Kershaw, Financial Secretary to the Government (NAI).
73. Revenue and Agriculture, Agriculture, July 1907, 38–48 A. “Report by Edward Buck On the Control and Utilisation of Rivers and Drainage for the Fertilisation of Land and the Mitigation of Malaria”; Home, Medical, September 1901, 139 A. Circular no. 2109A–S; Home, Sanitary, May 1910, 189–231 A. J. W. T. Leslie, “Malaria in India”; *Proceedings of the Third Meeting of the General Malaria Committee at Madras November 1912*, p. 13 (Asiatic Society Calcutta).
74. Home, Medical, September 1901, 139 A. Circular no. 2109A–S (NAI).
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76. Home, Sanitary (henceforth Home, Sanitary) May 1910, 189–231 A. “Notes,” *Proceedings of the Imperial Malaria Conference* (henceforth *Proceedings*), October 1909. J. T. W. Leslie, “Malaria in India” (NAI).
77. *Ibid.*; S. R. Christophers, “On malaria in the Punjab”; Home, Sanitary, April 1910, 47–67 A. Dated 29 November 1909, A. W. Chaplin, Chairman, Duars Branch, Indian Tea Association to L. J. Kershaw, Financial Secretary to the Government (NAI).
78. *Proceedings of the Third Meeting of the General Malaria Committee at Madras November 1912*, p. 13 (Asiatic Society Calcutta).
79. Rogers, “Special Report on Fever,” 41, 48–9.
80. Home, Medical, 42 A, April 1904. Dated 13 October 1903, T. E. Tuson, Officiating Superintendent of Port Blair to The Secretary to the Government of India (NAI).
81. Stephens and Christophers, “An Investigation Into the Factors Which Determine Malarial Endemicity,” 23–4.
82. Home, Medical, June 1905, 200–4 A. “Notes,” Ronald Ross, The Prevention of Malaria in India (NAI).
83. Anonymous, “Malaria Expedition to West Africa,” 36; See also Home, Medical, December 1901, 69–72 A. Dated 2 October 1901, Ronald Ross to Under Secretary of State for India (NAI).
84. *Ibid.*
85. See, for instance, Stephens and Christophers, “An Investigation into the Factors which Determine Malarial Endemicity,” 23–4.
86. Home, Medical, March 1904, 38–9 A. Dated 15 December 1903, B. Franklin to Secretary, Government of India; Howard, “Recent Important Anti-Malaria Work,” 746; Home, Medical, October 1904, 53–4 A (NAI).
87. Home, Medical, March 1904, 38–9 A. Dated 15 December 1903, Surgeon General B. Franklin to Secretary to the Government of India (NAI).
88. Howard, “Recent Important Anti-Malaria Work,” 746.

89. Home, Medical, October 1904, 53–4 A (NAI).
90. Ross, *Mosquito Brigades*, 72–3; Home, Medical, September 1901, 139 A. Circular no. 2109A–S (NAI); MacGregor, “The Fight Against Malaria,” 157.
91. Revenue and Agriculture Department, Famine Branch, February 1903, 6–7 A (NAI).
92. Wood, “Remark on the Subject of the Microorganisms on the Disease,” 60–2.
93. Home, Medical, September 1901, 139 A. Circular no. 2109A–S (NAI).
94. See note 69 above.
95. Home, Sanitary, May 1910, 189–231 A. “Notes,” S. P. James, “Experimental Demonstration Camps,” *Proceedings*, 87 (NAI).
96. Home, Sanitary, May 1910, 189–231 A. “Notes II”, Dated 17 February 10, from C. A. Innes and dated 3 February 2010, from A. T. Gage.
97. Revenue and Agriculture, Agriculture, February 1911, 37–9 A. “Notes,” Cutting from the “Civil and Military Gazette,” dated 3 November 1910 (NAI).
98. Deleuze, “Postscript on the Societies of Control,” 3.
99. Home Department, Jails Branch, January 1910, 11–15 A. Dated 18 March 1909, W. S. Hamilton, Officiating Secretary to the Government of Punjab, Home (Jails) Department to the Secretary to the Government of India (NAI).
100. Ibid. Dated 31 July 1907, G. F. W. Braide, Inspector General of Prisons, Punjab to All Superintendents of Jails in the Punjab.
101. Home, Sanitary, May 1910, 189–231 A. “Notes” Leslie, “Malaria in India,” 4, 5, 9 (NAI).
102. Ibid.
103. Home, Sanitary, May 1910, 189–231 A. “Notes” W. G. King, “The Difficulties Which Beset the Practical Application of Anti-Malarial Measures,” 52–54.
104. Ibid.; C. A. Gill, “A Summary of Anti-Malaria Measures in the Punjab,” 139.
105. Ibid., “The Indian Tea Industry: The Labour Question,” Cutting from the *Statesman*, January 1, 1909.
106. Home Department, Jails Branch, January 1910, 11–15 A. Dated 4 July, 1908, G. F. W. Braide, Inspector General of Prisons, Punjab to All Superintendents in Punjab and dated 31 July 1907 (NAI).
107. Home, Sanitary, May 1910, 189–231 A. “The Indian Tea Industry: The Labour Question,” Cutting from the *Statesman*, 1 January 1909 and “Extract from the *Pioneer*, dated 12 April 1909.” “Notes,” C. A. Gill, “A Summary of Anti-Malaria Measures in the Punjab,” 138.
108. Ibid.; “Notes,” S. J. James, “Experimental Demonstration Camps,” 155–7.
109. Ibid.
110. Ibid., 90.
111. Home, Sanitary, May 1910, 232–5 A. Dated 8 November 1909, C. M. King to the Commissioner Lahore Division (NAI).
112. Home, Sanitary, May 1910, 189–231 A. “Notes,” S. P. James, “Experimental Demonstration Camps,” 90.
113. Ibid.; H. H. Risley, “Popular Cooperation in the Prevention of Malaria,” 96.
114. Home, Medical, April 1904, 46–7 A. “Notes”, Dated 30 December 1903, W. G. King, Sanitary Commissioner for Madras to the Secretary to the Government of Madras.
115. Mitchell, *Rule of Experts*, 42–3.
116. For repair and maintenance, see Latour, “Whose Cosmos, Which Cosmopolitics?” 459.
117. McClintock, *Imperial Leather*, 56.
118. Stoler and Cooper, *Tensions of Empire*, 31. On how regimes of governmentality and non-human agency enable one another, see Joyce, “What Is the Social in Social History?” 191–2.
119. Shukin, *Animal Capital*, 9–11.
120. Latour, *Reassembling the Social*, 72 and 52.
121. For critiques of Latour, see Schaffer, “The Eighteenth Brumaire of Bruno Latour,” 175–2; and Chakrabarti, “Beasts of Burden,” 125–8.
122. Agamben, *What Is an Apparatus?* 13–14.
123. de Castro, “Exchanging Perspectives,” 471.
124. Haraway, *When Species Meet*, 2, 23–7.
125. On the theme of co-constitution: see Trentmann, “Materiality in the Future of History,” 297, 300; Kirsch and Mitchell, “The Nature of Things,” 688; and Pickering, “The Mangle of Practice,” 559, 567, 576.

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