

## Tensions and Adaptation in Tropical Medicine: Lagos in the Networks of Malaria Science, 1890s–1906

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This paper probes into the wide array of networks that shaped malaria control in the colonial Lagos during the nineteenth and twentieth centuries. It highlights the role of tropical locales in the production of medical knowledge, emphasizing the ways colonial doctors read and contributed to imperial discourses on tropical diseases. Existing histories suggest the existence of wide-ranging inclusive and complex circuits of knowledge production networks of European institutions and persons who ventured into the field of tropical medicine. Malaria research undertaken in Lagos between the 1890s and the early 1900s generated key ideas and findings that impacted on imperial medical science. Attempts to deal with malaria also created sites for contestations between the imperial blueprint that emphasized racial segregation as a disease control measure from the local view that regarded outright segregation as economically suicidal, advocating instead for environmental control.

[Malaria Control; Lagos Medical History; Colonial Sanitation; Tropical Medicine]

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### Introduction

A peculiar feature of European empires is the interconnectedness of colonial states through their integration to the imperial network. The major agents of these interactions were “cosmopolitan groups” that navigated territories, impacting arts, culture, literature, and politics in Europe and in European empires.<sup>1</sup> In the sciences, foreign scientists colonial bureaucracies in small but efficient numbers occupying key administrative positions. The permeation of colonial bureaucracies and locales by

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<sup>1</sup> D. NEILL, *Network in Tropical Medicine. Internationalism, Colonialism, and the Rise of a Medical Specialty, 1890–1930*, Stanford 2012, p. 2.

foreign interest groups (like scientific organizations, missionary societies, trading firms and philanthropists) implies that developments within colonies were a product of this transnational system of engagement and exchange.<sup>2</sup>

For medicine, the trans-nationality of medical research emerged initially as a tool of empire that facilitated European imperial expansion in the tropics.<sup>3</sup> When they settled in the colonies, officials realized that the array of problems they faced required them to collaborate and share information with professional colleagues in neighbouring colonies. These collaborations deeply informed imperial medical science. Also important are the metropole-colony interactions that defined the mode of scientific knowledge production. In essence, colonies were integral in the development of tropical medicine not merely as testing sites but as contributors to ideas about tropical diseases, particularly malaria. Contrary to a one-directional transfer of medical knowledge as portrayed by modernization theorists,<sup>4</sup> Douglas Haynes argues that a dynamic and dialectical relationship existed between the imperial metropole and the periphery that underlay the institutionalisation of tropical medicine in Britain.<sup>5</sup> Additionally, the mobility of colonial doctors and metropolitan scientists to and fro colonies and metropolitan areas contributed to the framing and development of tropical medicine.

In this study, I examine the ways tropical medicine ideas were appropriated and reimagined by colonial scientists and administrators to suit their local contexts. Thus, local colonial officials and medical experts

<sup>2</sup> D. ARNOLD, Globalization and Contingent Colonialism: Towards a Transnational History of British India, in: *Journal of Colonialism and Colonial History* 16, 2, 2015.

<sup>3</sup> J. FARLEY, *Bilharzia: A History of Imperial Tropical Medicine*, Cambridge 1991, pp. 18–20; R. MACLEOD, Introduction, in: R. MACLEOD – L. MILOTON (eds.), *Disease, Medicine and Empire*, London 1988, pp. 1–18; M. WORBOYS, Manson, Ross, and Colonial Medical Policy: Tropical Medicine in London and Liverpool, 1899–1914, in: R. MACLEOD – L. MILOTON (eds.), *Disease, Medicine and Empire*, London 1988, pp. 21–37; M. WORBOYS, The Comparative History of Sleeping Sickness in East and Central Africa, 1900–1914, in: *History of Science* 32, 1994, pp. 89–102; L. LAPEYSSONNIE, *La médecine coloniale. Mythes et réalités*, Paris 1984, pp. 1–20; M. WORBOYS, The Emergence of Tropical Medicine: A Study in the Establishment of a Scientific Specialty, in: G. LEMAINE, (ed.), *Perspectives in the Emergence of Scientific Disciplines*, Paris 1976, pp. 73–96.

<sup>4</sup> G. BASALLA, The Spread of Western Science, in: *Science* 156, 3775, 1967, pp. 611–622.

<sup>5</sup> D. HAYNES, *Imperial Medicine: Patrick Manson and the Conquest of Tropical Disease*, Philadelphia 2001, p. 14.

are viewed here as a part of a gigantic international medical network. Yet, they remained important as stakeholders in the colonial medical service.<sup>6</sup> While tropical medicine was supported by the colonial office and metropolitan-based institutions of tropical medicine as a panacea to the complex problem of European mortality in tropical colonies, its development was due to the contribution of other local and transnational entities. As explained by Mark Harrison, Indian medical men had “*criticized widely-held medical opinions in Europe on the basis of their experience of 'new' diseases in the tropics and of the environmental conditions thought to be responsible for their propagation*”.<sup>7</sup> This transnational intellectual activity was prior to the 1880s and was important in shaping the understanding of tropical diseases in India and other tropical locales.<sup>8</sup> At the heart of this exchange were medical officers of colonial administrations and trading companies who had received prior knowledge of tropical diseases at reputable universities in Britain like Edinburgh University and transverse Europe and India with a hybrid of knowledge.<sup>9</sup>

Our story begins with the complicated interactions among the early experts of malaria science who sort to advance a plethora of theories and by extension position themselves as authorities in the field. I further explain how these theories were read by colony-based scientists, sometimes challenged, and sometimes implemented locally in certain ways. The colonial service in Lagos became actively involved in efforts to study malaria since the 1890s. The lead experts, William MacGregor (the governor of Lagos) and Henry Strachan (his principal medical officer) pursued advocated the policy of health publicity and the distribution of free quinine to the whole population of Lagos and its suburbs.<sup>10</sup> Beginning in 1899, William MacGregor prioritized the policy of compulsorily distributing quinine prophylaxis to government officials, further urging the distribution of the same to Africans in Lagos and its vicinity.

<sup>6</sup> WORBOYS, *The Comparative History of Sleeping*, pp. 89–102.

<sup>7</sup> M. HARRISON, *Tropical Medicine in Nineteenth-century India*, in: *British Journal of History of Science* 25, 1992, pp. 299–318.

<sup>8</sup> Ibid.; A. STOLER – F. COOPER, *Between Metropole and Colony: Rethinking a Research Agenda*, in: F. COOPER – A. STOLER (eds.), *Tensions of Empire: Colonial Cultures in a Bourgeois*, Berkeley 1997, pp. 1–58.

<sup>9</sup> HARRISON, pp. 299–318.

<sup>10</sup> P. CURTIN, *Medical Knowledge and Urban Planning in Colonial Tropical Africa*, in: S. FEIERMAN – J. JANZEN (eds.), *The Social Basis of Health and Healing in Africa*, Oxford 1992, pp. 594–613.

McGregor's approach was different from British imperial policy of segregation that was also advocated for by some scientific experts from the Royal Society's Malaria Committee. In 1898, Joseph Chamberlain (the Colonial Secretary) wrote to Lord Lister, the President of the Royal Society (1895–1900) on the need for the society to conduct a special study on malaria in colonies. In that same year, the Society constituted a Malaria Committee which would undertake intensive clinical and entomology studies to ascertain the presence of the malarial Plasmodium in humans.<sup>11</sup> In an 1899 study carried out in Freetown, two members of the committee, J. W. W. Stephens and S. R. Christophers advanced that the congested and unhygienic state of African houses were responsible for the breeding of *Anopheles*.<sup>12</sup> They argued further that “natives powerfully attract anopheles” because of the prevalence of Plasmodium strains in their blood.<sup>13</sup> They justified this with an experiment that was carried out in an African village called Mabang in Freetown, Sierra Leone. In a 1900 report on Malaria in West Africa, they identified Africans as the “prime agents of malarial infections”. They concluded that the prevalence of malarial infections in European settlements was connected to the proximity of such settlement to Africans.<sup>14</sup> They recommended segregation of Africans as the panacea to the health of European settlers. Later that year, Chamberlain received the society's report and agreed to its recommendation on segregation. In a memorandum to the authorities in West Africa, he cited Christopher and Stevens' report as a “*compelling justification for wide separation of European living quarters from concentrations of African children*”.<sup>15</sup>

MacGregor presented one of strongest opposition to the committee's report and the colonial office's instruction on segregation in West Africa. He disapproved of segregation on several grounds – more importantly on the impracticality of delineating colonial territories along racial lines due to the need for day-to-day political and economic engagements within the colonial state. In one of his lectures, MacGregor argues that “*to carry the idea of segregation to a logical conclusion, the governor of Lagos would have to*

<sup>11</sup> Joseph Chamberlain to William Macgregor, September 7, 1899. London School of Hygiene and Tropical Medicine Archives (hereafter LSHTM), Ross/66/27.

<sup>12</sup> J. STEPHENS – S. CHRISTOPHERS, Distribution of *Anopheles* in Sierra Leone, in: *Royal Society. Reports to the Malaria Committee*, London 1900, pp. 12–41.

<sup>13</sup> *Ibid.*, p. 57.

<sup>14</sup> *Ibid.*, p. 46.

<sup>15</sup> Chamberlain to Governors of Gold Coast and Lagos, May 31, 1900; Colonial Office Miscellaneous, 129, 47, p. 22.

*take shelter in a mosquito net when he receives the chiefs of the country [...]”*<sup>16</sup> For him, the only way to tackle malaria was to “*advance ourselves and take the natives along with us*”.<sup>17</sup>

There is a noticeable connection between MacGregor’s policy on malaria and theories advanced by his professional colleague and friend, Ronald Ross (one of the pioneers of the malaria theory). From 1899 to 1904, MacGregor and Strachan exchanged correspondences with Ronald Ross culminating in them inviting him to visit Lagos to do further malaria research. Ross and his colleagues at the Liverpool School of Tropical Medicine had since 1898 advanced a radical and holistic approach towards malaria that emphasized a rigorous sanitation program to destroy the habitats of the *Anopheles* larvae.

MacGregor’s relationship with Ross and his unwillingness to enforce the colonial policy of segregation suggests hidden and enduring internal politics and tensions between specialists within the British empire. Scientists and colonial authorities were aligned to diverse intellectual networks and perhaps factions. The internal rivalries of colonial authorities and scientific organizations impacted on the ideas of these scientists. For instance, despite his profound opposition to segregation and some other ideas of the Royal Society Malaria Committee, Ross at a later stage became submerged into the committee’s episteme as his superiors subsequently persuaded him to recognise the viability of segregation as a preventative measure against malaria.<sup>18</sup> In Lagos, MacGregor and Strachan also exhibited some seemingly noticeable inconsistencies in their approach towards malaria. While they did not support segregation, at least in their correspondences and speeches, their policies nonetheless laid the foundations for racial segregation in Lagos. There was a noticeable difference between their discourse and their policies. In their reaction to the complex internal politics within the scientific communities in the British Empire, they introduced slum clearance policies and forcefully removed Africans from their original habitats to ensure a convenient environment for European settlers. I depict the duo as gradual segregationists whose discourse on malaria contravened actual policies implemented.

<sup>16</sup> W. MACGREGOR, A Lecture on Malaria, in: *The British Medical Journal* 2, 2190, 1902, pp. 1889–1894.

<sup>17</sup> *Ibid.*

<sup>18</sup> R. DUMETT, The Campaign against Malaria and the Expansion of Scientific Medical and Sanitary Services in British West Africa, 1898–1910, in: *African Historical Studies* 1, 2, 1968, pp. 153–197.

## A Metropolitan Network: The Early Years of Malaria Science in European Empires

The last two decades of the nineteenth-century were important in the trajectory of medicine for several reasons. First, as already established in existing histories, this period launched a remarkable and sophisticated scientific episteme for solving the medical problems obstructing European imperialism in tropical colonies. The germ theory of disease was a part of a series of bacteriological and parasitological discourses that remodelled age-long explanations and assumptions about tropical diseases. In the case of malaria, explanations furthered in the 1880s by Alphonse Laveran, Patrick Manson, Robert Koch, Ronald Ross, and many others challenged the old miasmatic and humoral assumptions that malaria was caused by vapours in the air and certain imbalances in the human body.

The works of pioneers in tropical medicine was geared towards improving knowledge of these tropical diseases. They leveraged on scientific traditions that had commenced in the 1850s with Louis Pasteur's pioneering works on micro-organisms. Pasteur, by pioneering the microscopic study of microbes, he demystified the dominant "zymotic theory of disease" which like its close relative, *miasmatism*, furthered the assumption that tropical diseases were caused by "*the emission of miasmatic poison from fermented organic materials into the air under the favourable conditions of soil, temperature, and moisture*".<sup>19</sup> By building on these established traditions and also working closely with Pasteur, Alphonse Laveran pioneered the parasitological explanation on malaria. He demonstrated that a parasite, which he named *Oscillaria malariae*, was transmitted by mosquitoes and caused malaria in the bodies of its hosts.<sup>20</sup> The works of Patrick Manson, Giovanni Grassi, and Ronald Ross established the life cycle of the parasite and traced its transmission to the anopheles mosquito.

Of these pioneers, Ross earned the highest reputation for his discovery that malaria can be transmitted from infected mosquitoes as they bite healthy hosts. This distinguished Ross's work from that of his pioneers as they had not yet speculated that malaria is be transmitted through mosquito bites.<sup>21</sup> This earned him a Nobel Laureate in Medicine and reputation in tropical medicine.

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<sup>19</sup> F. SNOWDEN, *Epidemics and Society. From the Black Death to the Present*, New Haven, London 2019, pp. 184–203.

<sup>20</sup> S. JARCHO, Discovery in the Retrospect of a Century, in: *Bulletin of the History of Medicine* 58, 2, 1984, pp. 215–224.

<sup>21</sup> J. GUILLEMIN, Choosing Scientific Patrimony. Sir Ronald Ross, Alphonse Laveran,

Ross's popularity in malariology, like those of other pioneers, were influenced by the works of his colleagues within the scientific community. His profound but soon to deteriorate relationship with Patrick Manson revealed the strength of his thesis, exposing it to a wide-group of scientific audience.<sup>22</sup> He also enjoyed the support of his teachers – especially Surgeon-General Maclean who taught him about treating malaria and dysentery during his preliminary training at Netley prior to his deployment to the Indian Medical Service.<sup>23</sup> The rivalry between Ross and some of his colleagues, especially the Italian zoologist, Giovanni Grassi, also shaped his work on malaria. To update his knowledge of the *Anopheles* mosquito, Ross kept track with Grassi's work. By 1898, Grassi had proven to the scientific world that human malaria was transmitted by *Anopheles*.<sup>24</sup> To this end, Ross relied on the English physician Edmonston Charles to spy on Grassi at his laboratory in Via de Pretis.<sup>25</sup> The pace at which he advanced his research was influenced by his suspicion of Grassi's work and the urgency of publishing on the *Anopheles* before his Italian colleagues. The race went on till 1906 when Ross won the Nobel Prize in Physiology and Medicine.

Further, Ross broadened his epistemic network to accommodate a transnational and trans-colonial community of doctors since they were at the forefront of efforts to combat tropical diseases. He built this relationship during the various malaria expeditions of the Liverpool School of Tropical Medicine. His science was defined by some ideas borrowed from this community, especially from colonial doctors interested in tropical medicine. In 1899, Ross led the Liverpool School of Tropical Medicine to Freetown, Sierra Leone to study the distribution of the *Anopheles* in puddles and attendant mortalities among European population. This expedition and others that followed brought Ross in close contact with his primary subject of research, the *Anopheles*. It was also an opportunity to test some of his ideas on malaria control with the experts in the colonies.

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and the Mosquito-vector Hypothesis for Malaria, in: *Journal of the History of Medicine and Allied Sciences* 57, 4, 2002, pp. 385–409.

<sup>22</sup> R. ROSS, *The Beast in the Mosquito. The Correspondence of Ronald Ross and Patrick Manson*, Amsterdam, Atlanta 1998, pp. xi–xix.

<sup>23</sup> R. ROSS, *Memoirs. With a Full Account of the Great Malaria Problem and its Solution*, London 1923, p. 48.

<sup>24</sup> I. SHERMAN, *Malaria Vaccines: The Continuing Quest*, London 2016, p. 152.

<sup>25</sup> E. CAPANNA, Grassi versus Ross. Who Solved the Riddle of Malaria?, in: *International Microbiology* 9, 1, 2006, pp. 69–74.

He recommended regular oiling of puddles to kill mosquito larvae. During the expedition, his team drew a map of the puddles in Freetown and subsequently oiled them. He also set up informal communication with Frederick Cardew, the Acting-Governor of Freetown to communicate their findings on how malarial fever could be reduced.<sup>26</sup>

While Ross was interested in building this network, one of his biggest concerns was the apathy of the host government towards his findings. At various points, the governor and his principal medical officer, Dr. William Prout were skeptical about Ross' ideas on how malaria spread. Prout argued at some stage that while it is true that mosquitoes were responsible for the spread of the germ, it did not produce the parasite that affects humans. Instead, he believed that the parasites were produced in the puddles, picked up by the parasite and transmitted to humans.<sup>27</sup> Prout's idea differed from Ross's in that the latter believed that the colonial government's efforts should be geared towards eradicating mosquitoes through mosquito brigades. To Prout, the mosquitoes were not actually the problem. The problem was the insanitary environment that bred the parasite.<sup>28</sup>

Ross's hypothesis encountered another setback. This time, two scientists commissioned by the Royal Society Malaria Commission (J. W. W. Stephens and S. R. Christopher) queried the investigations and recommendation of the Liverpool School at Freetown on the ground that it failed to recognise the peculiarity of the tropical climate. The scientists discovered that the method of oiling puddles was only effective while the exercise lasted; the *Anopheles* larvae reappeared immediately when the team stopped oiling.<sup>29</sup> They also noted that the puddles illustrated in Ross's map were just a few of the several that bred *Anopheles* in Freetown. Further, they argued that Ross's assumption was wrong as he counted the puddles during the rainy season without taking cognizance of those that sprang up during other seasons. To this end, "*mosquitoes survived the dry season by using relict pools in the beds of two streams that ran through town*".<sup>30</sup>

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<sup>26</sup> E. AUSTEN, *Report of the Proceedings of the Expedition for the Study of the Causes of Malaria*, London 1899. Available from: <https://archive.org/details/reportofproceedi1899brit/page/n4/mode/2up>.

<sup>27</sup> G. HARRISON, *Mosquitoes, Malaria, and Man. A History of the Hostilities since 1880*, New York 1978, p. 17.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> J. BUSVINE, *Disease Transmission by Insects. Its Discovery and 90 years of Effort to Prevent it*, Berlin 1993, p. 18.



In place of the radical idea, Stephen and Christopher opted for what they saw as the cheaper and more realistic alternative, “to move the Europeans to a higher location above the town, while relying otherwise on quinine”.<sup>31</sup> Overall, Ross’s problem with professionals at Sierra Leone was the stern resistance and apathy of the local colonial officials towards what seemed like a radical sanitation policy.<sup>32</sup>

### Local Appropriation of Malaria Theories: Lagos, 1898–1906

While ideas and works of metropolitan scientists were important in shaping the aetiology of the disease, it took support from colonial doctors for some of their ideas to materialize. These scientific works were appreciated by a group of European doctors based in Africa that shared similar ideas and some political positions. Some local authorities embraced metropolitan theories that confirmed their existing or proposed antimalarial programs.<sup>33</sup> Ross’s ideas on malaria, that were criticized in Sierra Leone were embraced by colonial doctors and administrators in Lagos and in most colonies of French West Africa. The French West African authorities immensely admired Ross’s *Mosquito Brigade*, even while it was disapproved by the British Colonial Office and scientific institutions like the Royal Society Malaria Committee.<sup>34</sup> They liked it because it tallied with ideas that were already popular in their territories.

In Lagos, Ross’s idea gained remarkable currency especially Lagos under William MacGregor and Henry Strachan. After his visit to Freetown, Ross spent a considerable time undertaking entomological studies of the *Anopheles* mosquito species in Lagos swamps. With the assistance of Dr. Henry Strachan, he studied major swamps in Lagos from where he discovered swarms of *Anopheles* larvae in roadside puddles, which he immediately treated with oil.<sup>35</sup> Henry Strachan, the Principal Medical Officer, Lagos, wrote to Ronald Ross on malaria.<sup>36</sup> Among several reasons,

<sup>31</sup> Ibid.

<sup>32</sup> DUMMETT, p. 176.

<sup>33</sup> C. STROTHER, Waging War on Mosquitoes. Scientific Research and the Formation of Mosquito Brigades in French West Africa, 1899–1920, in: *Journal of the History of Medicine and Allied Sciences* 71, 4, 2016, pp. 447–468.

<sup>34</sup> Ibid.

<sup>35</sup> R. ROSS, The Malaria Expedition to Sierra Leone. Habits of *Anopheles* Continued – Possibility of Extirpation – Explanation of the Old Laws of Malaria, in: *The British Medical Journal*, October 14, 1899, 2(2024), p. 1034.

<sup>36</sup> Ronald Ross to A. H. Milne, August 13, 1899. LSHTM, Ross/66/26.

Strachan wanted Ross to visit Lagos because he could prove the abundance of *Anopheles* and *Culex* mosquitoes in Lagos.<sup>37</sup> Ross wrote to the Liverpool School on this subject and convinced them of the need to extend the scope of his work to Lagos and the Gold Coast.<sup>38</sup> The school authorized the mission and appointed Dr. Fielding Ould, a pathologist to join Ross and his colleagues in West Africa.<sup>39</sup> With this development, the second (malarial) expedition kicked off. It was headed by Ould and was dispatched to the Gold Coast and Lagos in the winter of 1899.

The expedition report reveals Ross and his colleagues' inconsistent stance on segregation. Upon visitation to Freetown, the team recommended that colonial authorities should consider building European quarters in elevated sites, quite far from the houses of the townspeople who could easily transmit the plasmodium to Europeans.<sup>40</sup> Kortright Hill was selected as a viable place to house Europeans in the colony. With this, the team was simply advancing an idea that was already popular elsewhere in the British Empire, specifically India. Philip Curtin laid hands on some British-Indian sources which justified the fact that the British adopted segregation schemes in the early 1860s to safeguard British troops, first against Indian mutiny, and subsequently from the appalling number of deaths from malaria among British soldiers.<sup>41</sup> This scheme, which drastically reduced the rate of mortalities among British soldiers, was highly instrumental in the adoption of a replica scheme in British West Africa, starting from 1900.<sup>42</sup>

When the Liverpool School arrived in Lagos, the team discovered a wide spatial distribution of *Anopheles* (larvae) to the extent that it was impossible "to make any distinction in favour of one part of the town as compared with another".<sup>43</sup> They found samples in every native hut, all European quarters, even in the Government House and hospital. While it was imperative to adopt a separatist policy in Freetown, it became unscientific to apply

<sup>37</sup> William Strachan to Ronald Ross, August 28, 1899. LSHTM, Ross/66/22.

<sup>38</sup> Ronald Ross to A. H. Milne, August 13, 1899. LSHTM, Ross/66/26.

<sup>39</sup> A. H. Milne to Ronald Ross, August 30, 1899. LSHTM, Ross/66/23.

<sup>40</sup> R. ROSS – H. ANNETT, *Report of the Malaria Expedition of the Liverpool School of Tropical Medicine and Medical Parasitology*, Liverpool 1900, p. 20.

<sup>41</sup> P. CURTIN, *Medical Knowledge and Urban Planning in Tropical Africa*, in: *American Historical Review*, 90, 1985, 3, pp. 594–613.

<sup>42</sup> J. CELL, *Anglo-Indian Medical Theory and the Origins of Segregation in West Africa*, in: *American Historical Review*, 91, 1986, pp. 307–335.

<sup>43</sup> FIELDING-OULD, *Observations at Freetown, Accra, and Lagos. In Malaria Expedition of the Liverpool School of Tropical Medicine and Medical Parasitology*, Liverpool 1900, p. 56.

the same rule in Lagos. When Ross wrote independently in less-official correspondences, he projected segregation as unscientific. This was a sharp contrast to what he presented through his scientific community. Ross firmly discounted segregation in his 1902 book, *Mosquito Brigades*. He argued that it was not cost-effective and unrealistic. He argued thus: “Unfortunately, segregation will in many cases necessitate the construction of fresh settlements at a large cost; it will protect only the persons who are segregated, and then only if such persons absolutely refrain from going into other parts of the town. It will often be very difficult for business men to adopt these measures.”<sup>44</sup>

As earlier observed, the discoveries made during these malaria expeditions were relegated by the British colonial office. Instead, studies carried out by the duo, Stephen and Christophers (both Royal Society Malaria Committee) were selected as the official template of malaria control policies in British West Africa. While the tropical school recommended a mild, gradual, and cautious approach in the implementation of segregation, the colonial office wanted radical and rigid segregation policies. They believed that it was scientifically impossible to accommodate Africans and Europeans in the same community as this would further complicate the health of Europeans and jeopardize imperial expansion. In their words, they argued that Europeans dwelling “in this quarter is thus living in the midst of dangerous sources of infection [...] the residents here are certain sooner or later to suffer from malaria”.<sup>45</sup> The Colonial Office took Christophers and Stephen’s recommendation as a justification to implement segregationist schemes, which were at the heart of colonialism anyway. Joseph Chamberlain starting from 1900 sanctioned that all colonial administrators promulgate segregation laws in their respective colonies. Existing literature on the study of racial segregation in the empire in the twentieth century are divided as to whether the need to guarantee the health of Europeans was the underpinning basis for the CO’s adoption of segregation policies. Thomas Gale in *Segregation in British West Africa* explores the series of deliberations between the CO and the Malaria Committee of the Royal Society on one hand, and the CO and colonial administrators on the other. He deduced from these official conversations that the CO’s approach towards segregation was objectively influenced by the need to safeguard European lives.<sup>46</sup> Maynard W. Swanson’s *Bubonic*

<sup>44</sup> R. ROSS, *Mosquito Brigades and how to Organise them*, New York 1902, p. 62.

<sup>45</sup> STEPHENS – CHRISTOPHERS, p. 47.

<sup>46</sup> T. GALE, Segregation in British West Africa, in: *Cahiers d’Etudes Africaines*, 20, 80, 1980, pp. 495–507.

*Plague and Urban Native Policy in the Cape Colony, 1900–09* explores how colonial authorities used European fears of epidemic diseases as a justification for residential segregation in Cape Town and Port Elizabeth.<sup>47</sup> Unlike Gale, Swanson explains how medical officials and other public authorities used scare tactics around epidemic diseases to promote segregation. Segregation was influenced by the prevalent racial thinking of the nineteenth-century, and not necessarily by the issues around European health. One could read from this literature that segregation was neither a scientific solution to health issues. Segregation only made it easier to concentrate medical services to a defined white population, occupying a defined area to the exclusion of the colonized.

In Lagos, the CO's mandate to their colonial officials to enforce segregation was heavily contested. In effect, available evidence suggests that the colonial administration in Lagos rarely received and appropriated ideas from CO and metropolitan institutions without reshaping them to suit their local realities and their theoretical inclinations. The key players in the control of malaria in Lagos were William MacGregor and Henry Strachan. They became renowned for their disagreement with the CO's positions on segregation as a disease control measure. They believed that adopting segregation policy in Lagos was apolitical and unscientific. While delivering a lecture on malaria to medical students in Glasgow University in 1902 he argued that *"it would be surely highly unscientific to leave the natives alone as a permanent prey to malaria, as perennial centers of infection to one another as well as to Europeans"*.<sup>48</sup> Also in a sarcastic remark, MacGregor argued that *"to carry out the idea of segregation to a logical conclusion, the Governor of Lagos would have to take shelter in a mosquito net when he receives the chiefs of the country; and when he sits in church immediately behind a choir of two or three scores of native boys, he would have to occupy a glass case or a wire cage"*.<sup>49</sup>

With this development, it was obvious that the government in Lagos was willing to take full responsibility for the control of malaria on their own terms. Speaking at the inaugural meeting of the Lagos Institute (an institution established by his government to cross-fertilize literacy, scientific, and intellectual ideas on the peculiar problems on Lagos) in October 1901, MacGregor made it clear that his government was fully committed

<sup>47</sup> M. SWANSON, *The Sanitation Syndrome: Bubonic Plague and Urban Native Policy in the Cape Colony, 1900–09*, in: W. BEINART – S. DUBOW (eds.), *Segregation and Apartheid in Twentieth Century South Africa*, London 1995, pp. 25–42.

<sup>48</sup> MACGREGOR, pp. 1889–1894.

<sup>49</sup> *Ibid.*, p. 1890.

to effecting a holistic antimalarial scheme that would completely root out the mosquitoes in Lagos.<sup>50</sup> He recounted suggestions within his government on the need for the government to establish special townships (which should take the forms of enclaves) for Europeans on the Oloke-Meji hill. According to him, “*it would be indolent folly to remit our efforts for the sanitation of Lagos on account of what may be done at Oloke-Meji [...] Do not deceive yourselves. Lagos is necessary and must be cured*”.<sup>51</sup> One could read the view of his government from this. The government was geared towards controlling the malaria problem in every part of Lagos which include Lagos Island and the Mainland. Geographically, Lagos Island is a very flat island with large areas of swamps on its North, West, and East sides.<sup>52</sup> The mainland was not entirely different from the Island as it bred mosquitoes just like the Island.

MacGregor’s stance on malaria control was shaped by his in-depth reading of Ross’s theory. There was a strong correlation between MacGregor’s justification for a holistic antimalarial policy and Ross’s discovery in Lagos. Ross and his team had earlier explained that the *Anopheles* was spatially distributed across Lagos and that it was practically impossible to confine European settlers to a terrain less-endemic of malaria. The slight difference between Ross and MacGregor’s idea on malaria is that the latter exhibited a stern opposition to segregation in official and unofficial discourses. Ross on the contrary advanced the possibility of segregation if an elevated terrain, suitable for European settlement, existed in Lagos. In the 1900 malaria expedition report, the team advanced the possibility of relocating the government house “*some twelve miles up the railway from Abutemetta*”.<sup>53</sup>

As much as MacGregor’s disapproval of the implementation of segregation supposedly reflected a posture of benevolence and sympathy to the colonized, one could read that it was dictated by practical economic considerations. Like him, the British traders in Lagos at that time thought it was impracticable for the colonial government to adopt a policy that would separately handle the medical problems of the diverse races (Africans and Europeans). They thought it would imply that the traders would incur more medical and other costs in their dealings with Africans

<sup>50</sup> Lagos institute, Proceedings of the inaugural meeting, October 16, 1901, LSHTM, Ross/83/02.

<sup>51</sup> Ibid.

<sup>52</sup> Lagos, *Annual Medical Report, 1900–1901*, p. 142.

<sup>53</sup> FIELDING-OULD, p. 56.

further inland than they could afford. Coupled with this is the fact that it would be impossible for European traders to practically carry out their businesses when such a scheme was in place.<sup>54</sup> The reason for this was explained in a 1900 publication of the Lagos Weekly Record: *“Individuality counts for a good deal in the conduct of a successful mercantile business, and individuality as such can only be developed and sustained by keeping in contact and touch with those dealt with. On the other hand, supposing that temporary segregation should be effected in the case of the European trader, it is doubtful if the few hours’ separation at night would even compensate for the wear and tear which the daily travelling from one place to another would entail, to say nothing of being beneficial in any other respects. Everything points to the conclusion that the most efficacious measure all round would be to improve conditions generally without introducing any line discrimination.”*<sup>55</sup>

The government at that time also felt that there were no means European settlements would thrive without African labour. At this time, Africans were employed by European traders, clergies, and officials as servants. Therefore, it was obvious that the only way to realize the implementation of the scheme was to replace African servants with Europeans. Also is the fact that the government thought it was unwise to construct European living spaces on Lagos Island when they were in the process of expanding British official presence to the hinterland. Starting from 1861 when the government took official control of Lagos, European officials were often meant to navigate through the Yoruba forest to negotiate land and trading agreements with Yoruba towns and villages located in the interior. If these realities existed, the segregation of Europeans and Africans was only a chimerical suggestion.

While it was imperative for the colonial administration in Lagos to adopt a distinct stance on segregation, it became by implication more important to adopt an alternative scheme that would recognize certain local realities in the territory. To this end, MacGregor sought for a scheme that would cut across every community and race in Lagos. One of the ways he sought to realise this was to encourage malarial research among his medical officials that would provide details of the complexities of the problem. At this time, this was perhaps more unrealistic as the segregation scheme as Lagos lacked the requisite manpower and technologies to

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<sup>54</sup> The Lagos Weekly Record, August 25, 1900; The Lagos Weekly Record, October 20, 1900.

<sup>55</sup> Ibid.

effectively carry out entomological and clinical research on malaria. Only two medical professionals could efficiently and successfully conduct these researches. Macgregor's government had to rely on a collaborative effort between medical officials in Lagos and the Liverpool school in solving this problem.

At the beginning of the twentieth century, colonial officials like Henry Strachan and J. D. Small (an Assistant Colonial Surgeon) had very interesting professional relationships with the tropical schools. Strachan who was one of the key colonial scientists in Lagos had a robust relationship with Ronald Ross and on several occasions collaborated with him in collecting mosquito species in marshes and swamps in Lagos. In 1900, Strachan and J. D. Small examined some swamps in Lagos where they found hundreds of larvae of both the *Anopheles* and *Culex Genera*, more especially the former. They found *Anopheles* larvae in abundance even in the large pieces of swamp where there are plenty of mud fish.<sup>56</sup> Another important discovery is the fact that there were no traces of *Anopheles* and *Culex* larvae in the Lagos Lagoon (because of her quick running tide), shallow pools of water containing soap suds, which were frequently seen near the numerous washing sheds. Most of the findings of this research were presented to the Liverpool School and contributed to the aetiology of the disease.

Series of experiments were conducted on African bodies by Strachan. Africans were used in several cases as subjects to advance an understanding of the lifecycle of the Plasmodium in human hosts. On one occasion, Ross wrote to Strachan requesting him to conduct medical trials on African soldiers that were in-patients in the African ward of the Lagos Hospital. One of Ross' requests was that these patients should be exposed to mosquito bites to ascertain the condition of life of the Plasmodium in the human bloodstream.<sup>57</sup> Strachan failed to acquire approval from his superiors to extract the samples on ethical grounds. In 1901, he subsequently commenced the collection of blood samples in Ikerun, Oshogbo, Ogbomosho, Ede, and Iwo (all communities in southwestern Nigeria) to ascertain the incidence of malaria in African communities.<sup>58</sup> He subjected the blood samples to microscopic research during which he investigated the medical history of some of his research subjects, who

<sup>56</sup> Lagos, *Annual medical report, 1900–1901*, p. 143.

<sup>57</sup> Strachan to Ross, July 14, 1899. LSHTM, Ross/66/13.

<sup>58</sup> Notes on a tour to inspect the chief towns on the route from Ibadan to Ikerun, October 18, 1901. LSHTM, Ross/83/13.

were in most cases children.<sup>59</sup> From his experiment, Strachan discovered the presence of leukocytes which proved that the malaria *Plasmodium* was predominantly available in the bloodstream of his subjects.<sup>60</sup>

Strachan's study at this point contributed significantly to some of the complex issues around the aetiology of the disease. It brought to question ideas around 'native immunity' that had earlier been advanced by Robert Koch, a German bacteriologist. In the 1800s, Koch was commissioned by the German Foreign Service to study the aetiology of the disease in German New Guinea. He discovered in his research that continuous infections during childhood made adults living in malaria endemic areas less susceptible to the disease.<sup>61</sup> Apart from the fact that Koch's position made it quite difficult to imagine malaria as a major problem confronted by the indigenous peoples in the tropics, it served as a justification for the adoption of segregation policies by the British colonial office. Koch's theory on "native immunity" further laid credence to suspicions about supposedly malaria-ridden African domiciles. In its proposal to the CO, the Royal Society Malaria Committee cited Koch's explanation on immunity as a justification for the separation of Europeans from African children.<sup>62</sup>

In his *Diseases and how to Prevent Them*, a lecture delivered to Africans in 1901, Strachan presented a very strong criticism of the existing scientific traditions of African immunity. He argued that Africans actually died "in terrible numbers" from the disease and that the government had the duty to "prevent the loss to the population".<sup>63</sup> In a 1904 rejoinder to Koch's "native immunity" theory, Strachan further argued that African adults (not only children) suffered as much as Europeans from malaria.<sup>64</sup> He noted further that African adults only acquire partial immunity during their formative years as they were susceptible, either at greater or lesser intervals to more or mild attacks of malaria. To buttress his argument, Strachan presented figures of malaria mortality among Africans of various ages in Lagos.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid.

<sup>61</sup> I. SHERMAN, *Malaria Genome Projects. Promise, Progress, and Prospects*, London 2012, p. 195.

<sup>62</sup> Malaria Committee of Royal Society to C. O., pp. 1, 25–26.

<sup>63</sup> A course of simple lectures on elementary hygiene. LSHTM, Ross/66/30, p. 5.

<sup>64</sup> H. STRACHAN, Alleged Negro Immunity to Malaria, in: *British Medical Journal* 1, 2307, 1905, pp. 625–626.



Year	Total for all ages	Under 1 Year	1 to 5 Years	5 to 20 Years	20 Years to 75 Upwards
1900	491	282	50	34	125
1901	493	311	53	27	102
1902	473	263	55	42	113
1903	427	258	46	26	97
1904	493	314	71	28	80

Strachan's research presented to Macgregor's government, empire, and the community of tropical medicine that the nineteenth-century science of African immunity was not sufficient in explaining malaria in Africa. He contended therefore that policies of the colonial governments should be geared towards the entire races in colonies.

#### **How Ideas Materialize into Actions: Antimalarial Policies in Lagos, 1900–1906**

Strachan laid considerable emphasis on domestic sanitation and other capital-intensive antimalarial schemes as opposed to segregation. First, he and Macgregor emphasized on sanitizing government offices and residential areas (both Native and European) in Lagos Island and the execution of various reclamation schemes in Iddo Island, Ebute Metta and some parts of Yaba. MacGregor's sanitation schemes came in form of land reclamations, the construction of drainages and the enactment of a series of sanitary laws. These were carried out in most parts of the colony.<sup>65</sup> One of the major works of the government was the landfilling of the Kokomaiko and adjoining swamplands in 1901. By 1906, the government had implemented reclamation works in Alakoro Swamp, Ajassa, Elegbata, Isale-Gangan, Magazie Point and Idumagbo.<sup>66</sup> The government justified the overconcentration of her reclamation schemes to Lagos Island because the area lies so low; the highest part being only a few feet above sea level with a population of over 70,000.<sup>67</sup> To effectively implement the sanitation in Lagos Island, the government demarcated Lagos into four districts (A, B, C, D) under the administration of four sanitary inspectors. The inspectors were charged with the responsibility

<sup>65</sup> Lagos, Report of anti-mosquito campaign, December 1929, Vol. 1. National Archives Ibadan (hereafter NAI), CSO 26/981.

<sup>66</sup> Lagos, Blue Book, 1904, September 9, 1905, No. 470, para. 9.

<sup>67</sup> Southern Nigeria, Colonial Annual Report, October 21, 1907, para. 77, p. 190.

of performing vaccination and the supervision of sanitation regimes in their respective districts. They were placed under the control of the District Medical Officer.

While MacGregor and Strachan presented strong vocal opposition to the CO's prescribed policy on segregation, a closer glance at their policies reveal some disconnect between official discourses and actual actions. To some extent, they laid the basis for future segregationist policies through some of their racist and separatist policies. One of such was their involvement in the slum clearance project in Lagos. This policy was the forceful removal of the urban poor (invariably Africans) from their original settlements to new improvised communities. It took the form of a land expropriation ordinance. The Ordinance gave power for the compulsory expropriation of land for public use. It read thus: "*It shall be lawful for the Colonial Secretary to agree with the owners of any lands required for the service of the Colony paying such reasonable compensation thereon as may be due to the owners thereof.*"<sup>68</sup> The government took the first step to implement the ordinance in Ebute Metta in 1902. In a bid to renovate certain parts of Lagos, most especially Lagos Island and Ebute Metta, the government sought "*to clear and clean sweep most parts of Ebute Metta so as to cause St. Paul's Church to form the line of future frontage*".<sup>69</sup> Two central objectives could be discerned from the decision of the government. First, the government made the African landowners realize that they (landowners) owned these properties subject to the will of the government and that the government could step in at any time and appropriate the land by paying as compensation a price that would be determined by the government. The major victims of this rule were African landowners. Second is that landowners were obliged to clear, fence, and properly care for the land; failure to do so would necessitate heavy penalties from the government.<sup>70</sup> One could read through the policy and infer that while the government was enforcing the landowners to take responsibilities for their lands, their security of tenure were not guaranteed. They were relegated to the position of mere caretakers and not necessarily, owners. The policy raised so much suspicion and criticism from the African public in Lagos.

Some Lagos residents felt Macgregor's government was covertly laying a foundation for a segregation policy and that he was only trying to

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<sup>68</sup> *The Lagos Weekly Record*, July 29, 1903.

<sup>69</sup> *Ibid.*, May 17, 1902.

<sup>70</sup> *Ibid.*, December 27, 1902.

establish the legal framings for a future move.<sup>71</sup> There were hints in the public that the government was only trying to dislocate the Africans from their lands and reallocate it to European industries and traders. *The Lagos Weekly Record* captures one of these popular biases: “It is generally held that the object of the scheme is to clear the native away from the railway environment, while it is hinted that a portion of the land will be used for the construction of a hotel by a European. It is not likely that the native owners of the property will be paid adequately for their properties, and the scheme, whatever it is, must work to the detriment of the local industry. At all events, the future will disclose whether the scheme involves segregation as is supposed or not.”<sup>72</sup>

The public could also read that the ordinance and the scheme in Ebute Metta was a means for the government to pervasively allocate lands when any colonial official or soldiers need dwellings or barracks (as the case might be), the colonial government has the power within the law to forcefully expropriate the properties of Africans without their being rewarded anything like reasonable compensation.<sup>73</sup> While these suggestions were roaming the press and the public, the MacGregor’s government dismissed them as mere rumours. They emphasized that the government was committed to pursuing a general antimalarial policy and not one that delineated races.

MacGregor’s tenure as governor ended in 1904. Within a few years after his departure from Lagos, the impact of some of his policies became evident. For instance, his land expropriation ordinance shared remarkable similarities with Frederick Lugard’s Town Planning Ordinance of 1917 which further delineated Lagos into European reserves and native settlements. While the former laid the foundation for segregation, the later consolidated these policies and formalized racial segregation in Lagos. Also, the difference between MacGregor’s talk from his actions proves further that while colonial and metropolitan authorities were swayed by diverse influences and epistemic networks, there were no remarkable differences in the ways these authorities approached issues central to imperial advancement. While they were involved in some epistemic debates on medical issues, they rarely relegated issues that affected their primary mandates to the background. On some occasions, the talk was a facade that accentuated a sense of belonging to a rival epistemic community.

<sup>71</sup> Ibid., May 17, 1902.

<sup>72</sup> Ibid.

<sup>73</sup> Ibid., July 29, 1903.

In the case of Macgregor and Strachan, they were gradual segregationists who did not want to radically introduce segregation outright.

### Conclusion

Recognizing the influence of imperial science on colonial spaces, our paper focused on a neglected theme – the role of colonial locales in debates and in policies on disease control. From our study of early colonial Lagos, medical knowledge transmitted through imperial apparatuses usually had a one size fits all approach that rarely took into cognizance the nuances of the locality in which such recommendations were to be implemented. This bred resistance and tensions within epistemic networks and colonial bureaucracies. This resistance impacted on the overall imperial medical project. Knowledgeable colonial administrators and their doctors exercised their agency and powers to reject, and sometimes to accept with modifications key ideas of medical experts to make them more relevant to their local peculiarities. In instances when such expert knowledge from metropolitan medical institutions was discarded, they did so without recourse to official hierarchical structure within the colonial bureaucracy. In Lagos, colonial authorities intervened in debates by presenting superior arguments based on their lived experiences and research to challenge instructions from above.

This reality presented here points to the fact that metropolitan institutions and scientists were only as powerful as colonial administrators and doctors made them to be. This view reasserts David Wade Chambers and Richard Gillespie's argument that the intricacies of colonial science was pivoted by a "polycentric communications network," with multiple layers of authority and interactions.<sup>74</sup> So, in some cases, medicine like other sciences was swayed by forces beyond those prescribed from imperial headquarters. The local appropriation of malaria ideas and policies by colonial administrators and doctors persuades one to think of Western medical policies in African colonies as a product of a hybrid of ideas, some of which were not out-rightly imperial. Colonial doctors and their colleagues in metropolitan areas had a profoundly professional relationship

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<sup>74</sup> D. CHAMBERS – R. GILLESPIE, *Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge*, *Osiris* 15, 2, 2000, pp. 221–240; also see, H. TILLEY, *Africa as a Living Laboratory. Empire, Development, and the Problem of Scientific Knowledge, 1870–1950*, Chicago, London 2011, p. 314; M. HARRISON, *Tropical Medicine in Nineteenth-century India*, in: *British Journal of History of Science* 25, 1992, pp. 299–318.

that facilitated a two-way exchange of ideas between colonies and the metropolis. When MacGregor and Strachan engaged Ross, they sought a professional relationship with a highly respected medical authority. They collaborated with Ross to justify their ideas of malarial control as Ross was not initially in favour of segregation, and even disregarded the ideas promoted by the colonial office and the Royal Society Malaria Committee.

