"LOCALISING TROPICAL MEDICINE": A HISTORY OF THE MEDICAL RESEARCH INSTITUTE (MRI) IN COLONIAL LAGOS, 1907–1920s

Adedamola S. Adetiba[a]

Abstract: This article explores an early episode in the history of tropical medicine in colonial Lagos, British West Africa. It probes into the activities and outputs of scientists who operated within the Medical Research Institute (MRI) as a way to further complicate the agendas of tropical medicine. Scientists of the MRI undertook biomedical experimentation with a profound understanding of metropolitan and local imperatives as both determined the extent to which they contributed to popular discourses. The present paper explores the extent to which metropole-colony relations triggered local scientists at the MRI to resort to all available means, including human experimentation, in the course of ambitious scientific projects. In certain other contexts, international and local motivations converged to sway the ambivalent postures of colonial scientists to biomedical experimentation.

Keywords: *tropical medicine, Yaba, experiment, colonial, malaria*, *West African Medical Service (WAMS)*

Introduction

The present article analyses the factors that engendered biomedical research in tropical colonies, focusing on Lagos. It explores key milestones in the history of the Medical Research Institute (MRI), Lagos, from 1907 – when it was established – to the 1920s – when it gradually faded and made way for an international research facility, the Yellow Fever Research Institute (YFRI) of the Rockefeller Foundation. In this way the article analyses how interventions from international and more metropolitan institutions and platforms (the Advisory Committee of the Tropical Diseases Fund, tropical medicine pioneers, schools of tropical medicine, etc.) stimulated the intensity of scientific engagements in British West African colonies during the first two decades of the twentieth century. This period stands out in the long history of

a Department of History, Rhodes University, South Africa, E-mail: damolascripts@gmail.com. This research has benefitted from a generous postdoctoral award from Rhodes University.

medical research in tropical colonies as local biomedical laboratories sprung to challenge an apparent monopoly of metropolitan institutions in varied scientific endeavours, most significantly, tropical medicine.

This research delves into the original mindsets of the British empire in facilitating the establishment of colonial laboratories during the 1900s and how that shaped the endeavours of a wide array of scientists working at the MRI from 1907 to the 1920s. This historical case study highlights the decisiveness of the empire to centrally coordinate medical research in tropical colonies from metropolitan Europe through quite monumental institutions like the Advisory Committee of Tropical Research Funds (formed in 1904). The imperial tropical medicine framework justifies the MRI's sheer interest in bacteriology and parasitology and its numbness towards public health, drug discovery and vaccine research. The posture of the empire also amplifies an international division of labour system that existed to confine tropical colonies in certain aspects of biomedicine. It is glaring from this history that medical research was geared towards keeping colonial laboratories as enclaves for metropolitan-based institutions to carry out ambitious research agendas – specifically, the collection and transfer of research samples, specimens, biomedical data and intelligence, and local review of popular aetiologies of diseases. These relatively rigid dispositions toward medical research meant a perpetual disconnect between supposedly "local" research hubs and the public health realities in host territories.

Beyond this, the present article looks inward to comprehend how "local scientists" interacted with agendas pre-defined for them from the metropole. In local sites like Lagos, interventions from international actors were often met with stern criticisms and resistances from officials of the West African Medical Staff (WAMS) and colonial subjects needed for scientific research trials. The latter were "human material necessary for research projects" (Graboyes 2014: 379). By being integral parts of the biomedical research network, these two local categories embellished metropolitan research agendas differently. In some instances, they reconstrued ideas and policies that were popular elsewhere within European empires to suit their experiences of local conditions and expediences. This, of course, facilitated the production of new modes of scientific knowledge by supposed amateur scientists. In the instance of colonial subjects, their perceptions and, by extension, responses towards research projects transformed the focus

and pattern of scientific engagements. Apathy towards medical research, especially human experimentation, was excused on cultural grounds and often redirected medical research and intervention processes.

Medical intervention evolved as a means to galvanise African participation in human experimentation. The resilience of the African population towards medical research formed a significant part of broader medical discourses within the WAMS bureaucracy. Officials prioritised reaching out to communities that rarely encountered Western medicine in order to encourage their participation in medical research. This article will show how this local improvisation speaks to medical research and medical intervention histories, respectively. The two histories are interconnected, especially in the British Empire, where the colonial office and other constituent units alloyed medical intervention with medical research. In areas where it was strongly emphasised, public health served as means to experiment the efficacy and side-effects of drugs on the unsuspecting population and screen the local population to verify the spatial distribution and incidence of diseases and appropriate ideas that were ordinarily not in circulation within the cosmopolitan public.

The present article contributes to one of the lingering issues in the history of medicine in Africa – specifically, it investigates the diverse circuits of scientific networks and alliances that shaped the tropical medicine speciality in colonial Nigeria. As admonished by Maureen Malowany (2000), these networks provide a lucid lens for historians to rationalise the knowledge of medical authorities in colonial territories on exact policies. She advocated a new wave of scholarship that would appreciate the crisscrossing of ideas and experts across national and international boundaries beyond case studies of specific colonies and empires. The oeuvre of historical scholarship on medicine in Africa that has evolved since 2000 speaks to the extent to which Malowany's point was taken. There has since been a drastic change in the ways historians view the phenomenon of health and medical care in colonial Africa. Authors such as Helen Tilley (2011: 5) have proven that the posture of the colonial office towards healthcare during the interwar and postwar years was shaped by how well a metropolitan initiative (the African Research Survey) was taken. Medical knowledge is seen in more recent studies as products of commonalities among cosmopolitan scientists with shared identities and values on imperialism and medicine (Neill 2012: 5).

The present study explores the extent to which metropole-colony relations triggered local scientists at the MRI to resort to all available means, including human experimentation, in the course of ambitious scientific projects. As a result, these scientists lived to fulfill high expectations set by pioneers elsewhere within their epistemic communities by relating through an imperial and professional framework. In this case, we describe human experimentation as a consequence of pressures scientists had to endure and succumb to. Existing literature on the history of medical research in other climes has proven that coercion and manipulation on colonial subjects were the norms of the twentieth century (Graboyse 2014; Jones 1993; Lederer 1995; Savitt 1982; Washington 2006). It, therefore, proves further that scientists at the MRI were simply relating within the ambit of the professional ethics of the time; nothing was specifically distinctive or exceptional from developments elsewhere.

The Expediencies of a Laboratory in the Tropics

The tropics was perceived in several ways during diverse episodes in the history of European empires. During the early European exploration of the area, tropical Africa was presumed a vast paradisiacal landscape awaiting exploration. Its intrinsic buoyant resources (both human and material) were important themes in early European accounts on the continent. The quest to explore these enormous resources was specifically undermined by fears of the unknown. As was the case with fifteenth-century Portuguese explorers, such apprehensions were fuelled by rumours about a devastating climate and the difficulty of navigating West African waters without explorers losing their way (Tymowski 2014). With continuous interaction with the tropics, it slowly became clear to Europeans that navigating and exploring the landscape, settling in terrain suitable for European habitation, and eventually colonizing the territories, peoples and resources, were feasible. Thus, within a while, specifically from the eighteenth century on, European traders, sailors and armies built their commercial, military and social spaces in the tropics (Bhattacharya 2012).

European settlement and prolonged stay in the tropics came at a high cost (and an almost insurmountable task) to trading companies, Christian mission societies and colonial administrators. In addition, European susceptibility to the disease environment and diseases such as malaria, yellow fever, dysentery, smallpox and intestinal infections resulted in many deaths. Moreover, it

continued to decimate the population of newcomers within the first year of relocation (Feinberg 1989: 87). This, of course, had profound implications for Europeans' imperial quests in the tropics, most especially in the ways it discouraged a massive influx of highly valuable officials from managing quite ambitious commercial interests. In the next century, the alarming rate of European deaths had earned the tropics very infamous labels like "the Whiteman's grave" and "the dark and dank continent" (Curtin 1961; 1998).

At this point the tropics became an important site of inquiry to European medicine men who hypothesised on practical ways Europeans could survive in the disease environment. European physicians wrote quite extensively on the reasons why Europeans rarely survived in an utterly diverse climate (Lind 1771; Johnson 1821). European physicians of this era, such as James Lind and James Johnson, emphasised the need for European travellers to adopt the ways of life, especially food, clothing and behaviour of indigenous populations. Accentuating medical and racial acclimatisation theories, they also recommended that by limiting their exposure to sunshine, physical labour and the consumption of food, European settlers could be trans-bodied to survive in tropical climates within two years (Pols 2018). This played out in some ways, especially in the ways regular patronage of African therapies and cuisines by Europeans improved their chances of survival in the tropics. Feinberg (1989) provided evidence of a pattern of European consultations with African medicine men in efforts to search for a cure from severe diseases. Moreso, other factors played out in facilitating European survival in the tropics. In what reads like a triumphalist perspective of Western medicine in Africa, Philip Curtin has argued that the tropics became surmountable due to remarkable breakthroughs with quests by European medicine-men to unravel the aetiology of tropical diseases (Curtin 1990). The discovery of quinine (a Western modification of a Peruvian herb, the cinchona) in the 1820s, the rapid and entirely consistent development of colonial health infrastructure, and the subsequent success of European antimalarial efforts resulted in a sharp decline in European mortality rate on the continent.

Also remarkable was the development and progress of a new medical specialism, tropical medicine, which advanced laboratory medicine in the tropics in order to advance and verify insect-vector theories of filaria, malaria and sleeping sickness. Since the commencement of this new discipline, the tropics became a laboratory, both in the literary and metaphorical sense. Most

of the theories advanced were incubated in the tropics and were products of specimens collected and verified in the tropics. With Ronald Ross (one of the pioneers of malaria science), the tropical Indian sub-continent housed his laboratory, where he linked malaria with the *Anopheles* mosquito. His laboratory at Secunderabad, India, was a vista through which he interacted with the tropics and its constituents (Cook 2007). A more recent postcolonial perspective on Ross' research suggests how the tropics and his laboratory served as a screen through which he encountered Indian folk medicine. From there, he collected, modified, and transferred local knowledge of malaria (Ghosh 1995).

Tropical medicine professionals conceived these local spaces as essential components of their endeavours in tropical medicine and other cognate biomedical specialties. They required research outposts, or better put, enclaves where wide-ranging biomedical ideas would be facilitated, experimented with, and verified. These represented opportunities for advancement through discoveries and challenges, glamour and the lure of exotic field locations in which to practise their science (Bhattacharya 2012). For instance, in a bid to properly understand the aetiology of malaria, leading metropolitan institutions of the British Empire (the Royal Society Malaria Committee and the Liverpool School of Tropical Medicine) advanced the need for well-funded medical expeditions to tropical colonies as a way to gather specimens of mosquitos and blood samples of malaria patients. In this way, they were able to properly rationalise the aetiology of the disease and recommend pragmatic control measures that the colonial office and subordinate bureaucracies would adopt.

In specific contexts, like Nandini Bhattacharya's case study in colonial India, scientists of tropical medicine took cognizance of the peculiarity of the array of knowledge produced or reproduced in tropical colonies (Bhattacharya 2012). The tropics were important sites because they allowed pioneer tropical medicine scientists to learn and test disease theories within diverse local ecological conditions and specific political economy contexts. In these spaces, pioneers like Ronald Ross of the Liverpool School of Tropical Medicine leveraged on relationships with local colleagues elsewhere in India, Freetown and Lagos in order to shape their professional thoughts on tropical diseases.

For instance, the Liverpool school's malaria expedition to West Africa in the 1890s was specifically organised to solve several puzzles about the aetiology

of the disease onsite. In addition, the school saw the expedition as expedient to gather much helpful knowledge relative to the cause of malaria as well as zoological specimens for the British Museum. Ross saw the expedition as important to improving already existing malaria theories. In the previous years, while working in India, he had proven the possibility of man-to-man transmission of the malaria parasite (White 2003: 1201). This important fact was also affirmed by the Italian school, composed of Professors Grassi, Bignami and Bastianelli. However, many details remained unknown about the breeding of mosquitoes and the possible ways to destroy the mosquitoes and their breeding sites. Hence, an onsite investigation of mosquito species and breeding sites became a subject that could only be studied in the tropics, the epicentre of the malaria epidemic, with the assistance of colonial doctors on the ground who have mastered the local geography and potential mosquito breeding sites.

This development provides insights into the position of the tropics in the network of tropical medicine during its formative years. At the time, researchers conceived of and pursued tropical medicine through imperial and international networks of knowledge (Worboys 1988). Ideas of tropical medicine were formulated in the tropics by a caste of physicians not necessarily trained in science but with profound expertise in disease control. The tropics provided research sites for collecting research specimens, validating the medical hypothesis and eventually negotiating disease control measures within a local social and ecological context.

Initially, the tropics was not constructed for sophisticated clinical works as it lacked the much-required laboratory facilities. Ronald Ross's relationship with his professional colleagues in Lagos, William MacGregor, and Henry Strachan, further reveals the nature of this metropole-colony network. In 1899, Ross spent considerable time undertaking entomological studies of the *Anopheles* mosquito species in West Africa. Through the assistance of Dr. Henry Strachan, he was able to study major swamps in Lagos where he discovered swarms of *Anopheles* larvae in roadside puddles, which he immediately commenced to treat with oil (Ross to Milne 1899). Strachan influenced this expedition through his writing to Ross on some of his observations about mosquito breeding in the local swamps in Lagos (Ross to Milne 1899). Among several reasons, Strachan wanted Ross to visit Lagos because he could prove the abundance of *Anopheles* and *Culex* mosquitoes

in Lagos (Strachan to Ross 1899). Ross wrote to the Liverpool School on this subject and convinced them of the need to extend the scope of the expedition's work to Lagos and the Gold Coast (Ross to Milne 1899). The school authorised the mission and appointed Dr. Fielding Ould, a pathologist, to join Ross and his colleagues in West Africa (Milne to Ross 1899). With this development, the second (malarial) expedition kicked off. It was headed by Ould and was dispatched to the Gold Coast and Lagos in 1899. A third expedition, headed by Dr. H.E. Annett, Dr. J.E. Dutton and Dr. Elliott was also dispatched to Northern and Southern Nigeria in the spring of 1900 (Anonymous 1906: 567). Till the next century, the colonial office was focused on sustaining the status quo on tropical medicine research. Joseph Chamberlain, the colonial secretary, opted for a centralisation policy that frequently promoted the research agendas of metropolitan institutions and scientists at the expense of developing the research capacities of colonies. He prefered the coordination of tropical medicine from Britain, which colonial medical officers had to visit frequently for training, instructions and admonitions on the most appropriate ways to tackle local problems (Chamberlain to the Governors 1903). The tropics appealed to Chamberlain and his colleagues as a laboratory where sophisticated ideas, framed in Western, temperate and metropolitan landscapes, were experimented with for local and imperial use.

Localising Tropical Medicine: The Early Years of the Medical Research Institute

By the time Chamberlain left his position as colonial secretary, the colonial office's disposition towards tropical medicine had drastically changed with a concerted effort to enhance the research capacities of the tropics. His successor, the Earl of Elgin, saw the status quo as inappropriate and impractical in improving the capacities of local scientists in tropical medicine. The Colonial Office (CO) further noted that since medical officers were transferred to territories that were "far from the centres of modern scientific enquiry," the knowledge and skills gathered during training would naturally fizzle out within months of settling in the tropics (The Earl of Elgin to the Governor of Lagos 1906). The Earl believed that this accounted for why very few medical officers could "lend themselves to original research" (The Earl of Elgin o.c.). To the CO, the tropics should feature quite differently within the network of tropical medicine. As the epicentre of the medical specialty, he

expected more intensive and sophisticated scientific endeavours than those undertaken by medical authorities in the colonies.

The issues raised by Elgin were an obvious source of concern to colonial medical authorities and imperial scientists who were in the know concerning the limitations of over-centralising tropical medicine. For instance, Patrick Manson, one of the pioneers of tropical medicine, made a strong case for the establishment of colonial laboratories. While commenting on the proposal to establish the Hong Kong Bacteriological Institute, "Manson envisaged the colony as a hub of medical science spreading out across East Asia, a centre... for science" (Peckham 2013: 146).

In a circular dispatched to all governors in the British empire, Elgin sought suggestions on improving the research capacities of colonies (The Earl of Elgin to the Governors 1906). The recommendation was received quite differently by local authorities – a significant number of them discarded the idea on account of financial and administrative constraints. Authorities in Northern Nigeria, for instance, discarded the Colonial Office's new posture towards medical research "owing to the lack of the necessary funds or the numerical insufficiency of the medical staff" (Report of the Advisory Committee for the Tropical Diseases Research Funds 1906: 10). In other contexts, like the case of Barbados and Uganda, the near absence of government medical service nullified the practicality of the proposal (Report of the Advisory Committee for the Tropical Diseases Research Funds 1906: 13).

The idea received a better reception in other climes, especially in Lagos, where colonial medical authorities had been keen for more proactive participation in tropical medicine. For colonial doctors like Strachan, the tropics was supposed to be much more than a space for collecting research samples. He lamented the limited skills of medical officers to research tropical medicine. He claimed that he "could not fit anyone to speak with authority on such a question as those involving any research in the bacteriology and parasitology of tropical or other diseases" (Report of the Advisory Committee for the Tropical Diseases Research Funds 1906: 10). As an alternative to the status quo, the medical authorities on the ground in Lagos preferred that tropical medicine be centred around the tropics, not configured in some distanced and exotic landscapes, quite far from the prevailing realities that shaped the medical specialty and almost entirely out of the control of the very doctors that encountered and understood these realities on a daily

basis. Moreover, by pushing this agenda, colonial administrators made a strong argument for the viability of studying the environmental influences of tropical diseases alongside clinical conditions. This way, as argued by Walter Egerton (who succeeded William MacGregor as governor of Lagos), "recovery may not be due so much to treatment as to change of climate" (Egerton to Strachan 1906).

These kinds of motivations were popular discourses in other parts of the British empire. For instance, local scientists in India also expressed high resentment in the colony's willy-nilly dependence on metropolitan institutions in solving local problems. Thus, while negotiating with the colonial office concerning the establishment of a specialised tropical institute, local authorities argued that the status quo was unsustainable and impractical in meeting the urgent health needs of the locales. An interesting example of this motivation was written by Dr. Alfred McCabe-Dallas, an Assam tea-plantation medical practitioner, and published in the *Englishman*, a daily Calcutta newspaper, on 10 March 1910. McCabe-Dallas said that he felt it was an anomaly for medical men to go to London or Liverpool to study tropical disease (while the) clinical material depends on the shipping from East Africa and the West Indies (McCabe-Dallas 1910). McCabe-Dallas was responding to a cholera epidemic situation on the Tea-Plantation. Through the assistance of Leonard Rogers, a medical adviser to the Secretary of State for Colonies in London, he lobbied for the establishment of the School of Tropical Medicine and Hygiene Institute, Calcutta, in the next decade (Anonymous 1921: 388).

While responding to the CO's proposal, Walter Egerton wrote to the Advisory Committee for the Tropical Research Funds on the need to establish a specialised medical research Institute in Lagos. He proposed that the institute should be located in Lagos for two reasons. The first was based on Lagos' dense population, and the second on the availability of communication networks. He argued that

> Lagos is by far the largest town on the West African Coast. It has a railway running through the thickly populated country, containing larger centres of population than that exist in any other British West African Administration. The length of this railway will very shortly exceed 200 miles and will probably be largely extended in the near future. The port of Lagos is also within easy and frequent communication with nine ports of Southern Nigeria at which ocean

> steamers call and with a nearly equal number of ports on the Gold Coast. Lagos town, therefore, seems to be the most suitable position for such an Institute. (Egerton to Elgin 1906)

In 1907, the Advisory Committee for the Tropical Research Funds received instructions from the Colonial Office to establish a central research institution in Lagos for all British colonies in West Africa. The funds for the institute were to be raised by all colonies, with Southern Nigeria and Lagos contributing the highest share. It was agreed by the committee that out of an estimated expenditure of £1,500, Southern Nigeria should contribute £600 and other West African colonies (Gold Coast, Northern Nigeria, Sierra Leone and The Gambia) should contribute £400, £200, £200 and £100 respectively (Report of the Advisory Committee for the Tropical Diseases Research Funds for the Years 1907: 11). The institute would be staffed by a Director and an Assistant, who would be trained investigators, selected for special capacity in research work.

The establishment of a specialised institute meant several things to a broad category of scientists, policymakers and officials outside the colonial bureaucracy. In its formative stage, the MRI was a replica of a collection point of West African biodiversity, strategically positioned at Yaba (precisely because of its proximity to the Ebute-Metta train station) in order to relate frequently with commissioned entomologists, botanists, medical officers and zoologists. Beyond these categories of scientists, it was required to recruit non-professional scientists such as missionary doctors and nurses by ignoring their naivety about scientific discourses and requesting the transfer of various plant and animal species in West African colonies to the MRI. This was the actual agenda of its facilitators – Strachan, for instance, conceived of the facility as an agency devoid of any public health and curative medicine work, detached from the Lagos medical service, and focused on improving tropical medicine (Strachan to Egerton 1908).

Like most other colonial laboratories in the British Empire, the Medical Research Institute was conceived as a patch through which the empire and its metropolitan institutions could view and advance mastery of the tropics and its constituents. Thus, the institute was initially designed as an international cluster for biomedical scientists of diverse specialties across local and metropolitan cultural spaces and institutions. The primary agenda of an institute of this type was to facilitate a robust international presence within

a local milieu in order to advance the study of all significant constitutions of a tropical environment – the vegetations, insects, diseases and human population.

On the surface, the institute fits the descriptions of a colonial laboratory as detailed in existing histories of medical research in Africa. It took the resemblance of an enclave, focused on collecting vital information and extracting ecological value for the tropical medicine network and not specifically for the local public. The agendas spelt out and negotiated within the colonial bureaucracy were pretty similar to those described by Guillaume Lachenal in his postcolonial history of the Lamto field station in the Ivory Coast. Lachenal's case study was conceived as a tangible opportunity for the French scientific community to continuously access the vast ecological resources of the French postcolony for a universal course "to analyse, measure and improve nature" (Lachenal 2016: 890). The types of research carried out in such facilities were immensely important for improving scientific disciplines and the ambition of metropolitan scientists to fit scientific theories into practical scenarios.

During its formative years, however, the institute took an entirely different shape. When the MRI was originally established, its infrastructure could rarely attract a severe network of scientists. A small laboratory building, equipped with only one microscope (which of course had been borrowed to the institute by its first director, Dr. Graham) and no residential quarters (Annual Report on the Medical Research Institute Yaba, Lagos 1910), justifies the local scope of the network. At this time, it was almost impossible for the facility to align with its mandate; it served as a specialised laboratory for the government through the ways it assisted the colonial police and cognate agencies with various medico-legal cases. During most of these years, it ran autopsies for the police and assisted the medical and sanitary department to test water samples collected from weekly house-to-house inspections (Annual Report on the Medical Research Institute Yaba, Lagos 1911). This, of course, was far from the original mandate assigned to the institute. When Graham initially questioned the Advisory Committee about the extent to which the institute could assist the local administration with official responsibilities, one of its members, Patrick Manson (a pioneer of tropical medicine), completely dismissed such possibilities by emphasising the professional outlook of the laboratory.

During its formative years, the institute under Graham's leadership could only advance a few cases of entomological research across West Africa. His expertise and experience in this area was the reason he was appointed in the first place. He was mandated to collect and archive samples and highly detailed descriptions of the biodiversity in West Africa, most especially disease-causing insects such as biting flies, beetles, and mosquitoes. His early years as a medical officer in the Gold Coast and his profound contributions to the British Museum had proven to the committee that he was capable of advancing the institute's agenda. W. J. Simpson, the renowned British public health specialist and one of the founding members of the London School of Tropical Medicine, noted that Graham's appointment as director was appropriate on the basis that he knows "... of no one outside the British Museum who has a more intimate knowledge of the insects which play such an important part in the causation of disease in man, animals, and plants" (Simpson to the Principal Medical Officer 1908). In order to further equip Graham for the position, the Colonial Office approved that he should undertake four months of training in England. On completing the training, he was appointed to take up the position in Lagos, first on a one-year probation and subsequently permanently on the condition that he would satisfy the mandate of his office (Crewe to Egerton 1908). The Colonial Office appointed Andrew Connal, a medical officer in the Gold Coast, to assist Graham (Crewe to Egerton 1909).

On completing his training in England, Graham sought to advance research on three main diseases prevalent in Southern Nigeria: blackwater fever, guinea worm and malaria. In addition, he was anxious to update his collection of mosquitoes (which he had begun on the Gold Coast) and also ascertain whether the *Anopheles* mosquito could live and breed in slightly saltwater (Minutes of a Meeting of Sub-Committee of the Tropical Diseases Research Funds Advisory Committee 1908). When he arrived in Lagos in 1909, his first efforts were geared toward collecting research specimens for the British Museum and the tropical schools in England. These samples included pathological slides of intestinal parasites and preparations of insects. In his first report to the governor of Southern Nigeria, Graham recommended the need for the institute to establish a museum in order to retain duplicates of the materials (Annual Report on the Medical Research Institute Yaba, Lagos 1909). The reason for this was to reduce the complications and difficulties encountered by colonial scientists when they endeavoured to access these

specimens in the British Museum. He opined that "in the British Museum, these specimens are arranged by families and not by geographical distribution" (Annual report on the Medical Research Institute 1910). Therefore, in order to find a specimen a scientist had to know the family name and seek it among many very similar species collected from the whole world. Graham succeeded in laying the framework of the museum in Lagos (when it was established later that year. Aside from the fact that the museum directly fed the British Museum, most species of mosquitoes, especially of the new species he had discovered, were described and published in the *Annals and Magazine of Natural History* (Graham 1910).

By the next decade, there was a considerable variation in the institute's agenda and pattern of work. The institute gradually changed from its exoticness into an almost entirely local facility, run by local medical officials and facilitated to handle local consultancies. This was influenced more by informal local exigencies and wranglings rather than policy changes within the colonial service. The director found himself working within an unfamiliar space and would remain strongly attached to the Gold Coast, his former station. As a result, Graham left most of the administrative works to medical officers in Lagos who prioritised relating to the colonial medical service with the tropical medicine community. Dr. A. E. Neale, a junior medical officer of the West African Medical Staff, acted in most cases as director whenever Graham undertook his scientific expeditions to his former station.

During these years, the institute exhibited professional relations with the local medical service and medical issues. For instance, the duo Graham-Neale collaborated on several simple laboratory experiments on malaria. Two important experiments were conducted in this regard. First, the institute devoted enormous resources to study the side effects of quinine on the excretion of urinary pigment. It was discovered from this study "that a dose of fifteen grains of quinine causes an easy increase in the amount of water excreted in the urine and that this increase is followed within 24 hours by a marked decrease which is accompanied by an increase in the excretion of pigments" (Annual Report on the Medical Research Institute Yaba, Lagos 1911). The research findings published in the *Annals of Tropical Medicine and Parasitology* immensely contributed to the issues revolving around quinine dosage and how quinine caused blackwater fever (Graham 1911). The second experiment undertaken by the institute was to advance other methods of

destroying mosquitoes apart from the popular ways of land reclamation and drainage construction. The director and his team discovered a local fish of the genus *Hoplochilus* that preys on mosquito larvae. This was published in the *Bulletin of Entomological Research* (Graham 1910).

In the next few years, the change of infrastructure also meant a remarkable transformation in the operations of the institute. By 1911, a new laboratory building and a residential bungalow for scientific visitors and students had been completed (Annual Report on the Medical Research Institute Yaba, Lagos 1911). The laboratory building had been equipped with a bacteriological laboratory, a sterilising room, and an incubation room. Also, it had an operating theatre, a reaction stall, and a stall for large animals. This infrastructure was the cynosure of all eyes, standing entirely detached from its immediate environment by its magnificent walls.

The sophisticated scientific endeavours at the institute justify the strong impulse of European scientists to use colonial health infrastructures, such as the hospital and laboratory, and colonial medical personnel to gather research samples and ultimately expand the scope of the tropical medicine specialty. In this case, the laboratory stood at a vantage position of accessing the bodies of colonial subjects for possible explanations of the complex and controversial phenomenon. The primary suspects of experimentation were African bodies, both living and dead (encountered during autopsies), pierced through for the main task of rationalising very obscure health conditions. One of the issues of interest was the sleeping sickness disease ravaging most parts of Southern Nigeria and Northern Nigeria at this time. Colonial doctors stationed in communities where the disease was endemic looked upon the research institute for vivid aetiology of the trypanosome. In certain instances, they collected strains of the trypanosome from carriers' blood and thereafter transported it to Lagos for research via inoculated guinea pigs. After Grahams left Lagos in 1912, his successor, Dr. Scott Macfie, collected some of the samples for the institute in 1913 from a medical officer stationed in Eket, Southern Nigeria. He studied this material in order to rationalise the morphology of the parasite in sleeping sickness patients (Annual Report on the Medical Research Institute Yaba, Lagos 1913: 4). Macfie saw such collections as important in the institute's research on trypanosomiases.

Through his experiment, Macfie was intervening in the international discourse on the various trypanosome infection strains that caused human

sleeping sickness. Since the first such strain was discovered in humans in 1901, there was a strong urge by Portuguese, British, French, German and Belgian scientists to discover and investigate other strains of the parasite. These efforts paid off in 1903 when Castellani, an Italian bacteriologist, discovered that there were distinct morphological differences between the T. *gambiense* (the first trypanosome strain) and the new one he discovered when he investigated suspected carriers in Uganda (Crawford 2007: 48). Castellani named his new strain T. *ugandensis.* This was a similar motivation for Macfie's experiment on trypanosomiases. He sought quite assiduously to unravel local strains responsible for new human cases.

Macfie's study was an attempt to contribute to the burgeoning discourse on trypanosomiases. He was interested in identifying the morphology of the strains identified by colonial doctors during their encounters with African patients. During studies on the collections, Macfie discovered that the predominant strains in patients shared different characteristics from those of *T. gambiense.* On this note, he observed that "the trypanosome from Nigeria cannot be regarded as belonging to the same species as *T. gambiense*" (Macfie 1913) because it was a distinct strain which he named, *T. nigeriense.*

Macfie's remarkably hefty ambition had a significant impact on his career as an expert in tropical medicine and ultimately on the capacity of a colonial territory such as Lagos to contribute to the burgeoning conversations in the aetiology of the disease and of the tropical medicine specialty. Like his predecessors, his work gained significant visibility within the field as it was published in the most reputable journal of tropical medicine at the time, *Annals of Tropical Medicine and Parasitology* (Macfie 1913). In 1913, Macfie published thrice on trypanosomiases in the journal. He was one of the few colonial medical officers contributing to the journal during that year. By 1914, Macfie's newly discovered trypanosome strain, the *T. nigeriense,* had been recognised by experts within the tropical medicine community as it became the subject of further investigation. In that same year, David Bruce, the scientist who pioneered the trypanosome strain responsible for sleeping sickness, recognised Macfie's new hypothesis, even if he classified this new strain alongside some others to a broader group which he tagged *T. brucie* (Bruce 1914).

Who did what? The Tropical Medicine Network in Lagos

These research studies were preludes to more sophisticated works in the institute. During the interwar years, the MRI became more international in outlook, composition, and approach towards tropical medicine. Several broader developments occasioned this, including health concerns motivated by other metropolitan institutions in European empires. First, the yellow fever epidemic (which broke out first in Sekondi, Ghana, in 1910) influenced scientists' occasional visits to West Africa. In 1913, the colonial secretary established the Yellow Fever Commission in order to facilitate investigations into the scourge of yellow fever in British West Africa. Unlike expeditions previously sponsored by the colonial office and dependencies, which had to depend on scientists affiliated to metropolitan institutions, this investigation was facilitated by local doctors and investigators of health departments and research institutes. The MRI was specifically tasked by the commission to act as the local centre of yellow fever investigation. The staff of the institute was instructed to observe yellow fever cases and provide reports that would later shape the official stance and strategies to combat the epidemic (First Report of the Yellow Fever Commission, West Africa, 1913: 3). The core investigation centre in Northern and Southern Nigeria, the MRI would collate yellow fever cases and host investigators from across the area by providing the requisite facilities and samples to advance biomedical research (First Report of the Yellow Fever Commission, West Africa, 1913: 21).

The MRI was an international and a local facility because of the diverse collaborations and local engagements it facilitated. It hosted collaborative research among scientists affiliated with the West African Medical Service (WAMS). Consequent to the appointment of investigators by the Yellow Fever Commission, doctors affiliated to this Service traversed regional landscapes in order to facilitate professional responsibilities ascribed by the commission. Macfie, for instance, was entangled within quite a wide range of responsibilities. He operated concurrently through a scientific network and a colonial bureaucracy. While he was a medical officer attached to the West African Medical Service, assigned to execute policies transmitted through an imperial framework, Macfie was also obliged to relate intensely with a scientific community. The commission expected him and other investigators to make exhaustive diagnostic studies of yellow fever by all means – clinical, microscopic, bacteriological and chemical and submit

all specimens and pathological material for study in England (Fowler et al. 1913: 32). Investigators were also licensed to transmit the research outputs to the larger academic community through regular publications in highly referenced journals.

As officials of both WAMS and their respective scientific communities, European doctors' diverse identities further complicate the history of tropical medicine. The complexities in scientists' identities prove that several imperatives swayed them. The mindsets of scientists like Macfie towards the imperial project are quite straightforward – official scientific engagements were geared towards fostering the course of empire and science. This was the basis of the Yellow Fever Commission. Information gathered through this collaborative work was transmitted to the colonial secretary's office in order to shape the empire's approach towards the yellow fever epidemic. These scientists' works were also swayed by an imperative to meet obligations set by forces within their respective scientific communities. In the yellow fever research, these experts had to deal with pioneer scientists such as Ronald Ross and W. J. Simpson in the field who set the agenda and expected outputs of local scientific engagements. This reality reinforces Deborah Neill's argument that despite European scientists' strong connection with colonial and nationalistic agendas of the empire, they remained relevant within an "epistemic community" that fostered the sharing of specimens and information on tropical diseases on a diverse international forum including conferences and specialised professional publications (Neill 2012: 206).

Irrespective of the position they found themselves in, either as facilitators of a grand imperial agenda or as collaborators operating within a complex scientific network, local scientists found themselves entangled in entirely ethical severe and epistemic issues. Both imperatives enforced that scientists researched human subjects without considering ethical implications. Human experimentation was the core of their engagement in the tropics and its pathological constitutes. By the very nature of their tasks as investigators, scientists had first-hand day-to-day encounters with the African population whom they perceived were the major carriers of the yellow fever parasite. The commission suggested that investigators and other WAMS staff work closely with the African population, which it believed were the main reservoirs of yellow fever. The commission believed that researching the "natives" was one

of the only ways to rationalise the presence of the disease in West African colonies (Fowler et al. 1913).

This explains the pattern of medical research in Lagos. The MRI evolved as a hub through which local biomedical scientists linked with other research outposts such as the field, hospitals and laboratory outlets. Of these three, the hospital seemed like the last setting to collect specimens. According to Melissa Graboyes, however, scientists in East Africa chose field settings over hospitals because of the relative ease of convincing the entire community to participate in research (Graboyes 2014: 384). Except on occasions when the entire community acted in concert to express collective apathy, public sites drastically reduced the agency of the patient to either participate or not. She argues that, unlike the community, hospital settings accorded patients the avenues to express displeasure by "wielding a weapon of the weak and absconding" (Scott 1985).

For the MRI, the choice of field settings was contingent on the availability of auxiliary agencies within host communities that could facilitate or coerce participation. The MRI availed police, medical missionaries and native medical officers to reach potential participants. In his 1913 report on the activities of the yellow fever commission in the southwestern parts of current Nigeria, an investigator and medical officer of the West African Medical Staff, E. J. Wyler, explained that working closely with police officers was essential to ameliorate the reticence and suspicion of the public to research (Wyler 1913: 3). During the first few months of investigation, Wyler and other investigators at the MRI relied on the Commissioner of Police in Lagos to provide intelligence on the incidence of yellow fever and ensure public support. While his investigation endured at Lala, Idi Emmi, Aiyetoro, Meko, Idofa, Badagry, Idi-Iroko, Lagos, and adjoining communities, Wyler expressed anxiety that collaboration with the police could steer public distrust. To this end, he availed the assistance of missionaries and African doctors. Even at that, Wyler encountered enormous resistance from the African population in the places visited. He reported, for instance, that he rarely met Africans who were willing to subject their bodies for examination. Wyler's report reads of a particular encounter with an African woman who, out of mistrust, sent water instead of urine to him for examination in the Medical Research Institute. Though he opined that the woman acted out of mistrust and fear (Wyler 1913: 20), it is also possible that she acted out

of a lack of understanding of the whole essence of the exercise. As a result, Wyler eventually had to rely on interviews from other European residents in Abeokuta who had known the deceased's travelling history. Also, he resorted to a postmortem examination of the patient's body and others in hospitals in Abeokuta and Lagos.

Wyler's account is a typical complaint among scientists in colonial Africa. It brings to fore the problems with the "top-down" colonial science and medical research. Most colonial scientists had varied encounters with Africans who would not cooperate because they had not been furnished with sufficient information about why their bodily fluids were being collected. Similar cases of African mistrust for medical research were also reported by the yellow fever commission in her second report. The commission observed that Africans "are very suspicious of investigations into the nature of the diseases from which they suffer" (Fowler et al. 1913: 137). The commission also argued that Africans were reluctant to participate as subjects because of their inclination to their indigenous medicine and mistrust for Western medicine. It advised colonial scientists to earn the confidence of the parents through the treatment of their surgical afflictions.

To the Yoruba, like other Africans, body fluids like urine and blood represented sacred symbols of life and existence (Machingura and Museka 2016: 51). Roland Hallgren (1995: 45) explains that the Yoruba conceive that blood has a soul and could be altered in order to reshape the destiny of a person. They do not see it like the European medical officers saw it. To the woman encountered by Wyler, blood and other bodily fluids were sanctimonious and it was a taboo to treat it likely. It was when he revisited her, giving a detailed explanation of the essence of the urine sample, that she was able to comply with his instruction.

Collaborations among various scientists and colonial officials speak to the interplay between science and empire. At varying times, scientists considered colonial state institutions, like the police and the medical service, to meet up with professional obligations. However, there is limited evidence to suggest the success of these collaborations in human research. Helen Tilley (2014) argued that the limited success recorded was because of the colonial state's lack of the required capacity to translate political power into experiment power. A closer look at the relation between MRI scientists and colonial medical officers provides insights into exceptional instances when the state

swayed public participation. For example, Macfie's receipt of a regular supply of bodily fluids such as blood and urine from WAMS officials shows how state institutions coerced colonial subjects into participating in human research.

This method improved considerably in the 1920s with the establishment of laboratory outposts very close to the African hospital, Lagos. This was introduced by Andrew Connal, then director of the MRI, who believed that such outlets would facilitate the research process. He believed that the delay in transferring the consequences of this decentralisation process was the remarkable increase in the participation of African medical auxiliaries in medical research. From the 1920s on, a cluster of African laboratory assistants and learners were admitted to the MRI, specifically to operate the laboratories in line with instructions from European superiors. Other subordinate staff, such as labourers, animal boys, zookeepers and nightwatch, were employed within the MRI and its auxiliary laboratories. Aside from collecting bodily samples of patients visiting neighbouring hospitals, they were given specific instructions to participate in entomological research, generally in order to collect valuable specimens from around their vicinity. These officials were equipped with basic parasitological lessons; specific instructions on how to recognise mosquitoes. In 1923, for instance, Connal distributed several plugged test tubes to these employees for the collection of mosquitoes.

This newly improvised MRI policy reveals the mindset of European scientists towards the participation of African staff in medical research. While it suggests the sheer optimism of scientists to imbibe Africans within the tropical medicine epistemic community, it also goes further to reveal the colonial state's perception of colonial subjects as materials of experimentation; on this note, as receptors through which the MRI could transport specimens and ideas from within a resilient African community. As observed by Patrick Malloy (2014: 425), the new MRI policy further reduced the bodies of colonial subjects to a microscopic slide. For instance, the MRI required this corp of staff to subject their bodies to mosquito bites as a way for them to distinguish between male and female mosquitoes. Also, they were persuaded with monetary gifts to submit blood for examination in their respective laboratories (Harrison 2005: 63).

Conclusion

The present study has responded to yearnings to explore the ambiguities of the relations between imperialism and public health. Mark Harrison's article "Science and the British Empire" (2005: 63) reiterated the need for historians of medicine to look beyond the "colonizers and the colonized" binary categories. Instead, he argued, historians should explore the "multiple engagements of scientific ideas both within and without individual colonies." This explains why medicine within the empire exhibits a plural characteristic. The disease environment was not approached and defined in the same way in medical discourses; this defined the extent to which experts on the ground in colonies appropriated discourses transmitted to them through colonial and scientific communication channels. Beyond providing a critical perspective to postcolonial studies, Harrison presented a template for approaching medicine in colonial territories. In his earlier article, "Tropical Medicine in Nineteenth-Century India," he explored the other and often silent networks of tropical medicine, emphasising a solid relationship between metropolitan medical men and their local counterparts in colonies (Harrison 1992: 317). He argued, therefore, that colonial medical men contributed to the field of tropical medicine due to local realities. Harrison's analysis suggests that historical trajectories of medicine are relative due to the very nature of science and the speciality in question, tropical medicine (Tilley 2011).

Harrison's argument is well taken. The history of the MRI has shown how metropolitan motivations to establish laboratories gave way to the personal inclinations of biomedical scientists to push diverse agendas within their respective epistemic communities. The facility was initially conceived for imperial expediencies, specifically the need to ameliorate European health challenges in the tropics and ease the administration of colonial territories. Scientists understood these imperatives but were not all out to fulfill these calls. Instead, they sorted all means available in order to push the frontiers of science, collaborate and compete with colleagues elsewhere by localising popular theories and knowledge claims. They did this in no exact or uniform manner; their contributions to medical discourses were characterised by ambiguities.

The series of contestations and inconsistencies narrated in this study shape the modality of scientific knowledge transfer within the empire. It explicitly shows that scientific ideas were not explicitly differentiated from metropolitan

scientific centres to docile and dependent settings. On the contrary, colonies were hubs of knowledge production shaped by local imperatives. Within colonial localities, knowledge was imagined and appropriated in response to the prevailing socio-cultural context. These contexts were both international and local. Varied contestations influenced the international contexts by scientific experts on the best approaches to prevailing problems in the colonies. On certain occasions, metropolitan and colonial scientists were related on several levels and in varied ways. In this article, I have demonstrated that these relations were coordinated and unsystematic at the same time. In the first few years of the century, these relations were advanced through informal modalities and systems. An example of these relations was the series of interactions between the Liverpool School and the scientists on the ground in Lagos. Henry Strachan and William Macgregor hosted Ronald Ross in Lagos based on their inclination to his theory of malaria. At this point, they exhibited a sense of freedom in appropriating these ideas by agreeing and disagreeing at the same time. This explains the peculiarity of Strachan and Macgregor's antimalarial scheme even while the Colonial Office opted for a different model.

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