Placing Global Science in Africa: International Networks, Local Places, and Virus Research in Uganda, 1936-2012

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In 1936 representatives of the Rockefeller Foundation's International Health Division (IHD) moved into the former premises of a sleeping sickness research laboratory on the shores of Lake Victoria in Entebbe, Uganda and established the Yellow Fever Research Institute (YFRI). Almost eighty years later, the original laboratory building still stands at the heart of the sprawling campus of the Uganda Virus Research Institute and several of its collaborators, including the United Kingdom Medical Research Council (MRC), the Rakai Health Sciences Program, the International Aids Vaccine Initiative (IAVI), and the United States Centers for Disease Control and Prevention (CDC). My dissertation explores the history of virus research based at this institute through three case studies. These case studies are the Rockefeller Foundation's (RF) yellow fever research from 1936 until 1950, the Institute's work on Burkitt's lymphoma between 1962 and 1979, and the HIV/AIDS research of the Rakai Health Sciences Program (RHSP) in partnership with the UVRI from 1986 until the present. By looking at changes and continuities in the people, places, and things connected to research at the Institute at different moments in time, the project will contribute to a better understanding of the practices and relationships that have characterized international and global health research over the course of the 20th and early 21st centuries.

Historiography

My work contributes in several ways to a growing body of research on the ways that global science, and in particular biomedical research in Africa, is conducted. First, existing scholarship demonstrates that a diverse collection of actors has contributed to the collection and dissemination of scientific knowledge and that the values, backgrounds, and communities of these actors have had an impact on the nature of the knowledge produced.[1] This work, much of it conducted by anthropologists, sheds light on the social, cultural, and economic dimensions of scientific production. Yet it frequently lacks historical dimension. Historians of science, medicine, and public health have highlighted the importance of political economy, professional networks, and disciplinary developments for understanding how and why scientific practices develop and change in the ways they do.[2] Without recourse to historical data, ethnographers and others may be unaware of the influences that have shaped the practices they are examining. For example, Lundy Braunn and Evelynn Hammonds have shown how the study of genetic populations in sub-Saharan Africa have been profoundly and invisibly shaped by the use of ethnographic atlases which were created in particular historical circumstances. Without awareness of these circumstances, current researchers have employed populations as units of analysis that, as Braunn and Hammonds show, "construct the 'real world' in ways that researchers themselves may not anticipate or intend."[3] In a similar way, my research will explore how AIDS research in Uganda today has been shaped by earlier histories of biomedical research—from yellow fever to Burkitt's lymphoma—in subtle and not so subtle ways that are frequently imperceptible to current researchers.

Second, there is a tension in the study of global science between the importance accorded to the networks that link scientific projects in distant parts of the globe and focus on the mobility

of scientists, scientific strategies, and scientific facts and the parallel body of research which emphasizes the importance of place and locality in scientific knowledge production. On the one hand, historians recently have shown that agents of biomedical research in the global south have been integrated into comprehensive networks that connect metropolitan and so-called peripheral sites in complex sites of exchange.[4] On the other hand, historians have also called attention to the impact of local experts, environments, and practices in modifying, transforming, and sometimes thwarting agendas developed in other parts of the world.[5] This tension has been playing out for decades on the site of the UVRI. Studying virus research at UVRI, therefore, provides a unique opportunity to explore this tension and to better understand the relationship between the global and the local in the production of biomedical knowledge in Africa. This project will illustrate the intertwined relationships between scientific research, local social and political forces, and international professional and political networks. Looking at a site where the local experts were sometimes long-term expatriates and the scientists were sometimes native Ugandans builds on this literature to explore the forces that have shaped virus research in Africa.

Third, social scientists have begun to probe the ways that high-technology biomedicine in resource-poor countries is transformed and remade.[6] These studies demonstrate that the practices and objectives of scientific projects and applications do not travel unchanged from one part of the globe to another. They call into question the integrity of basic categories that are supposed to be consistent and unchanging between contexts. My research will examine the movement of equipment, expert personnel, biological specimens, and interpretive frameworks between different nodes in the Institute's network to explore the ways that the Institute appropriated and transformed practices and analyses imported from America, Europe, Brazil, and elsewhere.

Finally, existing historical and anthropological studies of medico-scientific work in Africa (as opposed to so-called indigenous healing practices) have typically examined projects designed, staffed, and interpreted by foreign scientists in African field sites.[7] These studies locate the cause of dissonance between expectations and outcomes of research programs in the difference between the nationalities, and often race, of research scientists and research subjects. This framework suggests a polar relationship between white scientists with one understanding of health and disease, and black research subjects with a different worldview that fosters misunderstanding, exploitation, and even abuse. The history of virus research in Uganda challenges this framework by demonstrating that the lines between Euro-American and African, medical and cultural, international and local, were neither clear nor unchanging. Rather than either overlooking the significant ethical and practical dilemmas facing biomedical research in Africa or setting up a binary between western research and African subjects, this project aims to inform new models for thinking about how biomedical research is practiced and how the evidence produced in these research sites should be translated into policy and practice.

Undertaken at an early stage in my dissertation research, my work at the Rockefeller Archive Center (RAC) in the spring of 2013 focused mainly on material that would inform my first case study. However, I was pleased to find some documents that will be useful in the second and third cases studies in the form of grant applications from Institute scientists, correspondence between former colleagues, and records of visits of RF officers to the site of the Entebbe laboratory in the 1960s and 1970s. I am approaching each case study through three categories of analysis: people, places, and things. In the following report I will outline some preliminary findings in each of these categories for my first case study on the yellow fever research conducted at the YFRI.

People

The RAC offers a rich set of materials that sheds light on the identities, personalities, and experiences of individuals working at the YFRI between 1936 and 1950. First, the diaries kept by scientific officers posted at the YFRI including Alexander Francis Mahaffy, Kenneth C. Smithburn, Stuart Fordyce Kitchen, Alexander John Haddow, and William Henry Russell Lumsden, among others, gave me the opportunity to compare the daily routines of various individuals, reflect on the challenges they reported to the New York offices, and put together a preliminary timeline of key events at the YFRI. The diaries also contained the names of some of the people who worked with YFRI, but were not part of the scientific staff (colleagues in the Colonial Medical Service, technical staff members, assistants, etc.). Correspondence between members of the staff in Entebbe and their colleagues in New York added to the accounts of the diaries and sometimes complicated them, as informal correspondence occasionally took a different line on events than the more public version in the diaries. Finally, records such as applications for travel grants, budget negotiations, and other administrative documents gave me some insight into the ways in which the various team members related to one another and their counterparts in the Colonial Medical Service and other research laboratories, as well as contributing additional names for further research.

Kenneth C. Smithburn's papers, which comprise his diaries, correspondence, photographs, and other documents from his personal collection, offer a particularly productive set of resources for understanding life and work at YFRI during his tenure there (1939-1949). Smithburn, an American, joined the IHD in 1938 as a young, but highly regarded, researcher with experience in pathology and bacteriology, under the supervision of Dr. Florence Sabin.[8] Smithburn's first task with the IHD was to get up to speed on virus work. Smithburn's arrival

was highly anticipated by the director of the lab in Entebbe, Alexander M. Mahaffy, and other senior IHD staff invested in the success of the lab. Personnel problems had been rife in the lab and Mahaffy was in the unenviable position of trying to maintain the success of both the field and laboratory work.[9] Smithburn was expected to pick up some of the slack in the lab leaving Mahaffy free to coordinate the field dimensions of the work as well as to fulfill his administrative responsibilities as director. However, before becoming a critical part of the YFRI team, Smithburn had to be trained in the skills and perspectives particular to yellow fever work. To achieve that purpose he trained first in the New York lab of the IHD and then in Rio de Janeiro to study yellow fever work under Fred Soper.[10]

Smithburn sailed from New York to Brazil on November 19, 1938 and arrived on December 1 of that year.[11] In the yellow fever laboratory he concentrated on interpreting liver specimens for evidence of yellow fever infection.[12] With Soper's permission, he assembled a collection of liver slides from humans and other animals to take to Entebbe for use as reference and instructional material.[13] These included specimens showing typical signs of yellow fever, specimens of suspect yellow fever cases, and examples of twenty-two other conditions Smithburn expected to encounter in Uganda including schistosomiasis, malaria, and leishmaniasis.[14] In addition to practicing his interpretation of these specimens and developing his slide library, he joined colleagues from the Rio lab in several field trips to observe yellow fever vaccination, investigation, and viscerotomy teams at work.[15] The IHD clearly intended to put Smithburn's experience in pathology to good use. With results of the mouse protection test[16] still controversial, pathological evidence of yellow fever in the liver tissues of suspected cases in East Africa would be important support for the IHD's serological findings. Smithburn also studied management of mouse colonies and the handling of larval and adult mosquitos. His

training in basic entomology and animal colony management in Brazil indicates that even the man destined to run the lab side of the virological work in Entebbe was expected to command a range of ancillary skills that New York lab workers might not require. With only a small staff of European and American scientists on hand, each member of the YFRI team had to demonstrate competence in several of the techniques that kept the institute running. Finally, Smithburn observed the preparation of the yellow fever vaccination, an experience that would stand him in good stead during the coming World War when the Entebbe lab was responsible for processing and distributing enormous quantities of the vaccine to Allied troops in East Africa.[17]

This is just a very small illustration of the kind of work I am doing with the RAC collections to better understand the experiences of the people at the YFRI and the ways that their training, previous experience, personalities, and professional affiliations effected the scientific work on yellow fever in Entebbe. The RAC gave me the opportunity to establish a large body of evidence about several of the principal scientific figures at the YFRI, as well as names for technicians, affiliates, and other relevant individuals that I will continue to research in other collections and through oral histories. The detailed information about individual scientists informs more general themes. For example, the path traced by Smithburn between New York, Rio, and Entebbe suggest that, even during the colonial period, the relationships between scientific projects in different parts of the globe were more complex than a simple "north-south" movement of science and expertise.

Places

My research at the RAC made me realize that the very location of the YFRI was the result of a complex negotiation about the significance of place and the availability of space. The RF was adamant that the decision to situate the Institute in Entebbe was an eminently scientific

one. “Uganda was selected as the area for this research,” they wrote, “not because of the convenience of the building at Entebbe, but because of an interesting situation in the apparent geographical distribution of yellow fever.”[18] It was the “topography of disease” that led them to Uganda.[19] This topography consisted of the apparent role of Uganda’s natural geography in limiting the eastward spread of yellow fever despite the abundance of known mosquito vectors. As an article in the RF *Trustee’s Confidential Bulletin* in 1942 put it, “seemingly these mosquitos found no opportunity to ply their virus-carrying trade.”[20] Fundamentally, Uganda was seen as an ideal place to explore the “enigma” posed by the results of the yellow fever immunological survey conducted by Mahaffy and his IHD colleagues in the early 1930s.[21] A 1938 *Confidential Bulletin* summed up the situation with a succinct set of questions: “Uganda is a strategic research territory, inasmuch as it seems to present a natural barrier to the spread of the disease. Why? Wherein lies the barrier? Is there some unknown carrier of the virus at work within Uganda and on to the West? And if so, what?”[22] Mahaffy described the mission of the new Institute “to elucidate the nature of yellow fever in Central and Eastern Africa and its method of spread; to determine more precisely the eastern border of the endemic region in Africa and the reason why the disease has not passed beyond that border to the highly Stegomyia-infested eastern coast of the Continent."[23] These questions were not merely of abstract value. Protection of the apparently uninfected regions of East Africa and even more urgently, India, which was closely linked by trade to the East African coast, were of enormous importance to the governments involved and the commercial enterprises they fostered.

However, my work in the RAC suggests that the decision to locate the YFRI in Entebbe was not a simple one and resulted from a combination of factors including convenience, politics, and geography, as well as epidemiology. The ability to attract high-caliber researchers was an

important factor and not all of them were willing to live in the hot and dry climates of Khartoum, another site mentioned as a possibility. Relatively temperate Entebbe represented a more attractive destination for European and American scientists and their families. Entebbe also boasted an airport that would facilitate transportation to other sites of interest in the event of epidemics or calls to investigate possible cases.[24] Furthermore, as the capital of Uganda's colonial government, Entebbe offered a broad range of services and amenities that were harder to find in many parts of Africa. As Wilbur Sawyer observed, "Undoubtedly yellow fever work would flourish better if it was carried on at a convenient center where the staff could live comfortably and work under favorable conditions."[25] Uganda was also a favorable location because of the Governor's willingness to permit the importation of yellow fever specimens (something other governments prohibited on safety grounds) and his apparent readiness to invest significant sums of money to obtain a definite result from the yellow fever research.[26] All of these factors together led to the selection of the site in Entebbe.

I am also interested in the relationship between places designated as "lab" and those designated as "field" in the work of the YFRI.[27] The documents I reviewed at the RAC suggest that the lines between lab and field in the YFRI's work were indistinct and impermanent. People traveled between the two and techniques and tools from the lab sometimes crossed into the field, and vice-versa, with varying results. Moreover, the relationship between the laboratory in Entebbe and the field station in Bwamba, a district in the western part of Uganda near the border of the Belgian Congo, fluctuated as personnel, research priorities, and results favored the laboratory or the field. Bwamba County proved to be fertile ground for yellow fever studies. It was in Bwamba that the YFRI discovered an endemic focus area and determined that yellow fever was able to persist in the area in the absence of a susceptible human population.[28] Though

work at the Bwamba field station was curtailed during WWII, the region was perceived as critical to the achievement of the Institute's goals and was revived as soon as petrol rations and personnel shortages permitted. The distance between the Entebbe and Bwamba, and the difficulty of traveling between them, gave the field site a certain degree of autonomy from the laboratory. Overall, the evidence from the RAC points to a complex relationship between lab and field work at YFRI and the importance of both for establishing the legitimacy and importance of the Institute's work in the larger scientific community.

Things

In 1955 a RF *Newsletter* playfully speculated about the significance of a future "gentleman from Mars" who would conclude about RF activities based on the records of the purchasing department:

> [M]icrometers, calibrating filters, laboratory microscopes, insect shipping boxes, Pyrex beakers, clinical spectrophotometers, 800 pounds of DDT, as well as baby food, dried milk, nylons, women's clothing, American cigarettes, Lionel electric trains, Coca Cola syrup, sweet mixed pickles. Families must accompany Foundation researchers, the gentleman from Mars might guess."[29]

Like the gentleman from Mars, I studied purchase orders, inventory records, photographs, and mentions of objects in correspondence and reports to reconstruct aspects of the scientific and domestic existence of YFRI researchers, staff, and families. I am using objects as a way of thinking about how the laboratory space in Entebbe was made with both imported and local items. Lab supplies, instruments, model organisms, biological specimens, household goods and maps are among the categories of objects that I encountered in the collection of the RAC. In addition to the objects themselves, the archive illuminates the politics and economics of procuring these items.

At the end of my time in the RAC, one particular type of object stood out to me as especially significant for the work done at the YFRI: maps. From the serological studies that preceded the establishment of the YFRI to the decision to diversify the YFRI's work into other arboviruses and even conditions suspected to be of viral etiology (like Burkitt's lymphoma), maps punctuate the archive and suggested to me the importance of place and space in the Institute's conception of its research agenda and the ways the products of its research were circulated and made meaningful. This realization has led me to reconsider the relationship between geography, pathology, and epidemiology in the three case studies I have chosen. As a result of my findings at the RAC I am looking into an additional body of secondary literature on medical geography to enhance my appreciation of the ways that scientists at the Institute would have understood the significance of maps, their importance in interpreting the results of observational and experimental findings, and the application of their research to public health policy and programs.

Concluding Remarks

My time at the RAC was enormously fruitful in several ways. It provided a wealth of material for my first case study of yellow fever research at the YFRI in terms of people, places, and objects. Furthermore, it suggested areas of inquiry, such as medical geography, that could bridge the gaps between the three case studies and point to larger themes in the history of virus research in Uganda and perhaps more broadly. As I continue my research in other archives in Europe and Uganda and begin to conduct oral history interviews, the research I was able to conduct at the RAC has provided an invaluable foundation.

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The ideas and opinions expressed in this report are those of the author and are not intended to represent the Rockefeller Archive Center.

ENDNOTES:

[1] Randall Packard and Paul Epstein, "Epidemiologists, Social Scientists, and the Structure of Medical Research on AIDS in Africa." *Social Science & Medicine* 33: 7 (1991), pp. 771-783; Caroline H. Bledsoe, Allan G. Hill, Umberto D'Alessandro, and Patricia Langerock, "Constructing Natural Fertility: The Use of Western Contraceptive Technologies in Rural Gambia." *Population and Development Review* 20: 1 (1994), pp. 81-114; Caroline Bledsoe, *Contingent Lives: Fertility, Time, and Aging in West Africa*. Illinois: University of Chicago Press, 2002; P. Wenzel Geissler, Ann Kelly, Babatunde Imoukhuede, and Robert Pool, "'He is Now Like a Brother, I Can Even Give Him Some Blood': Relational Ethics and Material Exchanges in a Malaria Vaccine 'Trial Community' in The Gambia." *Social Science & Medicine* 67: 5 (2008), pp. 696-707; P. Wenzel Geissler, "'Kachinga are Coming!': Encounters Around Medical Research Work in a Kenyan Village." *Africa* 75: 2 (2011), pp. 173-202.

[2] Randall Packard, *White Plague, Black Labor: Tuberculosis and the Political Economy of Health and Disease in South Africa*. Berkeley: University of California Press, 1989; Kim Pelis, *Charles Nicolle, Pasteur's Imperial Missionary: Typhus and Tunisia*. New York: University of Rochester Press, 2006; Richard C. Keller, *Colonial Madness: Psychiatry in French North Africa*. Illinois: University of Chicago Press, 2007; Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950*. Illinois: University of Chicago Press, 2011; Pratik Chakrabarti, *Bacteriology in British India: Laboratory Medicine and the Tropics*. New York: University of Rochester Press, 2012.

[3] Lundy Braunn and Evelynn Hammonds, "Race, Populations, and Genomics: Africa as Laboratory." *Social Science & Medicine* 67: 10 (2008), p. 1584.

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[7] Geissler et al 2008; Geissler 2011; Pelis 2006; Keller 2007; Tilley 2011.

[8] Letter from Wilbur A. Sawyer to A.F. Mahaffy, April 28, 1938, Folder 2, Box 1, Series 477o, Record Group (RG) 1.1, Rockefeller Foundation Records (RF), Rockefeller Archive Center (RAC).

[9] Letter from A.J. Warren to W.A. Sawer, October 12, 1938, Folder 2, Box 1, Series 477o, RG 1.1, RF, RAC.
[10] Letter from Wilbur A. Sawyer to Fred Soper, April 28, 1938, Folder 2, Box 1, Series 477o, RG 1.1, RF, RAC.
[11] Kenneth C. Smithburn Diary, December 1, 1938, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[12] Kenneth C. Smithburn Diary, December 1, 1938 - March 5, 1939, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[13] Kenneth C. Smithburn Diary, December 7, 1938, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[14] Kenneth C. Smithburn Diary, December 22-23, 1938, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[15] Kenneth C. Smithburn Diary, December 1, 1938 - March 5, 1939, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[16] The mouse protection test was a method used to determine whether a person carried antibodies to yellow fever virus, indicating prior infection. To perform the test, scientists injected newborn mice with human serum and then injected the mouse with yellow fever virus. If the mouse did not become ill, then the serum was inferred to contain protective antibodies. If the mouse did become ill, then the serum afforded no protection and was presumed to be free of antibodies. The test is described more fully in Alexander Mahaffy, Wray Lloyd, and H. A. Penna, "Two Years' Experience with the Mouse Protection Test in Mice in Epidemiological Studies of Yellow Fever." *American Journal of Epidemiology* 18: 3 (1933), pp. 618-628.
[17] Kenneth C. Smithburn Diary, January 23, 1939, Folder 101, Box 11, Series II, Kenneth C. Smithburn Papers, RAC.
[18] Excerpt from Trustees Confidential Bulletin February, 1942, "Africa on Guard Against Yellow Fever," Folder 6, Box 1, Series 477o, RG 1.1, RF, RAC.
[19] Excerpt from Trustees Confidential Bulletin February, 1942, "Africa on Guard Against Yellow Fever," Folder 6, Box 1, Series 477o, RG 1.1, RF, RAC.
[20] Excerpt from Trustees Confidential Bulletin February, 1942, "Africa on Guard Against Yellow Fever," Folder 6, Box 1, Series 477o, RG 1.1, RF, RAC.
[21] Excerpt from Trustees Confidential Monthly Bulletin May, 1938, "A Yellow Fever Barrier in Africa," Folder 2, Box 1, Series 477o, RG 1.1, RF, RAC.
[22] Excerpt from Trustees Confidential Monthly Bulletin May, 1938, "A Yellow Fever Barrier in Africa," Folder 2, Box 1, Series 477o, RG 1.1, RF, RAC.
[23] A.F. Mahaffy and A.W. Burke, "Annual Report for 1936 Paris Office - International Health Division. Section 4: Uganda Yellow Fever Research Institute," Folder 2905, Box 241, Series 700, RG 5.3, RF, RAC.
[24] Letter from Fred L. Soper to Wilbur A. Sawyer, December 26, 1935, Folder 1, Box 1, Series 477o, RG 1.1, RF, RAC.
[25] Letter from Wilbur A. Sawyer to Fred L. Soper, January 11, 1936, Folder 1, Box 1, Series 477o, RG 1.1, RF, RAC.
[26] Letter from Fred L. Soper to Wilbur A. Sawyer, December 26, 1935, Folder 1, Box 1, Series 477o, RG 1.1, RF, RAC and Wilbur A. Sawyer to Fred L. Soper, January 11, 1936, Folder 1, Box 1, Series 477o, RG 1.1, RF, RAC.
[27] This line of inquiry is heavily informed by Robert Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology*. Illinois: University of Chicago Press, 2002.
[28] Mahaffy, Smithburn, and Hughes, "The distribution of immunity," p. 81.
[29] Rockefeller Foundation *Newsletter* 1: 11 (February 1955) Folder 30, Box 3, Series 1, Kenneth C. Smithburn Papers, RAC.