

Yellow Fever in the Anglo-Egyptian Sudan *by Heather Bell*

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No one had any idea that yellow fever occurred in the Anglo-Egyptian Sudan until 1933, when its previous biological existence was discovered as part of an Africa-wide immunity survey conducted by the International Health Division (IHD) of the Rockefeller Foundation (RF). The IHD immunity test results baffled scientists and laymen alike: while the tests revealed pockets of high immunity to yellow fever in southern Sudan, the disease was clinically unknown in that area, indeed in all of East Africa, and no doctor could recall ever having seen a case. The discovery caused widespread consternation in the international political community, which feared that newly developing commercial air travel would spread the disease from East Africa to the virgin soil of Asia. For IHD it was an exciting, if medically puzzling, find. The British-run Sudan government was less enthused: only just climbing out of the Depression, it was compelled to assume the costs of compliance with international regulations designed to contain the spread of a disease which its doctors claimed did not exist in Sudan.

Little of a critical nature has been written about the history of yellow fever research in Africa, as scholars have focused on the more famous American experience of the disease. This is no accident: it was in Central America at the turn of the century that U.S. Army scientists confirmed that yellow fever was transmitted from human to human by *Aedes aegypti* mosquitoes, and established that the disease could be eliminated by targeting mosquito larvae. While yellow fever was viewed as a disease of the Americas, its etiology was held to be universal, leading the RF to commit itself to the disease's worldwide eradication. The application of medical knowledge acquired in one region to the situation in another was not straightforward, however, as the RF discovered in West Africa. The archives document the RF's struggle in the mid-1920s to establish whether American yellow fever and West African yellow fever were in fact the "same" disease. In the context of the new laboratory medical science, this meant showing that American and West African yellow fevers were caused by the same organism. The first strain of yellow fever virus was isolated by RF scientists at Accra, Gold Coast in 1927; cross-immunity experiments in South America soon confirmed that yellow fever was a single disease.

If yellow fever was a well-known disease, the interwar preoccupation with it was born of entirely new conditions: the dawn of commercial air travel. By reducing travel time, air travel removed age-old barriers to the spread of infectious disease. This resulted in an unprecedented internationalization of health concern. New international health bodies formulated the International Sanitary Convention on Aerial Navigation (ISC), which attempted to protect "uninfected" countries from diseases such as yellow fever, without stifling the nascent airplane industry. In order for quarantine and disinfection regulations to work, however, the extent of the disease had to be known. Accordingly, the Office international d'hygiene publique approached the IHD in 1930 for help in mapping areas endemic for yellow fever. The appeal was fortuitously timed, for RF scientists in New York had just developed a test for yellow fever immunity in white mice--the mouse

protection test-- which would allow them to analyze a larger number of human sera samples.

At complete odds with the clinical evidence, the test results from Sudan indicated endemicity and were greeted with a variety of responses. Many European doctors, serving the colonial and commercial interests of their states, quite reasonably challenged the scientific validity of the mouse protection test. Officials in vulnerable countries, such as India and Indonesia, declared bans on flights arriving from endemic areas, such as Sudan. The Sudan government, while skeptical that yellow fever could occur in its territory without detection, chose to comply cautiously with the ISC in maintaining mosquito-free aerodromes. In addition, mosquito larvae were diligently collected and killed in most southern Sudanese towns, and all suspicious deaths due to fever were investigated.

The Sudan government was not willing, however, to let the yellow fever virus enter Sudan for experimental purposes, and therefore refused an IHD request to establish a yellow fever laboratory in southern Sudan. The Ugandan government gave the IHD a better reception; with the opening of the Yellow Fever Research Institute at Entebbe in 1936, IHD scientists started the search for East African yellow fever virus in order to indicate their immunity test results. Field diaries and semi-annual reports record painstaking research in Uganda, Sudan, and the Belgian Congo in the late 1930s, which failed to yield the virus. The frustration and concern of IHD scientists grew. They remained convinced that where yellow fever could occur endemically, as indicated by their protection test, it could also flare up into a significant epidemic.

When the outbreak that the IHD had been waiting for finally came, it nearly passed everyone by. Although it had been claiming lives since May, the Nuba Mountains epidemic of 1940 only came to the attention of the Sudan government in October. The area in question was remote and had been cutoff from outside contact during the summer rains. Moreover, the government's attention was elsewhere that summer, preoccupied with the threat of Italian army invasion from Abyssinia. When government doctors finally confirmed yellow fever in November, officials moved quickly to further isolate the Nuba Mountains from the surrounding area, and thereby protect the British, Sudanese, and Indian troops moving through northern Sudan.

The 15,000 reported deaths among the Nuba made this the largest known yellow fever epidemic in Africa. In the eyes of the Sudan Medical Service (SMS) and IHD researchers, however, the epidemic was less an episode of human suffering than an exciting scientific event. Exulted Dr. Robert Kirk of the SMS, in his Scottish lilt, "If it were no' for the war, this epidemic wad be juist grrrand!" IHD doctors Alexander F. Mahaffy and Kenneth C. Smithburn isolated two strains of yellow fever virus from the Nuba Mountains. This proved the validity of the protection test and confirmed that many cases of East African yellow fever were mild, even sub-clinical. Among colonial doctors in Africa, everyone was a convert, requesting large supplies of the RF's 17D yellow fever vaccine.

I arrived at the Archive Center thinking that Sudan's rather strange experience of yellow fever was peripheral to the history of the disease in Africa, but the documentation completely overturned my preconception. In addition to enlightening me, this story also illuminates wider themes in the history of medicine and empire, to the point of challenging the usefulness of the term "colonial medicine." Colonial relationships, both between colonizers and colonized, and between European capitals and their representatives within the colonies, are not the decisive ones in this story. What mattered was not whether a country was a colony, but whether it was infected by yellow fever. Indeed, this story revolves around a globalization of health concern, triggered by the start of air travel, which made colonial boundaries seem obsolete at the same time as it created new relationships. Uninfected countries such as India suddenly found themselves dependent on precautions taken in distant, infected countries, like Sudan. From a country without African colonies, the RF provided the international personnel, outlook, and funds that made for truly global medical philanthropy.

The story of yellow fever in Sudan also reminds us of the "imperialism" of ambitious medical scientists, who ignored international frontiers in their eagerness to follow disease mysteries wherever they led. The increasingly sophisticated technology at their disposal advanced their scientific understanding, but in its emphasis on laboratory tests, also served to marginalize the patient's experience, or non-experience, of disease. The mouse protection test could tell a doctor whether a person had ever been infected by the yellow fever virus. With the dominance of medical science, what patients remembered about their medical history no longer mattered.

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