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East Africa High Commission:
(4) Filariasis Research Unit

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Dear Mr. Rogers:

The initiative for the establishment of the Filariasis* Research Unit was taken in United Kingdom through the Colonial Medical Research Committee. The Medical Research Council sent a small team out in October, 1948 which was intended to be enlarged later into a Research Unit under the Colonial Office. This action was stimulated by the introduction of apparently effective filaricidal drugs and a new recognition of the seriousness of the diseases, arrived at after the experience of a 25 percent disability of American military personnel in infected areas of the Pacific during World War II. It could be seen that if the disease was having an equivalent effect in East Africa, where in many areas half of the population is infected, it would have to be ranked as a major problem. The Medical Council Research Team remained in East Africa for six months, and one of its members stayed on as Director designate of the new Colonial Research Unit. Filariasis Research Unit, with European staff of one, the Director, and two Africans, came under the administrative control of the High Commission on June 1, 1949. Further staff began arriving late in the year. In 1951 it appeared that the Unit would cease to exist in 1954, with its facilities being given over to the Medical Survey.

Administrative authority reaches up from the Filariasis Research nit through the executive officer (Administrator) to the High Commission, though scientific oversight is retained by the Colonial Medical Research Committee in London. The Unit headquarters is located at Mwanza, on the south shore of Lake Victoria in Lake Province, Tanganyika. The staff authorization in 1951 consisted of a Director, two physicians, a helminthologist, an entomologist, three European laboratory technicians, a photographer and a librarian. The original European strength had been one, the Director, in June of 1949. In 1951 all authorized vacancies had been filled except one for a physician and one of photographer. At the end of 1952 the positions of one physician, the helminthologist, the photographer and Librarian were vacant.

Installations at the Mwanza headquarters consist of staff housing and a laboratory shared with the Medical Survey. Begun in January 1951,

* The term describes a group of diseases produced by round-worms of the family Filarioidea. The worms lodge in parts of the human body such as connective tissues and the lymphatic tissues, and their offspring (called microfilariae) go into the blood and lymph spaces.

the permanent staff houses were completed by the end of the year, while the laboratory remained under construction. The land for housing was made available by the Tanganyika Government, and a place for the laboratory on the site of the new Mwanza hospital was obtained through the Director of Medical Services, Tanganyika.

Expenditures of F.R.U. in 1949 and 1950 were as follows:

	1949	1950
Recurrent	£2,861	£11,537
Extraordinary		19,269
Total	£2,861	£30,806

Of the extraordinary expenditure in 1950, £12,521 was probably spent on the joint headquarters for the F.R.U. and Medical Survey. Revenue was £25 in 1949 and £307 in 1950.

The expenditure on the joint headquarters (£12,521) was met entirely by C.D.&W. funds under Scheme R.402. Another capital expenditure of £6,748 in 1950 under Scheme R.325 was also met entirely by C.D.&W. funds. Two-thirds of net recurrent expenditure in 1949 and 1950 (£2,836 and £11,230) was provided under Scheme R.325 by C.D.&W. funds, the remaining third being contributed by the East African territories, Kenya, Uganda and Tanganyika providing equal amounts.

The objectives and procedures of this Unit are similar to those of the Medical Survey, but with a more specific field of inquiry, dealing only with filarial infections and disease. The first needs are to measure the effect of the disease upon the economy and welfare of East Africa, to determine if the medical problem they present is serious, and to ascertain the relative importance of the several filarial diseases present. The basic question to be answered, prior to any expensive remedial action, is whether or not the disease is so serious that it demands control and whether it is of such economic importance that the expense of large scale measures of prevention and treatment would be justified. A careful survey, with large samples of population to be examined in each district, was recognized as an only means of obtaining valid estimates of the disease and its effects during various stages. The plan of assessment of bancroftial filariases for the three territories involves the collection from widespread areas of some 90,000 night blood films, and a count of the population suffering from elephantiasis and hydrocoele. Such surveys were described as a "primary task" of the Filariasis Research Unit by the retiring senior member of the High Commission in 1952.[1]

A second series of research targets would be the finding by experiment of methods of controlling the disease, either by attacking it in the human host by means of drugs or by control of insect carriers, or the two combined. The testing of the two control methods envisaged was expected to involve much difficulty and expense. The second method, clearing vectors from an area, would involve, in order to allow time for the disease to die out in human reservoirs, continuous vigilance over an area for as long as ten years. However, an advantage of this method is

that it would at the same time wipe out other insect-borne diseases like malaria. The first method, rendering the host non-infective to the mosquito by means of drugs, is a procedure which would inevitably demand a high degree of cooperation from native authorities as well as District officials.

The third and more detailed field of investigation would be concerned with treatment of patients, especially to test the effectiveness of drugs developed since 1942. All three programs may have to be accomplished in part before the initial question regarding the disease as an economic deterrent can be accurately answered.

Research would concentrate upon the filarial infections most common in East Africa, thought to be three in number, Bancroftial Filariasis, Onchocerciases and Dipetalonemiasis (i.e. infection with Dipetalonema perstans). The first is transmitted by many species of mosquito and in late stages produces elephantiasis and/or hydrocoele; the second, transmitted by a biting gnat, causes abnormalities of the eyes and skin and sometimes blindness; the third, with vector unidentified and little known of the infection history by 1951, apparently causes no serious inconvenience. All three have the common feature of adult worms (which belong to one family) somewhere in the body of the infected individual which shed offspring called microfilariae into the blood or skin. The separate diseases have different vectors and produce different symptoms.

Operations during the year 1949 were hampered by lack of facilities and shortage of staff, and the limited efforts were devoted principally to the study of a single drug, hetrazan, and one disease, bancroftial filariasis. During 1950 work continued on both, further investigations were initiated on protostib, a drug, and on dipetalonemiasis, and plans were made for 1951 work on finding the vector of Perstans and to investigate its effects by means of tests on human volunteers. Up to 1952 the major research effort was directed at bancroftial filariasis and onchocerciases.

The surveys to determine the seriousness of the diseases were deterred somewhat by a lack of satisfactory methods of diagnosis. The microfilariae count proved unsatisfactory for diagnosing bancroftial infections and an attempt to evolve a satisfactory method using skin tests had not succeeded by the end of 1950. By the end of 1952 the survey was almost completed in Tanganyika, with a total of 60,000 people examined by May 1952, and a survey was begun in Kenya.

With bancroftial filariasis the incidence of detectable microfilariae in night blood of individuals tested was found to be high in the warmer areas near the ocean and large lake waters. In the worst areas forty to sixty percent of the tests were positive. A patchy distribution of infections was found even in hyperendemic areas and was thought to correspond with the presence of suitable disease vectors. A very small percentage of infected persons showed the late manifestations, elephantiasis and/or hydrocoele. Elephantiasis was found proportioned in incidence to that of microfilariae, approaching one percent in some areas. The incidence of hydrocoele was found to be ten times that of elephantiasis, affecting 20 percent of male adults in some localities. Despite the likelihood that a million people in East Africa are infected with the parasite, investigations have shown that the majority of African patients (unlike Allied

soldiers during World War II) suffer no crippling symptoms during the early stages, that the South Pacific disease was quite different from that in East Africa. The real problem is that represented by late-stage afflictions of elephantiasis and hydrocoele, which cause considerable loss of working time. "The economic importance of the disease lies in the crippling effects of genital filariasis and of elephantiasis."[2]

Onchocerciasis exists in serious form in several vaguely demarked areas of Uganda and in better known locales in Kenya, and a very few cases have been reported in the Southern Highlands Province of Tanganyika although none were found during the survey in that area. On the basis of recorded data from Kenya, disclosing that in certain areas in Nyanza Province 50 percent of the population suffer severe itching and as much as 5 percent of the adult population in a few areas is blind, the effects were opined to constitute a serious local problem but not a general major one.

Dipetalonema Perstans, like bancroftial filariasis, was found to have a patchy distribution, though it was unusual to find the two diseases common to a single area. The west shore of Lake Victoria was the favored range of the infection. By the end of 1950 "no satisfactory support for the theory that infection with dipetalonema perstans does not harm the human host" had been disclosed.[3]

Researches into methods of controlling the disease over wide areas have been pressed, in cooperation with territorial medical departments and have resulted in an appreciable amount of new knowledge. The investigation into control of the disease through treatment of human infections was reported, at the end of 1951, to be in an advanced stage, with five drugs (hetrazan, protostib, neostibosan, solustibosan, and arsenamide) having been tested, each on 150 patients. Results on two, hetrazan and protostib, were available by the end of the year.

In the case of bancroftial filariasis, the drug hetrazan proved effective and safe in reducing the transmissibility of the disease from human hosts. Quickly and for a prolonged period it eliminates larval forms of microfilariae from the peripheral blood, providing a means of control by keeping the parasite out of blood accessible to a biting insect. Administered orally, the drug can be dispensed by unskilled staff. East African natives tolerate larger doses than are used elsewhere in the world, allowing a shorter yet effective treatment. The difficulty is that the drug as used at present is very expensive, and a cheaper means is a present investigative target. Large scale control through the use of hetrazan is also prevented by the fact that no one knows what is the microfilariae blood level below which the vector does not become infected to any significant degree. Protostib proved effective enough in reducing microfilariae in the blood through its attack on the adult parasites. But it has the disadvantages of being expensive and of needing to be injected under medical supervision. The effects of attack on adult worms may be harmful to the patient. Though it may have the advantage of being effective against other diseases, such as schistosomiasis, when injected for filariasis, it was judged unsuitable for large scale use in the field. Tests showed there was no drug for wiping out onchocerciasis in the human host, but there was no need of continuing this investigation because the cost of eliminating the vector is so reasonable.

Investigations of control by means of eradicating the vector of bancroftial filariasis are in the preliminary stages. Entomological investigations to identify vectors on Ukara Island have been in progress since December of 1950. Anopholes gambiae was identified as an important vector, and plans were made for large scale research into mosquito biology. Projects of actual elimination were intended to be undertaken in 1953 in collaboration with other services such as the E.A. Malaria Unit and the Colonial Insecticides Research Unit. Some work was done in 1950 to determine incidence of microfilariae in wild animals. Another project of investigation in respect of vector elimination, on the disease onchocerciasis, was said to have been precluded through the success of an experiment of the Kenya Medical Department. By 1950 it was seen that the disease incidence in children of 4 to 8 years had dropped from 37 percent to one percent, the result of eliminating the vector, S. neavei, by dosing rivers in 1946 with DDT applied by means of aircraft. In Uganda, where the vector is S. damnosum, the Colonial Insectidides Unit, on the recommendation of a Belgian Congo specialist, carried out experimental spraying of insecticides from aircraft.

In studying the problem of curing bancroftial filariasis in individual patients - as opposed to collective preventive measures - two mass experiments to test the effect of hetrazan in preventing the onset of late manifestations in patients with symptom-free bancroftiasis were undertaken in 1951 on Ukara Island and at Kyela on the mainland, with an accompanying experiment with protostib on Ukara. In the case of bancroftian elephantiasis and genital filariasis with skin changes it was found that hetrazan was of value in preventing recurrent attacks of fever and paid. Protostib also brought relief but this could be obtained more safely and easily by the use of hetrazan. Hetrazan and protostib also cured a proportion of patients with simple filarial hydrocoele with no skin changes, but again hetrazan is the safer drug.

The treatment of onchocerciasis with drugs is a difficult problem since the cause of the disease is the presence of dead microfilariae and yet the only way of producing a cure is to use drugs which kill the microfilariae and the adult worms. The administration of effective drugs therefore necessarily makes the patient's condition temporarily worse and there is danger of harm resulting to the eyes. Hetrazan and protostib and one other drug have been tested against onchocerciasis. It was found that the treatment with hetrazan, both expensive and uncomfortable, halted itching and returned changed skins to normal but the effect was not believed to be permanent. The treatment caused some apparently unharmful and temporary changes in the eyes. In the case of advanced eye patients considerable treatment and long term observations are needed before it can be known if hetrazan will be harmful to them. This work was carried on with the help of an officer of the Kenya Department. A need for an evaluation of hetrazan as a preventive when used in regular dosage was cited. Final results of protostib tests were not available by 1952. It is not strongly microfilaricidal, and its value for the treatment of onchocerciasis will depend on its effect on the adult worms. The disease dipetalonemiasis seemed unaffected by hetrazan, the number of circulating microfilariae perstans remaining unchanged during treatment. This finding coincides with results recorded earlier by other workers.

The fullest cooperation of the Unit with the territorial medical departments and officers contacted in the field is the announced intent. A method of estimating hetrazan content of blood was elaborated by a Tanganyika Government chemist. Blood slides were provided by the Chief Entomologist, Tsetse Research, and the Virus Research Institute. In the 1951 Annual Report of the Unit, which was written for professional and scientific rather than lay readers, papers were contributed by two Kenya medical personnel.

Sincerely,

John B. George

P.S.

Footnotes

1. East Africa High Commission, Interterritorial Cooperation: Work of the East Africa Central Legislative Assembly, Despatch No. 1/52, 19th May, 1952, from P.E. Mitchell, Chairman, East Africa High Commission, to the Secretary of State for the Colonies, paragraph 53.
2. East Africa High Commission, Filariasis Research Annual Report 1952, p. 18.
3. Colonial Office, Annual Report on the East Africa High Commission, 1950, p. 46.

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