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SUMMARY OF REPORT ON THE PROGRAMME AND FIRST RESULTS
OF THE ONCHOCERCIASIS SECTION OF THE CENTRE MURAZ

by

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I. Preliminary Data

When the Section was set up the data available consisted of:

(a) Local information: the reports of inquiries made by physicians of the SGHMP, summarized in the confidential report "L'onchocercose en A.O.F. (1955)" by A. Masseguin, J. Taillefer-Grimaldi & J. J. Leveuf. There were also the results of restricted epidemiological and entomological investigations by Holstein, Puyuelo & Holstein, and Pfister. Finally, personal information was given to me by Médecin-Général Richet, Dr Leveuf and the IOTA team in Bamako.

All this information showed that a series of endemic foci existed throughout the savanna area with a relatively very high level of ocular lesions, exceeding 30 per cent. at certain spots. It also showed the very great difficulty of carrying out a mass chemoprophylactic and chemotherapeutic campaign in these areas. My opinion, as will be seen later in this report, has not changed on this subject, at least so far as West Africa is concerned.

(b) Information obtained elsewhere and particularly thanks to the study fellowship from WHO.

Apparently great successes have been achieved in the Belgian Congo (Leopoldville region) Kenya and Uganda. In fact, the half-failure in the Mayo-Kebbi and recent information from the Congo were leading to the fear that these were only special cases.

Indeed, so far as the Congo was concerned, I had expressed doubts as to results lasting long enough after control treatment restricted to the river, in view of the nearness of other breeding places (Ovazza, 1953); this has been confirmed by the recent reappearance of Simulium damnosum, although the Djoué dam has pushed the breeding places 35 km upstream.

The experience on the Victoria Nile is inapplicable here since the breeding area there was an isolated one, in which control conditions were particularly easy.

With regard to the experience in Kenya, although the breeding places are on numerous small streams, the fact that the vector concerned belongs to a species in the neavei group means that it is not certain that the methods can be applied elsewhere. McMahon's very simple methods on the other hand give a very good idea of what must be done if prohibitive costs of control campaigns are to be avoided.

In any case, the half-failure in the Mayo-Kebbi shows that it is dangerous to apply methods elaborated for equatorial climates, where simuliid flies are present at every season, to tropical areas with a short rainy season and where the rivers run dry for part of the year. Edwards and then Crisp in Ghana have already considered this.

In the basic instructions given by Médecin-Général Richet it was stated that it was necessary (a) to look for an insecticide which would be perfectly harmless for fish in the conditions under which it would be used; (b) to be certain of having perfect knowledge of all the breeding places in the area to be treated and of the isolation of that area; (c) to be absolutely certain of which season or seasons were the most favourable for a campaign.

II. First Programme and First Results

I feel I must emphasize here once more why, in spite of Dr Leveuf's experience in the district of Bougouni (Sudan), purely medical methods were not envisaged. To carry out his campaign Dr Leveuf had to bring relatively large

resources into play for two cantons only. A sizeable effort was needed and he had to use all his very considerable personal powers of persuasion. Then again, his area is particularly favourable since its population is relatively approachable, consisting as it does of peasants who, in a few years, have passed from cultivating millet with the hoe to growing rice in flooded fields and using the plough. This is an absolutely exceptional case in our region. Secondly, curative treatment with notezine is very painful and very exacting. If prophylaxis is to be effective a very high rate of attendance must always be ensured, and that for a treatment which must be applied every week. It is certain that attendance would fall to nothing during the peak periods of agricultural work.

Recently my ideas on this subject have been modified a little by reading the article by Kershaw and his colleagues showing that only medium infections are really a reservoir of the disease as far as the simuliid flies are concerned. The problem should perhaps be reconsidered from this point of view.

Our programme was based on an expenditure restricted to 5 million C.F.A. francs during each of the first two years and 10 million C.F.A. francs for each of the subsequent two years.

(a) Insecticide studies

These have been carried out in collaboration with Mr Blanc, Mr D'Aubenton and Mr Dajet, hydrobiologists. Trials have been carried out partly on the spot and partly in the laboratory at the Musée National d'Histoire Naturelle. The first results are summarized in the article by Blanc, D'Aubenton, Ovazza & Valade attached. Since then Mr Blanc and Mr D'Aubenton have carried out laboratory experiments on liquid insecticides of a density lower than 98 per cent. in which the active principle is DDT alone. Our preliminary trials indicated that this information was necessary. The results thus obtained and which have recently been published (I have only a manuscript here, however) have made it possible to find a product whose toxicity for fish seems low enough to enable it to be used. This product is to be given its field trials soon.

(b) The search for breeding places; taxonomic and ecological data

An article now in the press will give the first results on this subject. In general it seems almost certain at the moment that the Volta focus is continuous as far as the breeding places of Simulium damnosum are concerned. On the other hand there is a great possibility that the Volta focus may be separated from the generality of the Sudanese foci by a zone without breeding places of sufficient extent to make it impossible for simuliid flies to cross it. We only have a small number of surveys left to make before being able to state this as an absolute fact.

The situation is much less favourable with regard to the type of breeding places and the annual cycle of Simulium damnosum. We are faced indeed by a mass of small breeding places distributed over numerous watercourses. Part of these watercourses consist of alternating rapids and stagnant reaches, so that the larvicide has no chance of passing from one breeding place to another. Above all, the adults only exist in certain periods of the year. Some of the streams dry up completely towards the end of the dry season. We have not yet been able to determine the stage which enables the insect to get through the bad season. Edwards' idea in Ghana that this is the egg stage has not been confirmed. Indeed, all other results and observations suggest rather that it is the adult female which survives. In any case, a low-water treatment is out of the question here, since in many places there would be nothing to treat. On many streams the height of the rainy season is hardly any more favourable. The breeding places are then swept away by the sudden rise in the water level caused by storms; the supports are under water and the number of adults itself is very low, as many counts of the hourly biting rate have shown.

Dissections with a view to finding out exactly the duration of the ovarian cycle do not give results in conformity with those obtained by Lewis. For the moment we can establish nothing coherent. An exchange

of correspondence with Lewis has ended in the idea that everything must be begun again right from the beginning in the savanna areas of the Sudan. This is what the team here is now trying to do by different means.

(c) Study of the incidence of the disease among human beings

Because of the distribution of tasks and the lack of means, and also because I am not an ophthalmologist, I have not tackled this problem. Two IOTA missions in my area (at Tenkodogo and at Diebougou) have shown an incidence of onchocerciasis reaching at certain points more than 90 per cent. of the population over ten years old, with a very high proportion of ocular lesions. This has no relationship to what is seen in the equatorial zone but nobody appears to know why.

III. The Present Plan

A team has been formed in Dahomey which will be responsible both for the focus on the Volta in Dahomey and for the small and apparently isolated focus in the south.

Requests for assistance made to F.A.C. (France) and the F.E.D. (European community) cover 318 million C.F.A. francs in 5 years for the whole of the Volta zone. The idea is to have on the spot at the same time survey teams, two teams at least for studying the annual cycle and biology of the vector, and three pilot zones where the methods of control could be perfected from next year onwards. Two of these zones are connected with agricultural projects, which may be useful since they envisage hydraulic regulation of the local streams. The third is that of Lower Dahomey, which has been set up at the request of the Government of that country and the Government of Togo. This last problem is much more simple and more restricted.

Meanwhile, and on the remainder of this year's budget, I hope to be able to begin immediately tests of susceptibility to insecticides. Indeed the laboratory breeding methods introduced by my assistant are at the moment giving the following results:

(a) Larvae

About 50 per cent. of the larvae brought to the laboratory die during the first 12 hours. The others survive perfectly well and reach the adult stage, depending on their age, in 2-3 days.

(b) Adults

The adults from these larvae survive from 48-72 hours on sugared water; some of them have even bitten in the night. The adults taken after a blood meal under natural conditions survive three days. I think that that will perhaps be enough for susceptibility tests. In any case I believe it is necessary to try.

During this time the results obtained by Blanc and D'Aubenton will have to be verified in the field and we shall know at least whether the insecticide chosen is practical and effective.

IV. The items which it seems to me are most important for a general programme covering all the zone where *Simulium damnosum* is found

There will certainly be further talk of human therapy trials. I believe that in Africa before any trial of this nature it is necessary to know to what degree it will be accepted. I do not believe that everybody will attend during the periods of agricultural work; the fields are too far away. I do not believe that too painful a course of treatment will find general acceptance. I think that a preliminary indication might be given by the rate of voluntary attendance at out-patient clinics (pregnant women, pre-natal consultations, vaccinations).

With regard to human onchocerciasis I believe that the problem of the occurrence or non-occurrence of ocular lesions in the various regions must be tackled again. The idea that there is some dietary cause shocks me at first sight, since the people whose diet is most deficient and unbalanced are those who show the smallest incidence of ocular lesions, unless it were a question of deficiency in one single element. The results of the skin snips taken at

various levels in Sierra Leone are interesting. Whatever the truth of the matter so far, we only have hypotheses or facts which have been inadequately checked.

With regard to Simulium damnosum, a great effort must be made to find out its exact distribution, its annual cycle in the Sudan, which is certainly different from that found in more humid regions, and its practical flight range in the same area; finally, its susceptibility to insecticides in as many places as possible must be checked. The quantities at present used have been decided on a purely empirical basis.

The reservoir of the virus is considered to be purely human and there are no facts at the moment to indicate the contrary. Observations, however, made by Lacan in the Mayo-Kebbi indicate that there are clouds of this simulium fly round the herds of Hippotragus equinus, the host of Onchocerca Gibsoni. Is the difference between this species and Onchocerca volvulus any more certain than that which not so long ago it was asserted existed between the loa of human beings and the loa of monkeys?

ANNEX TO THE REPORT COVERING THE SUDAN

At the request of the Minister of Health in Bamako I proposed a campaign in three restricted zones: Bougouni, Dioula and San. The situation there differs from that here from several points of view. The breeding places seem to be confined to a few large streams which flow all the year round. It seems therefore possible to install hoppers on hydraulic works and to spread the larvicide every week for several months of the year. The responsibility for observations could be given to the nearest out-patient clinics. The price could then be low enough to make it possible to try prophylaxis on all schoolchildren and to treat all possible cases of medium infections which, according to Kershaw, are the most important.

The Sudan has furthermore the advantage of having available a small number of persons who already have entomological knowledge or who have already taken

part in anti-onchocerciasis campaigns. The problem seems rather to find the funds necessary for the insecticides.

Obviously the transmission cycle could only be interrupted after a long period since these three zones border on other zones where there are extensive breeding places. The number of adults could be reduced considerably but there would always be re-infestation. However, this completely different method for a region of a different nature would, I think, be interesting to try.