

The Control of the Tsetse Fly Menace.

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TSETSE-FLY problems may be divided into three—the problem of *G. palpalis* and the rain-forest tsetse, that of *G. tachinoides* and that of the savannah or “bush” tsetse belonging to the *morsitans* and *fusca* groups. These, as Major Church showed well in his recent article in NATURE, January 31, inhibit the development of vast areas in Africa, and members of the *morsitans* group are the carriers of Rhodesian sleeping sickness. It is to the control of the bush tsetse that I shall refer in this article (though the broader principles laid down would refer to all), and I shall describe in particular the methods and ideas that we are employing in our fight against them in Tanganyika. These may be understood best if I say that I have from the first felt that if we are to attack the tsetse-fly economically as well as effectively, we must do so in the main by the mere diversion and regulation of agencies already in existence—always, of course, with the fullest knowledge of and regard to the habits of the particular species we are fighting.

This implies that the natives would be taught to understand and take part in the solution of their own problems, and that natural agencies, such as grass-fires, flooding and exceptional seasons, would be harnessed. In a report to the Portuguese Government (*Bull. Ent. Res.*, vol. xi. pt. iv. pp. 315-385) I laid special stress on the fact that “settlement properly planned will protect itself,” on the utility of offering inducements to natives to settle in places, perhaps quite limited, where previous ecological investigation should have indicated that their presence will lead to control of the fly, on the part that European settlement on a sound agricultural basis might be made to play if clearing of the crucial spots were made a condition of occupation and the farms were small enough, and on the probable great value of postponing the annual grass-burning, usually worse than useless, to the end of the dry season (October), and then carrying it out under chosen conditions and in a thoroughly organised fashion.¹ I also emphasised the necessity for studying means of consolidating clearing or, in the absence of consolidation, the need, in a great fly-belt, for providing fly-proof barriers up to which to work; and, in a later report (*Bull. Ent. Res.*, vol. xiii. pt. iii. pp. 317-370), I sketched the scheme which has since been put into operation in Tanganyika Territory, and will be described briefly here.²

It should be noted, first, as regards “settlement properly planned,” that the bushless cattle-areas of that Territory are, in very large part, “culture steppe,” to borrow, provisionally, a German term. That is, they are kept free of bush and, thereby, of tsetse-fly,

¹ I based this recommendation primarily on more than fifteen years of experiment and observation as to the results on woody vegetation of grass-fires lighted year after year in different months, but suggested that deferred fires would also have the other effects—on the pupæ and as to the driving of the fly on the wing into unburning thickets, which would themselves gradually be destroyed—which I shall describe below. Shircore, in 1914, included grass-burning postponed to late July or August, for the clearing up and driving of any flies still scattered, amongst his measures of attack on the dry season centres of *G. morsitans*. Lloyd and Johnson have suggested that, long grass being inimical to breeding, the postponement of burning may be useful also for the prolongation of this unfavourable condition.

² My experiments in Shinyanga will be described in detail in the *Bulletin of Entomological Research*.

almost solely through the presence of sufficiently (not excessively) closely-dotted villages with their chopping for firewood, building and cultivation and the browsing of their numerous stock. On the whole, settlement and bush, man and fly, are sharply segregated. It is hoped that by encouraging this form of settlement in the far greater areas in which the natives *all* live dotted through the bush, pestered with tsetse and subject to other serious disabilities, we shall extend segregation and obtain what will be, for practical purposes, a control of the fly. This form of settlement—implying concentration of organisable labour, a safe base from which to extend, and a breeding centre for population which, being accessible, is capable of receiving assistance from us—is in any case a necessary preliminary to all measures of a large nature against the tsetse in the bush—that is to say, to *reclamation*. The production of it throughout the Territory will be gradual, and in certain parts it may prove to be impracticable, but appreciable success is already in places attending our initial propaganda.

Concentration accomplished and the natives in our new culture steppes assisted to become the possessors of cattle (for these are necessary in order to “anchor” them), it will remain for them to protect themselves against encroachment of the bush and the fly and to expand their fly-free grazing *pari passu* with the increase in their cattle. This, with tact and propaganda, will be done as we have already begun to do it in Shinyanga—through sheer clearing (as last year), for this appeals to the native, or better, through more discriminating measures which will be carried out by the people themselves under our guidance during a few days each year. Here I would say that our victory in Shinyanga lay not in our large clearing of ground—many people have cleared ground (and then let it go back to bush and tsetse)—but in the successful teaching of a native population to tackle its own problems. Stiebel, McMahon, Scupham are my administrative collaborators to whom the credit for this is chiefly due.

Thereafter, as population increases (and we would help it to increase by means of propaganda in hygiene), the scheme is that we should so guide the directions of expanding settlement as to bring into being coalescence, and thereby complete our fly-proof barriers and break off our blocks—the latter corresponding, let us say, in width with so small a fly-belt as that of Zululand. These, being of more manageable dimensions than our entire belt, would next be attacked individually in order to obtain final security and room for the freest development.

What methods are we to apply to the blocks? Lamborn's fine work in the breeding and release of parasites has been mentioned by Major Church. This, in places, might prove a useful contributory measure. Shircore, in an admirable little paper published in 1914, suggested, first, the concentration of attack on the dry-season centres of *G. morsitans* (which would first, he suggested, have been isolated by clearing from the rest of the bush and finally be cut down themselves); and, secondly, for the further controlling of the movements of the fly (which can be done, he considers,

even by narrow barriers), "the splitting up of fly-belts near villages and along main routes by forest destruction and burning." This, with the extension of agriculture, the clearing of villages and the attacking of the fly-centres, would ultimately, he thought, limit fly to areas which need not be entered by the natives. I doubt whether, short of such concentration of population as would produce "culture steppe," these measures could maintain safe segregation in any considerable belt; but they are thoroughly sound in principle and probably roughly represent a part of the means by which the relatively small belts of South Africa were unintentionally cleared of fly by the early settlers. Under such conditions I propose to use them freely.

Jack has experimented on a large scale in the destruction of game—but while, here and there, the checking of particular movements, large or small, of game animals may, if it is also feasible, be very necessary, no one wishes to exterminate our wonderful African fauna, a heritage of the Empire, of posterity, and of the scientific world, if we can control the tsetse otherwise. Our first results in Tanganyika lead to the very strong hope that we can, at least in the type of belt in which I have worked chiefly of late (Acacia-bush with *thickets* as the keynote to the fly's control, much like the fly-bush seen by me in Zululand); and suggest that we should wait a little longer before we commit ourselves finally anywhere to counsels of despair in the form of war against the game.³

I have mentioned my own views already on the utilisation of man-power and the grass-fires and on discriminative clearing, and I think that the diversion of native energy and settlement—or European energy and cultivation where that is present—to the destruction and breaking up merely of the locally-important types of thickets, is likely to be a most valuable measure, because thickets are the chief breeding place of most species of tsetse and a refuge for all during fires. I am employing this already in conjunction with late grass-burning.

As regards the latter, I demonstrated last year (and, concerning certain points, many years previously) the correctness of the view stated in my Portuguese report, that postponed and organised grass-burning is capable, where the grass and the dry season are long enough, of destroying small woody growth and numbers of the smaller thickets, logs and (to judge from a comparative count obtained at Shinyanga) pupæ, and of driving the flies before the fire in great numbers into previously burned patches and such unburning thickets as are as yet uncleared. Our work suggested that in these places they can be exterminated (given the labour) by sheer catching on a great scale by hand and otherwise before they disperse. There can be little doubt also that by means of October grass-burning Father Cirvegna, a missionary in the Iringa district, has cleared of fly (*G. morsitans*), progressively but completely, an area a dozen miles in diameter in three burnings. The measure is not applicable everywhere.

³ I may here correct an error that has slipped into a quotation of Major Church's from a conversation with myself—undoubtedly through my not making myself clear. It is by no means the whole of the Dar-es-Salaam district that is "gameless," and bush-pigs are present in any case. The point is that bush-pigs, by any methods now known to us, are, I believe, inexterminable in certain tsetse-infected types of woodland that cover great areas of Africa; and that, from observations made, I consider that these animals can alone support populations of fly sufficient to preclude the keeping of cattle.

An exceptional season appears to have been responsible for the disappearance of the fly in 1921 from some of the out-jutting portions of the Shinyanga belt. Had there existed fly-proof barriers between these and the main belt, they would not have been re-stocked. It is thus, and for the accentuation of the effect of late grass-burning, once this is installed as an annual custom, that I suggest that we shall "harness the exceptional season" for the clearing of some of our blocks.

Finally, the verification by Harris of views held by him (for example as to the possibility of isolating tsetses in particular pieces of bush until, as I understand it, they starve) is likely, when it comes, to help greatly.

I am experimenting also in Shinyanga as to consolidation of ground gained. We are offering inducements to natives to settle where their activities will be of use, introducing a rule that villagers should keep down young shoots from cleared growth round their villages, experimenting in the encouragement of the keeping of goats for their browsing, trying to induce people in culture steppe to dig up stumps for firewood rather than make journeys to the bush for it, and experimenting in cheap methods of killing woody growth. The encouragement given by our Department of Agriculture to the use of ploughs by the natives is helping me, for ploughing entails the removal of stumps, and we are diverting so far as possible large-scale cotton culture by means of ploughing to the actual ground I am clearing. The replacement of great thicket-areas by high forest (in this form, an idea of Fiske's), the safeguarding of roads, the means of reducing the carrying of fly into contact with cattle by man, and the testing of three important questions in connexion with the game, including its possible utilisation as an ally in our fight with the tsetse, are amongst the further experiments which are already in progress or contemplated.

In short, with the very hearty co-operation of the other Departments and of the District Administration, I have put into effect and, I think, begun to justify the view, that we can now best advance our knowledge of how to fight the tsetse by taking a definite large area or entire Territory and applying to it, without stint of necessary funds and labour, all ideas and knowledge that have been gained hitherto, and all further knowledge we yet shall gain, in a large-scale experiment in control by means (preferably) of reclamation officers working hand in hand with research officers. The latter are still needed for expert "survey," for the many points which will come up for investigation as we go along, and because, for economical and effective work, our knowledge of our flies' habits and habitats must be absolute; and, should funds become available, they will be needed in some numbers, in order that, as they master thoroughly the details of the problem and the work in the field (which it would take new men, unattached, some years to do), many may pass on from the earlier centres to other parts of Africa and assist in making the campaign general. Especially is needed a large fund to meet the various expenses of a scheme which shall provide for this gradual development of large-scale experimentation in actual control under all African conditions; that is, at the stage we have now reached, the right method of research.