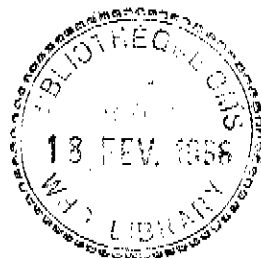


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UNITED NATIONS ADVISORY COMMITTEE FOR THE
APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT

PROPOSALS FOR A CONCERTED ATTACK ON AFRICAN TRYPANOSOMIASIS

Submitted jointly by
the World Health Organization and
the Food and Agriculture Organization of the United Nations

1. Background information

It is only fairly recently that specialized international agencies have been taking a more active part in the control of African trypanosomiasis. The reasons for this relatively late interest have been indicated in a previous document,¹ which is attached for easy reference (Annex I).

The first task to which the two international organizations mainly concerned - WHO and FAO - addressed themselves was to make an appraisal of the current situation of human and animal trypanosomiasis and to determine which problems required immediate attention. For expert advice, the Advisory Panel on Parasitic Diseases was enlarged to include a special section on trypanosomiasis and an Expert Committee was convened in June 1962, whose report should still be considered as an up-to-date assessment of the situation. The very special position of trypanosomiasis due to its epidemic tendencies, the difficulties experienced by developing countries in maintaining surveillance and continuing control operations, the seriousness of the disease in man and domestic cattle, the magnitude of the economic consequences have

¹ "African trypanosomiasis: A review of the needs", report prepared jointly by WHO and FAO, mimeographed document AD/98.64 Rev.1

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already been described in the document referred to above and have been subsequently recognized by the Advisory Committee on the Application of Science and Technology to Development, in its second report.¹

The programme of activities launched by FAO and WHO has also been outlined in the attached document (Annex 1). It is proposed, therefore, to give a brief account of the work accomplished in the intervening period before discussing the programme of work to be carried out in the next five years.

2. Activities during the 1964-1965 period and critical appraisal

As part of the continent-wide survey of trypanosomiasis, a joint WHO/FAO team went to Kenya to assist the Government in drawing up a plan for the eradication of trypanosomiasis in Nyanza Province for which assistance under the United Nations Development Programme (Special Fund) is sought (a summary of the project is given in Annex 2 for the information of the Advisory Committee). Another survey is in progress in Bechuanaland and a third is now envisaged in Chad, Cameroon and Nigeria. Simultaneously with the surveys, consultants have been sent by WHO on field missions to areas where a critical situation is developing such as around Lake Victoria and Burundi. This type of activity is now the main responsibility of a special trypanosomiasis advisory team which has been established in 1965.

Training being one of the top priorities, two training courses have been organized, one at the end of 1963 in Bobo-Dioulasso for French-speaking participants, the other in 1965 at Kaduna for English-speaking participants. Emphasis was placed in the curriculum on the integration of all aspects (medical, veterinarian, entomological, forest and agriculture, etc.) of the disease.

Fundamental and applied research was supported, mainly for the development of rapid mass screening methods, maintenance and distribution of trypanosome strains needed in experimental work, development of self-perpetuating colonies of Glossina needed for studies on the biology of Glossina, laboratory testing of insecticides and transmission experiments required for pathological investigations and laboratory assays of newly-developed drugs. In the meantime, assistance was also given to ecological studies of Glossina in natural conditions.

¹ Economic and Social Council, Official Records: Thirty-ninth session, Supplement No.14, E/4026, pp. 23-25, 26

For the rapid dissemination of all information received by WHO and FAO to all field and laboratory workers, a Joint Information Service has been established and is now operating.

During this initial period of activities, there is no denying that the two organizations concerned have not always met with immediate success. The difficulties of trypanosomiasis control have already been pointed out. They are inherent to the epidemiological features of the disease, the lack of trained personnel and the disruption of public health work for which there are many causes, one being the departure of experienced personnel. But, in addition, there are two major impediments to quick action, one being the limited financial resources available for international assistance, the other the difficulties of co-ordination at the national level. To illustrate this point, it may be said that in one particular instance it took more than one year to achieve co-ordination and agreement between all governmental services concerned on a concerted plan of action. Furthermore, attention must be paid to the necessity of co-ordinating trypanosomiasis control with land reclamation and rehabilitation schemes in the Glossina infested zones, and this can be done only through the integration of the work of all specialists involved. However, in this respect much depends also on the efforts of the national authorities.

Very close co-operation has been maintained throughout the period between WHO and FAO in the trypanosomiasis field, through visits from staff members or joint internal meetings. It has now become apparent, however, that to achieve further progress in that direction and accelerate activities a more permanent system of collaboration would be desirable. The form under which this system should be established is under study.

3. Proposed expanded programme for trypanosomiasis control (1966-1971)

3.1 Assistance to governments: field surveys

There is a large fund of knowledge and experience available on the control of trypanosomiasis both by chemotherapy or chemoprophylaxis and by eradication of the vector tsetse. It may be said that, in the present state of knowledge, eradication of the disease could not be achieved without eradication of tsetse. This eradication can now be, and has been, achieved in certain areas with the use of insecticides and the most economical and effective schemes have depended on the ground application of residual insecticides.

The areas in which such techniques are at present assured of success are those in which tsetse are known to occupy a restricted habitat. These conditions obtain particularly towards the northern limit of tsetse in West and Central Africa in the dry season when heat and desiccation restrict the fly to narrow bands of riverine vegetation. By ground application of insecticides in the dry season Northern Nigeria has treated over 9000 square miles (23 000 square km) of tsetse infestation in the last five to six years and it is probable that, in this dry vegetation zone stretching east and west from the Sudan to Senegal, the treatment of some 20 000 to 30 000 square miles (52 000 to 78 000 square km) would serve to eradicate the threat of trypanosomiasis from a very much larger area, perhaps as much as 150 000 square miles (390 000 square km). However, it must be stressed that methods proved to be successful in one area cannot safely be applied to other areas without preliminary surveys to collect adequate epidemiological and entomological data.

These data could be obtained by joint teams of consultants (epidemiologist/veterinarian/entomologist) and it is estimated that the zone referred to above could be covered in a total of 54 consultant months. Similarly the Kenya Special Fund Request, referred to above, includes as one of its main functions the finding of economic means of extending successful small-scale operations to large-scale projects. The feasibility of extension from the Nyanza Province of Kenya to the larger areas of tsetse infestation in Uganda and Tanzania could be studied by joint teams in a total of 36 consultant months.

The main obstacle to the application of present knowledge to the eradication of trypanosomiasis in the areas mentioned is the lack of trained personnel. Northern Nigeria and Kenya, and more recently Uganda, have done an immense amount of work on insecticidal eradication of tsetse and refinement of techniques have brought costs in Northern Nigeria down to the level of \$ 150 or even less per square mile (\$ 60 per square km) of the actual area treated - the restricted dry-season habitat only. The Northern Nigerian control and eradication schemes have been implemented with a staff of eight professionally qualified (three veterinarians, five entomologists), 30 sub-professional (control officers and field assistants), about 120 junior staff (tsetse control assistants) and locally recruited labour, and are now covering approximately 2000 square miles (5 200 square km) per year. The training needs to extend this work are primarily for professional and sub-professional staff who could

then themselves train junior staff. It is suggested that about four months' training for each would be required to obtain adequate knowledge of equipment and techniques. Thus the requirements per 1000 square miles (2600 square km) per year could be estimated at 16 (4 x 4) fellowship months for professional staff and 60 (4 x 15) fellowship months for sub-professional staff.

In addition to training, there would be transport and equipment requirements. Again, recent experience in Northern Nigeria can be called upon for estimates. Their transport and equipment per 1000 square miles per year would be four "reclamation units", each unit comprising: two five-ton lorries, two Land Rovers, two tractors with trailers and water tanks and 50 knapsack sprayers with spare parts and maintenance equipment (approximate capital cost per unit \$ 35 000).

Apart from the relatively dry areas mentioned in which tsetse eradication could be undertaken with confidence there are other areas which present different problems. The southern limits of tsetse on the western side of Africa occur in the Congo (Leopoldville) and Angola, but relatively little work has been done in those parts on the ecology of the fly in relation to control. It cannot therefore be assumed that conditions conducive to control exist along the southern limits as they do along the northern limits until the problem has been properly investigated. There are also the areas of higher rainfall in West and Central Africa, the Guinea savannah and forest zones. Experience is already being acquired in the Guinea savannah and it seems probable that within a few years economic methods of tsetse eradication in such areas will have been evolved. In the highest rainfall areas, the Congo Basin and near the West African coast, dense rain forest occurs and it cannot be said at present that tsetse eradication from high rain forest could be considered as economically possible.

From the preceding statement, it is clear that, in addition to transport, equipment and insecticide requirements, the following international assistance would be needed:

- (1) Epidemiological and control work in the dry areas at the northern limit of the tsetse distribution area: estimated 54 consultant months.

(2) Epidemiological and control work in East Africa as an extension from the pilot project in Nyanza Province of Kenya: estimated 36 consultant months.

(3) Basic epidemiological investigations in other areas: not yet estimated.

From the above, it appears that only for work in areas where epidemiological conditions are sufficiently known and control or eradication has been recognized as immediately possible, a total of 90 consultant months is needed, which would amount to approximately \$ 153 000.

3.2 Assistance to governments: training

The requirements per 1000 square miles per year have been estimated above at 16 fellowship months for professional staff and 60 fellowship months for sub-professional staff. Here again, it is clear that training and fellowship should be made available to a greater number of potential scientists and technicians in Africa and elsewhere.

3.3 Research

It is evident that research must be amplified in the basic and applied aspects of science relevant to trypanosomiasis.

A new field of entomological research which is being investigated is the possible application of nuclear physics to vector control. The International Atomic Energy Agency (IAEA) has suggested that, aside from a controlled agricultural change which would modify the tsetse fly environment, one of the more permanent control measures would be to develop and use the sterile male technique which would utilize radiation or chemicals, alone or in combination. For this purpose, however, one would have to dispose of large artificial colonies of Glossina and of methods to improve the flying ability of the laboratory-reared tsetse fly. Owing to the very slow rate of reproduction of Glossina (one pupa per 10 days), in order to produce any given number of males per week, the number of fertile females would have to be at least three times as great. While the difficulties of establishing and maintaining such large colonies of laboratory-bred flies should not be minimized, support is required to develop such a programme.

It was stated above that eradication of trypanosomiasis could not succeed at present without eradication of the vector but attack on the vector is not the only route to the control of the disease. The other route of attack on the causative organism may take the form of chemotherapy or of immunization. Improved drugs, acting safely and in a short time, are needed. The subject of immunity in trypanosomiasis has been intensively studied in recent years but it is extremely complex and much more needs to be known before active immunization could be considered as practicable.

There are centres of intensive research in Africa such as the Institut Pasteur, Dakar, the Nigerian Institute for Trypanosomiasis Research, Kaduna, and the East African Trypanosomiasis Research Organization, Tororo, Uganda. The full resources of these institutes plus the research output of territorial control organizations will be indispensable to progress in future years. Every possible support should be given to them not only for their research activities but also to stimulate the interest and co-operation of qualified African and other scientists, and to prevent them from switching over to activities not relating to trypanosomiasis. A substantial amount of fundamental research must at the same time depend on workers in the developed countries and full support should be given to this not only to ensure its continuity but also to attract new workers to the subject. The Committee, therefore, might wish to give its support to these aspects of institutional development.

4. Financial implications of the proposed expanded trypanosomiasis control programme

At the present stage it is difficult for WHO and FAO to offer a valid opinion on the expenditure which would be incurred, in addition to present bilateral and international aid, through the implementation of these proposals. It should, however, be remembered that such a programme as previously outlined could only be developed in stages, extending over, say, a five-year period. The average annual cost of such an undertaking would be not less than \$ 500 000. This should be considered only as a very rough estimate. The proposed programme cannot be financed from the ordinary budgets of WHO and FAO. As an indication, funds earmarked for trypanosomiasis activities in the WHO budget and programme for 1965, 1966 and 1967, including technical assistance funds, amount to \$ 114 312, \$ 136 496, and \$ 171 566 respectively.

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24 September 1964

AFRICAN TRYPANOSOMIASIS: A REVIEW OF THE NEEDS¹

1. Present situation of the disease and its effects on health and economy

Trypanosomiasis, or sleeping sickness, is a parasitic disease caused by protozoa (trypanosomes) of various species which are mainly transmitted to man, domestic animals and wild game by tsetse flies (Glossina). The disease, particularly lethal to man and domestic stock, is widespread throughout the African continent from the southern borders of the Sahara to a latitude of approximately 20° south.

Trypanosomiasis is now no longer the terrible scourge of the past. Nevertheless, despite the reassuring over-all prevalence figures - extremely low in some parts - the considerable knowledge gained about the disease and its natural history, and the spectacular successes achieved through continuous case-finding, treatment and vector control activities, trypanosomiasis today is still a serious public health problem and a major factor in retarding the development of vast areas.

The reasons for concern, expressed alike by specialists and government authorities in many sectors (public health, animal health, agriculture, water and forest resources, population resettlement, etc.), are briefly indicated in the following paragraphs.

1.1 Public health aspects

Human trypanosomiasis in West Africa and about as far east as the Western Rift Valley is caused mainly by Trypanosoma gambiense, and on the eastern side of the continent mainly by T. rhodesiense.

Measures to control trypanosomiasis caused by T. gambiense by means of chemotherapy and chemoprophylaxis have reduced the incidence of the disease to a very low level. However, the low over-all figures must be regarded with caution, since they may conceal high local incidence. There still remain ill-defined active residual foci, which may become the starting-point of new epidemic outbreaks. The existence of an animal reservoir is suspected. T. rhodesiense infection is more acute

¹ Report prepared jointly by WHO and FAO

Cases may be grouped or sporadic. The fundamental reasons for this discontinuous distribution are not known. Although the general prevalence is low in some countries, this is mainly due to avoidance of occupation of the infested areas. T. rhodesiense also seems to show epidemic tendencies and there is evidence that animal reservoirs exist.

In view of the above, the present situation gives cause for great apprehension, especially when it is remembered that active foci may flare up unexpectedly, that large-scale economic development schemes being undertaken in tsetse-infested areas result in large-scale migrations of workers and may increase the possibilities of Glossina/man contacts, that surveillance and control activities are forcibly slowed down, if not completely halted, by the withdrawal of experienced trained personnel, and, last but not least, that the ideal drug, non-toxic and effective at all stages of the disease, has not yet been found.

1.2 Economic aspects

The effects of trypanosomiasis on the economy of infected areas, often countering all efforts to improve, inter alia, the deficient diet of African populations, are outlined below.

Now that rinderpest and contagious bovine pleuro-pneumonia are largely under control, trypanosomiasis remains the greatest single impediment to the development of the stock-raising industry. Trypanosomiasis of domestic stock covers a larger area than human trypanosomiasis. It is of major importance in cattle and, in some regions, in camels and pigs. Generally the better beef and milk-producing breeds are more susceptible, and the disease causes considerable mortality among the normally tolerant strains of cattle maintained in tsetse areas whenever their natural resistance is lowered by other factors. The disease prevents the improvement of local strains by crossing with introduced dairy or beef strains, and the raising of beef herds throughout the tsetse belt. It affects the survival, the dressed weight and quality of cattle driven through fly belts to consuming areas, such as the zebu cattle bred north of the tsetse line, which supply 90 per cent. of West Africa's beef. In one experimental study of the stock routes from Mopti to Accra, losses due to trypanosomiasis were estimated at £ 1 000 000 per annum.

The cost incurred for treatment of trypanosomiasis of cattle is high. In one country of West Africa, over nine years, the cost to cattle owners amounted to £ 200 000 while the cost to the government in staff, transport, and maintenance of 350 treatment camps was approximately £ 1 000 000.

Trypanosomiasis affects largely the herds of cattle driven from the fly-free areas into the fly-infected dry-season grazing areas. If in the areas which are tsetse free mechanical transmission occurs through other flies, and if these are numerous, widespread epizootics may be caused. This was the case in 1946 and 1947 in one country where one and a half million cattle were affected, the death rate exceeding at one time 10 000 cattle a month.

Large areas of otherwise suitable grazing land are at present denied to cattle. Approximately 10 million square kilometres of land, most of it of average fertility, is infested with tsetse flies and devoid of cattle. If cleared of tsetse flies, this land could provide for a potential cattle population of 125 000 000 head, thus more than doubling the present total cattle population in Africa.

The effects on agriculture are chiefly caused by failure to establish any system of integrated mixed farming in regions where trypanosomiasis makes livestock farming uneconomic or impossible. The consequent absence of draft animals and loss of manure to maintain soil fertility has had profound effects on agricultural development and productivity. Forestry policy is also hampered, owing to the close relationship of vegetation to tsetse-fly distribution. Careful selection of forest reserves in relation to present demands for agriculture and existing tsetse-fly belts is necessary.

2. Investigations needed to achieve control of the disease

However effective the efforts undertaken to control the human disease, the potential for serious epidemics remains. The burden of animal trypanosomiasis on economy is of such magnitude in some countries that assistance is required to enable them to operate control programmes on the least costly basis. Technical assistance must therefore be provided to find cheaper, safer and more effective methods of control than have so far been applied, and for this purpose investigations are needed to gather basic information on the general and local transmission patterns (epidemiology) and to devise accordingly the most effective methods of attacking the parasite in man and in domestic animals (drug therapy and prophylaxis) and in the vector or animal reservoirs (chemical, environmental and biological methods).

The most important needs in this connexion, as determined by the WHO Expert Committee on Trypanosomiasis¹ in June 1962 are outlined below.

2.1 Epidemiology

Surveys of residual human foci of T. gambiense infection are required to determine the reasons for their persistence (failure in the methods used, existence of animal reservoir hosts, especially among small domestic animals such as sheep and goats), as well as investigations to ascertain the type of man/fly contact responsible for rapid transmission of the disease under various conditions (climate, vegetation, human activities, etc.)

There is need for more complete knowledge of the geographical distribution and prevalence of trypanosome species and strains pathogenic to man and domestic stock and for development of better and quicker identification and diagnostic techniques to be used in case-finding or animal surveys, particularly to distinguish non-pathogenic strains from pathogenic ones, and to detect symptomless carriers.

Further ecological and physiological studies should be made of tsetse species in relation to the epidemiology of the disease, and better knowledge is needed of the relative efficiency of different tsetse species as vectors of different trypanosome species. The diagnosis of trypanosome species in the fly is in the most elementary state. Knowledge of infection rates in both animals and vectors is required. Techniques for such studies need to be improved, especially for field surveying of tsetse populations when their density is low. This is essential in determining any advance or retreat of the species involved and in assessing the success of control programmes.

Apart from the problem of cyclical transmission, i.e. by the tsetse fly, there is need for work on mechanical transmission, to ascertain to what extent and under what circumstances it occurs, and to define the species of biting flies responsible. There is also need to follow the effects of chemotherapy, since there is already a suggestion that widespread use of drugs has influenced the relative incidence of species of trypanosomes in cattle.

¹ Wld Hlth Org. techn. Rep. Ser., 1962, 247

2.2 Immunobiology

For diagnostic and therapeutic uses, it is important to support work being carried out on the antigenic composition of the pathogenic trypanosomes and on antigenic variation which gives rise to antibody-resistant or relapse strains.

There is no direct evidence that man becomes immune after exposure to T. gambiense. Some hosts are not susceptible to infection with particular trypanosome species. Particular breeds of cattle (e.g., N'Dama) have a special ability to resist infection. These complex immunological problems are extremely important, as development of methods of artificial immunization will depend on understanding of the basic processes underlying resistance and non-susceptibility to strains. Worthy of study on experimental lines are the possibilities of enhancement of resistance by combining antigenic stimulation with drug therapy, and the initiation of antigenic stimulation in the calves of immune mothers.

2.3 Chemotherapy and chemoprophylaxis

Until such time as the ideal drug effective against all stages of the disease, easily administered in a very short course of treatment and safe enough to be used by auxiliary medical personnel is found, the following improvements would be important advances: (a) less toxic drugs than those used at present for the treatment of late cases of both T. gambiense and T. rhodesiense trypanosomiasis; (b) a longer acting prophylactic drug against T. gambiense; (c) a reliable prophylactic drug against T. rhodesiense; (d) prophylactic drugs that will give longer protection to domestic animals; (e) new groups of curative drugs to increase the choice of those not causing cross-resistance in domestic animals.

2.4 Environmental, chemical and biological control of vectors

The extent to which such procedures succeed in reducing fly populations depends on very precise knowledge of the breeding sites and the resting and food habits of the various vector species, of the natural factors responsible for the natural limitation or expansion of tsetse populations, or their adaptation to changes in fauna, etc.

Different species of tsetse are dependent on different types of woodland, forest or vegetation to provide the suitable climatic conditions - temperature, humidity and light - in which the fly can live and breed. Knowledge of these particular vegetation associations enables the control of some species to be achieved by bush clearing, which may be restricted to certain types of tree, or to certain key localities such as river crossings. Barrier clearing of bush can also isolate blocks of tsetse-infested woodland which can then be controlled or treated in other ways. In many areas bush clearing is most effective when followed judiciously by human and cattle resettlement in the tsetse-freed areas, thus efficiently preventing regrowth of bush and reinfestation by the fly.

In certain circumstances elimination of game can lead to disappearance of tsetse flies and trypanosomiasis. There are several examples of success being achieved by this method in the past, but it is currently considered secondary to more recent methods.

Extensive use of insecticides in tsetse control by means of insecticide mists applied from aircraft has been developed to deal with those species of tsetse which occur over wide areas of savannah woodland, and has in several instances led to successful eradication of the fly and subsequent resettlement of indigenous people and their stock. This method is, however, costly and is being replaced where possible by ground application, either by the production of insecticidal fogs or smokes, or by residual treatment of vegetation essential to the tsetse. Under favourable conditions treated vegetation may remain lethal to settling flies for up to two months, which is considered sufficient to lead to eradication in due course.

Considerable attention is now being directed to the possibility that the sterility method - which has given striking results with some other insect pests - might be applied to tsetse. The basis of this method is to release into the natural tsetse population very large numbers of glossina males which have been sterilized, either by irradiation or by use of certain compounds - chemosterilants - which act orally or by contact. Provided that the sterile males can compete successfully with the normal males, the result will be a progressive decrease in the production of offspring. The success of this method may be closely dependent on whether the area is one of high tsetse density, i.e. over 1000 flies per square mile; one of medium density, or one of low density, i.e. 200 flies or less per square mile. Where tsetse density is high

it is suggested that the sterility method would be most effective when the tsetse population has already been considerably reduced by conventional methods such as insecticide application by aircraft.

The choice of methods of vector control is therefore dictated by local conditions, but it is also dependent on financial resources, personnel and equipment available. There is still a need to perfect the techniques from the point of view of efficacy and economy.

3. International activities in Trypanosomiasis

3.1 Background

The League of Nations was already aware of the importance of the disease, both human and animal, and sponsored the first international conference held on the subject in London in 1925, and the second held in Paris in 1928. The recommendations of this second conference are of particular interest and indicate that even in those days the importance of understanding the ecology of man, fly and animal was well appreciated.

The main reason that FAO and WHO have not at an earlier stage taken an active part in trypanosomiasis activities in Africa is that the Scientific Council for Africa South of the Sahara, and the Commission for Technical Co-operation in Africa was very active in this field through the work of its Bureau permanent interafricain de la Tsé-Tsé et de la Trypanosomiase, which made a great contribution to the problem, and also of its International Scientific Committee for Trypanosomiasis Research, whose work is also of considerable importance. Further, several outstanding research institutes were fully engaged in this field at that time, including the East African Trypanosomiasis Research Organization in Uganda, the West African Institute for Trypanosomiasis Research in Nigeria, and several other centres.

Changes in the health and veterinary administrations of so many African countries in recent years, however, and the decline in activities of the Scientific Council for Africa South of the Sahara, together with the closure of the Bureau permanent interafricain de la Tsé-Tsé et de la Trypanosomiase, and depletion of staff in the research institutions, have brought about an urgent need for strengthened co-ordination at the international level.

3.2 Proposals for future action

The role of WHO in trypanosomiasis work may be summarized as follows: to advise national health administrations, on request, on the development of their national trypanosomiasis services, including the collection of epidemiological information and a stricter control of reporting methods; to assist in the development of inter-country and country projects; to help to develop better survey and control methods; to stimulate research into the more urgent unanswered problems of trypanosomiasis having a direct bearing on control; and to facilitate and develop exchange of information among trypanosomiasis workers throughout the world.

The role of FAO in trypanosomiasis work consists of advising national veterinary administrations, on their request, on the organization and development of their trypanosomiasis and tsetse services, including all related aspects of their work; assisting in the development of inter-country and country projects; helping to develop better survey and control methods; stimulating research into the more urgent problems of animal trypanosomiasis and facilitating and developing better exchange of information among trypanosomiasis workers throughout the world.

The majority of these aspects of FAO's work in trypanosomiasis would be handled in close co-operation with WHO.

It is suggested that the following action would most appropriately meet the present needs in Africa for control of human and animal trypanosomiasis:

3.2.1 Epidemiological surveys

Before control programmes can be established on a large scale, surveys should be made with the object of assessing the current situation and the extent of the problem created by trypanosomiasis; reviewing national plans and such programmes as are already in existence; evaluating the feasibility of co-ordinated action at regional level and of operating a control programme over an extensive area; and recommending priorities for future action on control of human and animal trypanosomiasis.

It is planned to begin with a joint FAO/WHO survey along these lines in an endemic area of East Africa late in 1964. Other similar surveys in other endemic areas will also be necessary. It would be of great advantage if those surveys were

carried out by a trypanosomiasis study team which would propose co-ordinated measures to keep the disease under control and collaborate in exchanging epidemiological information and stimulating modern techniques and methods for sleeping-sickness control. This team should consist of a medical officer (epidemiologist) on a permanent basis, with consultants added to the team as appropriate for work required at any particular time.

3.2.2 Control programme

On the basis of the surveys mentioned above, a co-ordinated control programme for the continent of Africa should be gradually worked out. The first step to this end should be the establishment of a large-scale pilot demonstration project in a suitable area, which would provide opportunities, inter alia, for testing new tsetse control methods, gaining practical experience on current problems, carrying out field trials of the newer trypanosomicidal drugs, and training personnel. On the basis of experience gained from such a project, other projects could be initiated elsewhere with greater confidence than in the past.

There is no lack of requests for assistance from governments in Africa... Many of them have already expressed their full realization of the importance of the trypanosomiasis problem in their country, and have presented requests for assistance, either directly to responsible organizations or in statements made on the occasion of technical meetings. Among such requests, the following (not an exhaustive list) may be mentioned:

inter-country campaign against human trypanosomiasis in the Kissi area (Guinea, Liberia, Sierra Leone);

eradication of Glossina in the Cameroon-Chad frontier area (portions of the Chari-Logone river system located in the Sahel-Sudan climatic zone);

large-scale field trial of insecticidal treatment in South-East Africa (three governments concerned);

campaign for tsetse control in the Caprivi area (three governments concerned);

tsetse control in Northern Nigeria (Komadugu-Gana river system);

campaign against Glossina morsitans in the Bugesera region of Rwanda (Burundi also involved);

eradication of G. fusca and G. fuscipes in the Central African Republic.

More recently a project for the eradication of G. fuscipes and G. pallidipes in Nyanza Province (Kenya) has been submitted to WHO. It offers a possibility of extension to the provinces of the lake-shore of Uganda, from which reinfestation could always occur. It includes veterinary as well as human aspects and would offer a good opportunity for a pilot project to be started in that area.

3.2.3 Stimulation of research

The questions most urgently in need of an answer have been outlined in section 2 above. Research along these lines by workers in existing research institutions should be stimulated and co-ordinated. When such research cannot be undertaken for lack of funds, it would be desirable to provide from international sources some financial support in the form of grants for specific items of work.

3.2.4 Training of trypanosomiasis workers

By far the most serious obstacle to progress in the trypanosomiasis programme is lack of personnel. It is estimated that only about 10 per cent. of the workers who have carried the load of trypanosomiasis and tsetse control in African countries have remained as a result of the fundamental changes in those countries in the past few years. The lack is felt at all levels - research scientists, epidemiologists and technicians - but the most urgent gap to be filled is in field officers, who formed the backbone of the sleeping-sickness control and animal health services in Africa. There were very few Africans among them, and the majority of those have now moved on to more senior administrative posts which in most cases have little or no connexion with trypanosomiasis.

Some improvement in this situation may be obtained by the following means:

Training courses - of six weeks or two months' duration each year for the next five years.

Seminars - biennial seminars for those in charge of national trypanosomiasis programmes, to discuss problems of epidemiology and developments in research, control, diagnosis, and organization of services. These should be co-ordinated with meetings of the International Scientific Committee for Trypanosomiasis Research, which also meets every two years.

Personnel for research institutions. The lack of personnel in these institutions constitutes at the present time a most pressing problem. Many vacant posts exist, owing to depletion of staff following changes in the political structure of the countries concerned in the past few years; there is little incentive for non-Africans to fill the vacant posts, and there are few indications that Africans are attracted towards a research career at the present time.

In the past, if research institutions were created, it was because they were essential to the conduct of control programmes. Although they carried out a certain amount of fundamental research, their work was directed chiefly towards finding means of controlling trypanosomiasis. Without this instrument, it is almost unthinkable that any advance can be made in a programme for trypanosomiasis control. As an immediate measure to improve the staffing position of these institutions, therefore, it would be desirable to provide annually from international sources for the next five years or so research grants (of 12 months each) to be awarded to trainees who would be sent to train in these research institutions. (Priority would, of course, be given to Africans, but if it were not possible to find sufficient Africans for the number of grants, the balance should be given to non-Africans.)

It would also be desirable for special arrangements to be made with the research institutions in Africa which are collaborating in trypanosomiasis work, whereby they would receive annual grants to enable them to take African candidates for training as field officers.

3.2.5 Dissemination and exchange of information

Exchange of information is, of course, implicit in most of the activities mentioned in the preceding sections, but in the special context of the trypanosomiasis situation in Africa at the present time it is essential that the greatest possible amount of technical information should be exchanged among trypanosomiasis workers in different countries in the shortest possible time. The customary distribution of technical publications from national or international sources is not sufficient to meet the need, and for this reason it is planned to establish a Trypanosomiasis Information Service, to be operated jointly by FAO and WHO, the modus operandi of which is at present being worked out between the two organizations. This service

would in no way compete with the material normally published in printed form in books or journals, but is intended rather as an informal newsletter to link together, and stimulate exchange of information among, technical workers in different countries with similar interests in trypanosomiasis work.

4. Summary

It is becoming increasingly obvious that trypanosomiasis, both human and animal, is an important factor in impeding the economic development of the countries of Africa in which it is endemic, owing to its devastating effect on human health and on the animals which are needed to provide food for the populations of these countries.

In order to achieve and consolidate control of the disease, it is necessary to assemble more precise information than is at present available on its epidemiology, to find better drugs for its treatment, and to evolve more efficacious and economical methods of eliminating the tsetse fly which is responsible for its transmission.

All aspects of the problem must be dealt with by concerted action irrespective of national frontiers, and it is for this reason that proposals are made for assistance by the appropriate international organizations in epidemiological surveys, control programmes, stimulation of research, training of personnel, and dissemination and exchange of information among workers at all levels in the field of trypanosomiasis.

PROJECT FOR THE ERADICATION OF HUMAN AND ANIMAL
 TRYPANOSOMIASIS FROM THE NYANZA
 PROVINCE OF KENYA

SUMMARY

1. Aims and objectives

The project, for which the assistance of the Special Fund is sought, has the following objectives:

1.1 Immediate objectives

(a) To support the efforts of the Tsetse Control Unit of Kenya in controlling the present epidemic spread of human trypanosomiasis in Central Nyanza. Until tsetse control is achieved in that area, measures for the drug treatment of humans and animals will have to be continued. The present spraying operations against G. fuscipes, starting in the epidemic area, must be continued through the lakeshore islands up to their conclusion i.e. the eradication of all G. fuscipes from South and Central Nyanza.

(b) To implement a programme of eradication of G. pallidipes, the main vector of bovine trypanosomiasis and also transmitting human trypanosomes, from Nyanza Province. This programme is an essential prerequisite to a properly planned scheme of land usage.

(c) Although eradication of G. pallidipes has been achieved in small-scale operations (Thomson, Glover and Trump, 1958), it will be necessary to work out the most economical and effective means of extending these techniques to large-scale operations by pilot projects.

(d) To continue and expand the medical and veterinary measures for the prevention and control of the disease in man and cattle; combined attack on the vector and on the parasite offers, at present, the only chance of eliminating the disease.

(e) To increase research related to the foregoing activities. Full advantage should be taken of the opportunity to add to existing knowledge of the problems by carrying out research while the project is developing, such as:

- (i) Continuation of investigations to gather basic information on the general and local transmission patterns (epidemiology and epizootiology). Available information should be taken into account as much as possible and be analysed and evaluated.
- (ii) Further investigations into the nature of man-fly contact and its relation to transmission of the disease under various conditions of climate, vegetation and human activities.
- (iii) Determination of infection rates in man, animals and vectors, with development of improved techniques. This is essential to determine any advance or retreat of the parasite species involved and to assess the success of control programmes.
- (iv) Follow-up of the effects of chemotherapy on man and animals with a view to detecting any drug resistance as early as possible.
- (v) Experiments to be continued to find the most economical and effective methods of vector control through bush-clearing combined with various spraying regimes.
- (f) To train national counterpart personnel. This training would take place:
 - (i) in the field as in-service training under the guidance of the national and international experts assigned to the project;
 - (ii) in established research centres in Kenya under the Government counterpart contribution; and
 - (iii) in the form of fellowship abroad.

1.2 Long-term objectives

(a) In relation to the overall plan for the economic development of Kenya, to allow reclamation and settlement of large portions of valuable farm and grazing land, at present denied to man and cattle by heavy tsetse infestation. An analysis of the benefits to the economy of Kenya resulting from this long-term objective is presented in the section of this document entitled "Value of the project to Kenya".

(b) The experience gained in the G. pallidipes eradication campaign in Nyanza will lead towards country-wide tsetse eradication, and similar tsetse eradication and land reclamation projects in other countries of Africa.

2. Value of the project to Kenya

The eradication of tsetse and trypanosomiasis from Western Kenya will benefit the country in five main ways:

- (i) by its impact on the human population of the affected areas;
- (ii) by growth and improvement of the livestock industry;
- (iii) by allowing large areas of land, at present uninhabited, to be used for settlement, agricultural production and forest development;
- (iv) by removing a dangerous threat to the valuable tourist industry;
- (v) by facilitating the general development and planning of the economy of the whole nation, by the Government departments responsible.