EXPERT COMMITTEE ON MALARIA

REPORT ON THE FIRST SESSION

Geneva, Palais des Nations, 22-25 April 1947

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SECTION I

Introduction

The Epidemiology and Quarantine Committee of the Interim Commission in its first report (WHO.IC/EQ/1, 13 November 1946) agreed "that the problem of malaria was sufficiently urgent and important to warrant immediate action". It was decided to appoint a committee of five experts "to study and advise on this important problem". It was anticipated that subsequently it would be necessary for this committee to continue certain investigations and to submit a report in due course.

The report of the Epidemiology and Quarantine Committee was adopted by the Interim Commission at its second session (13 November 1946). It was felt that the Malaria Committee should meet just before the next session of the Interim Commission and prepare a note for consideration of the Commission. But this was not possible.

At the third session of the Interim Commission (11 April 1947) the Committee was renamed "Expert Committee on Malaria" (WHO.IC/69 and WHO.IC/76). The interpretation of the Secretariat (WHO.IC/61–H, 20.3.1947) of the terms of reference was that this Expert Malaria Committee "would advise the Interim Commission and also make recommendations to the World Health Assembly concerning the creation of a Malaria Committee with the help of the Draft Constitution submitted by Dr. Gabaldon (WHO.IC/W.27, 6.11.1946) and also concerning the programme of work for such a committee". The necessity for giving expert direction to the field work to be carried out by the field missions of the World Health Organization was emphasized.

The first meetings of the Expert Committee on Malaria appointed under the terms of Document WHO.IC/61–H, were held in Geneva (22–25 April 1947) and the following were present:

Members: Dr. Mihai CIUCA, Roumania
Dr. N. Hamilton FAIRLEY, Great Britain
Dr. Arnaldo GABALDON, Venezuela
Dr. Paul F. RUSSELL, United States of America.

At the time of the meeting there had been no nomination of a member by the USSR.

Dr. Arnaldo BABALDON was elected Chairman.

Secretary: Dr. E.J. PAMPANA (WHO.IC Secretariat)

Also present: Dr. Brock CHISHOLM, Executive Secretary,
Dr. N. GOODMAN, Director of Field Services,
and Dr. J.H. VINE, Chief of the WHO Interim Commission Mission in Greece.
Section II

New developments and opportunities

The period from 1939 to 1947 has been marked by world events which have had a profound effect on malarialogy, not only creating new problems but especially bringing up new opportunities for a degree of practical malaria control and even of practical malaria eradication, impossible, in fact unthinkable in pre-war days. As regards malaria, it is now possible for the World Health Organization to go a considerable way towards its objective, "the attainment by all peoples of the highest possible level of health."

In many regions of the world malaria is still, by all odds, the greatest obstacle in the way of the objective of the World Health Organization. World War II intensified the incidence and increased mortality from Malaria in many regions and there have been in each of the war and post-war years and there will doubtless be in 1947 severe epidemics of malaria. UNRRA helped to meet emergency post-war needs, but now the only international agency which can furnish appropriate aid and technical assistance is the World Health Organization or its Interim Commission. It must be remembered that malaria is still – as it has been in the past – the most important preventable disease in the tropics and subtropics, East and West.

Malarialogy has come of age and it is not an exaggeration to say that a new era has begun in malaria treatment and control. War needs stimulated notable advances and we now have in the new antimalarials (see Section VI below) and in DDT (see Section VII below) weapons of great practical value.

But the war, which brought about these advances, at the same time greatly restricted dissemination of knowledge about them so that there is a real need for the World Health Organization to spread information and to make it possible through fellowships and travel grants to send malaria officers to areas where the new measures are in active use.

In particular, DDT spraying offers at last a method of controlling malaria in many areas at costs within the economic means of the people. But it will sometimes require the initiative, technical advice and assistance of the World Health Organization to start such a programme and to bring it to a point where Governments can carry it forward.

Although the new weapons are much more effective, they still have important limitations so that there are research needs which the World Health Organization can profitably explore.

The Committee believes that never before has an international body faced such great opportunities over wide areas for the practical control of one of the world's greatest afflictions.
Section III

Recommendations for a Malaria Committee and a Malaria policy for the WHO

In view of the great importance of malaria in the world to-day and the fact that many aspects of the disease require highly specialized and technical handling, the Expert Committee on Malaria of the Interim Commission strongly advises the Commission to recommend to the Health Assembly at its first meeting that the Executive Board be directed to establish, at once, in the World Health Organization a committee of experts to be called "The Malaria Committee of the World Health Organization" (Constitution, Art. 38).

The basic objective of this Committee should be to assist the World Health Organization and the United Nations in carrying out their international public health functions in the specialized field of malaria research, epidemiology, therapy, control and eradication in different parts of the world. (Constitution, art. 2).

Functions

The ways and means by which such a Malaria Committee could most effectively aid the World Health Organization have been carefully considered and the Expert Committee recommends that the general functions of the proposed Malaria Committee of the World Health Organization should be along the following lines:

(1) The first and primary function of the proposed Committee should be to act as an expert malaria advisory group to the World Health Organization and, as requested by the Director-General, to other agencies of the United Nations.

It would seem to be highly desirable, if any other body of the United Nations contemplates a project which involves some aspect of malaria such as, for example, education, treatment or control, that advantage be taken of the expert advice of the proposed Malaria Committee and also that there be only one malaria advisory board within the United Nations specialized agencies.

(2) A second basic function of the Malaria Committee should be that of an international co-ordinating and intelligence centre, collecting pertinent data, disseminating useful information suggesting new methods, providing practical advice in respect of all phases of malaria control. Furthermore, it should concern itself with the developing of an informed public opinion in regard to malaria incidence, treatment, control, prevention and eradication.

(3) The Malaria Committee should give technical assistance to Governments, upon request, in order to strengthen national malaria treatment, control, research, or training services and where appropriate it should be prepared to recommend to the World Health Organization that the latter provide such facilities to special groups.
With the new insecticides and antimalarials malaria epidemics can be stopped effectively and quickly when a suitable organization and the supplies are available. Therefore, the Committee should be specially alert regarding possibilities of assisting in the control of epidemic malaria which in the recent past and even to-day is so disastrous in certain areas.

(4) Although great advances have been made there is still need for fundamental research in the field of malaria. It is advised that the proposed Malaria Committee plan and stimulate research and where appropriate recommend the financing of specific projects by the World Health Organization.

(5) Another function which the Expert Committee believes should be undertaken by the Malaria Committee is the recommending of World Health Organization Malaria Fellowships, upon request of Governments, either to enable senior malariologists to make useful tours to other countries, or to provide younger men an opportunity to attend training courses at a school of malariology. It may be advisable for the proposed Committee to recommend, plan and supervise one or more WHO International Malaria Courses along the lines of those set up by the Health Organization of the League of Nations, with special emphasis on malaria control.

(6) The Expert Committee strongly recommends that provision be made so that the proposed Malaria Committee or its individual members as indicated may make tours from time to time for the purpose of giving help to a malaria programme, or to obtain a clear understanding of a problem or project, or to obtain new and useful information. Such tours should be subject to agreement with the Governments concerned and to approval by the Director-General.

(7) Finally, the Expert Committee believes that a most important function of the proposed Committee should be to promote co-operation and agreement between nations in regard to malaria nomenclature, standards, indices, epidemiological procedures, laws and regulations. It is specially important that the proposed Committee consider most carefully what further steps might be recommended to prevent the inadvertent transport-ation of malaria vectors across national boundaries and into areas where they are not now present.

Organization

The Expert Committee considered at some length the question of the membership of the proposed Malaria Committee. It would seem essential that such a Committee be large enough to insure that there is in the first place proper geographical representation so that all parts of the world where malaria is a problem will have intelligent understanding by the Committee. Secondly, since malariology is a very wide subject ranging from engineering to entomology and from pathology to therapeutics appropriate technical representation is also essential.

Budgetary needs must be considered and the Expert Committee has therefore decided to recommend that the proposed
Malaria Committee of the World Health Organization consist of not more than nine members. The Expert Committee strongly advises that it is a minimum number below which the proposed Committee could probably not function with efficiency.†

The Expert Committee advises that the members of the proposed committee be appointed for terms of three years and that they be eligible for reappointment without reference to previous service. It is also recommended that the members be appointed by the Chairman of the Executive Board and the Director-General to a list of names of individuals actively engaged and well known in some phase of malariology, the list to be prepared in the first instance by the present Expert Committee and thereafter by the Malaria Committee of the World Health Organization, each list to contain at least twice as many names as there are appointments to be made.

The Expert Committee further recommends that the Malaria Committee of the World Health Organization should be provided with a secretary thoroughly familiar with and competent in the field of malariology and appointed by the Director-General who may delegate to him the Director's functions as ex-officio Secretary of the Committee. (Constitution, Art. 32)

The Expert Committee believes that normally two meetings of the proposed Committee each year will be necessary in order to carry out its functions properly. But conditions will vary from time to time and it is therefore recommended simply that the proposed Committee meet at places and times decided by the Committee with approval by the Director-General and that if a sudden meeting is necessary it may be called by the Director-General and the Chairman of the Malaria Committee.

The Expert Committee recommends that the proposed Malarial Committee be empowered to elect its own chairman and adopt its own rules of procedure.

The Expert Committee further recommends that the Malaria Committee with the approval of the Director-General, be empowered to invite to its meetings technical experts when it seems essential to a proper understanding of a problem at hand.

Finally, the Expert Committee calls attention to the Pan American Malaria Commission and it recommends that when the Health Assembly defines geographic areas for Regional Organizations (Constitution, Art. 44) there be established at once, if malaria is a problem, Regional Malaria Commissions appointed by the Regional Directors. It is recommended that the Organization of the Pan-American Malaria Commission be based on the model of the Malaria Committee.

† The former Malaria Commission of the League of Nations consisted of some 50 members, 21 of whom constituted a study committee.
American Malaria Commission be used as a guide for the formation of such regional Malaria Commissions. Particular attention is called to the system of sub-committees within the Pan American Commission.

It is further recommended that there should be established very close relationships between these Regional Commissions and the Malaria Committee of the World Health Organization and that the latter be empowered, with the approval of the Director-General, to invite one or more chairmen of Regional Malaria Commissions or sub-committees to attend its meetings as observers.

SECTION IV

The Darling Foundation and Prize

The Expert Committee on Malaria supports the request of the Interim Commission to the Secretary General of the United Nations that the funds of the Darling Foundation be transferred to the World Health Organization or to its Interim Commission, according to the Resolution (see Doc. WHO.10/75) of the Interim Commission, adopted during its third session;

Should this transfer be effected the Committee considers that the statutes of the Darling Foundation should be modified, the draft of the revised statutes to be entrusted to the future Malaria Committee according to the Recommended Resolution presented in Section X.

SECTION V

The 4th International Malaria Congress

The 4th International Malaria Congress will be held in Washington, D.C., U.S.A., on May 10-15, 1948. An invitation has been received from the Convener (Dr. M.F. Boyd) for the Malaria Committee to take active part in its sessions. It is expected that, by the time the Congress is held, the Malaria Committee of the World Health Organization may already have been appointed, but also that because of the shortness of time it may be unable to accept such an invitation. Because of this fact, the Committee advises the Interim Commission to appoint an observer to represent the Committee in the said Congress.
SECTION VI
Chemotherapeutic Control of Malaria

The following report bearing on the chemotherapeutic control of malaria is included for purposes of supplying information to the Interim Commission regarding (1) recent anti-malaria drugs which have become available since the war, and (2) lines of investigation which, in the opinion of this Committee, might be undertaken in the future. Owing to the absence of funds for the purpose, no definite recommendations are made to the Commission at this juncture.

Malaria proved a grave menace to troops operating in malarious areas during World War No.2 and great national efforts were directed to the discovery of more effective drugs to suppress and cure malaria. These chemotherapeutic discoveries made during the war have greatly increased our capacity to control and eradicate malaria in times of peace.

Atebrin

Though atebrin had been widely used before 1939 and was known to be capable of replacing quinine in the treatment of malaria, its value and correct dosage as a suppressant had not been worked out. Investigations in volunteers experimentally infected with both falciparum and vivax sporozoites while taking one tablet of atebrin (0.1 gramme) every day revealed that even the heaviest falciparum infections were suppressed and cured by this regimen while vivax infections were completely suppressed though not radically cured. Subinoculation revealed that erythrocytic parasites appeared in submicroscopic numbers in the blood of such volunteers, but provided atebrin was present in sufficient concentration in the plasma, the parasites were destroyed, and, in the case of falciparum infection, radical cure resulted. If correct, these experimental findings implied that there should be no deaths from falciparum malaria and no black-water fever, provided an adequate daily dosage of atebrin was taken. Field results with few exceptions confirmed these findings. Atebrin administration became a matter of strict military discipline, and following this malaria was reduced to insignificant proportions, ceasing to be a disease of military importance.

The 4-Amino-Quinolines

Much new work was also done on two new drugs – sontoquin (SN 6911) and resoquin (SN 7618) – which had been synthesized and patented by German chemists in 1939. The action of these drugs was found to be essentially similar to atebrin, but resoquin, which is now called chloroquine or aralen, possessed the advantage of not discolouring the skin and being effective in one-half the therapeutic dosage. Like atebrin, aralen produces its therapeutic effects by schizonticidal action and does not affect the exo-erythrocytic parasites. It is, however, a drug of great potentialities, and is being selected for very wide field trials, both as a suppressive and for therapeutic purposes.
The 8-Amino-Quinolines

The value of plasmoquine (1) as a gametocide, (2) as a causal prophylactic in falciparum malaria, and (3) in combination with quinine in radically curing vivax relapsing malaria has been recognized for many years. Recently in the U.S.A. new drugs of this series have been synthesized, the most promising of which is pentaquine. Pentaquine has a similar therapeutic action to plasmoquine; it can be given in slightly larger dosage, but unfortunately, like plasmoquine, may produce serious toxic complications. Haemolytic anaemia and haemoglobinuria have both been recorded in patient receiving pentaquine, and for this reason its therapeutic use is likely to be restricted to hospital patients.

The Biguanides

A remarkable series of antimalaria drugs synthesized during the war were the biguanides, the most important of which is paludrine. This drug is an effective schizonticide; it possesses an action similar to quinine and atebrin in benign tertian malaria, producing clinical but not radical cure. It cures overt falciparum malaria with great regularity in a dosage of 0.3 grammes daily for ten days; in one series 106 out of 107 falciparum infections were radically cured by this treatment. It also has a sterilizing action on gametocytes and later sexual stages, the sexual cycle not proceeding further than the early oocyst stage in mosquitoes fed on carriers while taking paludrine.

Its most remarkable action, however, is as a suppressant drug: when given in suppressive doses either daily or two or three times a week it acts as a true causal prophylactic in falciparum infections, and as a partial causal prophylactic in vivax infections. As a result of this action, falciparum infections are terminated in the pre-erythrocytic stage so that erythrocytic parasites never reach the blood stream.

A remarkable feature of paludrine is the latitude allowed between the effective therapeutic dose and the toxic dose. A daily dosage of 1.0 gramme has been frequently taken for three to four weeks with impunity. Yet a single dose of 50-100 mg. given from 29 to 131 hours after severe sporozoite falciparum infection eradicates the disease. Similarly, a single dose of 0.1 gramme will often terminate a clinical attack of either vivax or falciparum malaria; generally recrudescence follows a few weeks later. General Covell has recently reported that a single dose of 0.3 grammes of paludrine has been found to be very effective for treatment of overt malaria in Indian villages; he believes this to be the best treatment for village use.
Field Trials with Paludrine

In the first field trials with paludrine, only one tablet of 0.1 gramme weekly was given. Field trials in India and Africa arranged by the Malaria Sub-Committee of the Colonial Medical Research Council in England, indicate that a single tablet weekly is sometimes insufficient as a suppressive, for occasional overt attacks occur even in regions of low endemicity, while in hyperendemic areas the dosage is definitely insufficient. This failure is not surprising as the results obtained in experimentally infected volunteers at Cairns indicated the minimal effective dosage to be 0.1 gramme given at least twice weekly. General Covell reports that when the dosage is increased to two tablets of 0.1 gramme a week given at three to four days interval, paludrine appears to be entirely effective, but series is so far too small to reach final conclusions. Arrangements have been made to test in hyperendemic areas one dose of 0.3 grammes weekly, but no field results are yet to hand. Field trials arranged by the Malaria Sub-Committee of the Colonial Medical Research Council are being made in Malaya by Dr. Field, in India and Ceylon and in many parts of Africa.

Projected Chemotherapeutic Investigations and Field Trials

Two outstanding drugs are now available for field trials:
(1) Aralen (chloroquine), produced by Winthrop in USA,
(2) Paludrine, manufactured by I.C.I. in England.

It is understood that supplies of both these drugs will be made available gratis by the manufacturers for field trials undertaken under the direction of the WHO.

Aralen

This is a most effective schizonticide both as a suppressant and for therapy. It gradually "builds up" in the blood and the concentration is maintained for some time after medication ceases. This is an advantage in a suppressant drug, since occasional doses can be missed with impunity. On the other hand, it is more likely to be associated with occasional toxic features as is the case with atabrine. The standard tablet contains 0.25 grammes of base.

Paludrine

This drug has a direct action both as a schizonticide and as a causal prophylactic. It is also a primary gametocide and should directly affect the carrier rate quite apart from any secondary effects dependent on early termination of the primary trophozoite wave in malaria infection. The standard tablet contains 0.1 gramme of paludrine.

The potentiality of these two drugs when given in suppressive dosage should be fully explored (A) in volunteers or patients needing therapeutic malaria, and (B) in highly malarious villages. These investigations should be undertaken not only from the standpoint of suppressing malaria fever, but also from the standpoint of prevention of infection and radical cure. Following chemotherapeutic control, the ensuing loss of premunity in village populations might increase the tendency to epidemics, but this is a
risk which can now be taken, since the means at our disposal for controlling epidemics have vastly improved.

A. Chemotherapeutic investigation on volunteers or patients needing therapeutic malaria.

(1) Chemotherapeutic suppression: Volunteers or selected patients needing therapeutic malaria are generally infected with *falciparum* or *vivax* sporozoites either by the bites of infected mosquitoes or by intravenous injection of sporozoites derived from the salivary glands of infected anophelines. For the purposes outlined here, repeated infection could be made with *vivax* and *falciparum* sporozoites, while such selected patients were receiving one of the various regimens of paludrine or aralen.

When such investigations are undertaken it is suggested they be planned as follows:

**Series I** - Receives one tablet of aralen (0.25 grammes of base) once weekly, exposure to infection commencing four weeks after administration of the drug has been initiated.

**Series II** - Receives 0.3 grammes of paludrine once weekly, administration commencing 2 days after the first exposure to infection.

**Series III** - Receives 0.1 grammes of paludrine twice weekly at three to four days interval, drug administration commencing two days after first exposure to infection.

**Series IV** - Receives 1/2 tablet of aralen (0.125 grammes of base) twice weekly at 3-4 days interval, drug administration commencing 4 weeks before exposure to infection.

**Series V** - Receives 0.1 grammes of paludrine three times in each week, i.e. at 2 or 3 days interval, drug administration commencing 2 days after first exposure to infection.

In all these experiments the drugs should be continued for two weeks after last exposure to infection.

Patients developing clinical attacks of malaria during the period of drug administration or thereafter should be treated with standard therapeutic doses of the same drug - i.e. paludrine or aralen - which was being used for suppressive purposes. In this way the development of paludrine-resistant or aralen-resistant strains would be detected.
(2) Gametocyte carriers: Mackerras found at Cairns that 
(1) the sexual cycle was inhibited and did not proceed beyond the 
small oöcyst stage in the mosquito if paludrine was present in the 
blood of the carrier; (2) the action was reversible since falciparum 
gametocyte-carriers later regained their capacity to infect mosqui-
toes normally, the time depending on the dosage of paludrine 
administered to the carrier.

Additional experiments on gametocyte carriers should, in 
our opinion, be carried out when they are receiving paludrine as 
follows:

**Series I** - 0.3 grammes once weekly.

**Series II** - 0.1 gramme twice weekly.

**Series III** - 0.1 gramme thrice weekly.

It would be most important to determine whether sporozoite 
infection of the salivary glands can occur under these regimens, 
and if so on what days of the week the carrier becomes infective.

B. Chemotherapeutic Field Trials

Two types of experiments are visualised:

(1) A comparison of the efficacy of aralen and paludrine 
in adjacent villages or in the same village.

(2) The eradication of malaria entirely in a given area 
by chemotherapeutic means.

Throughout it would be essential to select villages and 
areas where DDT or Gammaexane will not be used.

(1) Comparison of the efficiency of aralen and paludrine in 
adjacent villages with similar spleen and parasite rates.

In the ideal field trial, the value of the two drugs would 
be determined for a cross section of the whole village community 
including (1) infants and young children without premunity, and 
(2) older children and adults who had developed premunity as a 
result of repeated infections.

Two adjacent highly malariacous villages would need to be 
selected. In village "A" one-half of the population comprising 
approximately 50% of all age groups would receive paludrine in 
appropriate dosage once weekly, while the other 50% would be 
given a placebo. Adults would receive 0.3 grammes of paludrine 
once weekly while the dosage in the age groups under 15 years 
would be scaled down according to age.

In village "B" a similar experiment would be conducted 
except that aralen would be substituted for paludrine in 50% of 
all age groups. The dose of aralen would be 0.25 grammes for 
adults and this would again need to be scaled down in the lower 
age groups. The control half of the population in each village
who were taking the placebo would (1) afford an accurate index to malaria transmission, and (2) ensure a reservoir of gametocyte carriers, provided individuals without premunition, i.e. infants and young children, were adequately represented. As overt attacks would be immediately treated the health of the group taking the placebo would be adequately cared for.

Field trials of this type are more readily planned than carried out. The difficulties associated with the administration of a placebo may be not inconsiderable, and with new drugs it is at first difficult to determine the appropriate dosage in the lower age groups, and having determined it to ensure it is properly administered. For these reasons, the simpler field trials outlined below may be preferable – at least in the first instance.

(a) Children under five years of age would receive no suppressant drug, but clinical attacks would be immediately treated as they arise. Parasite rates and spleen rates would be determined at stated intervals; where possible, this would be monthly, otherwise every two months. The remainder of the population, i.e. those over 5 years, would receive aralen once weekly in one village and paludrine in the other village. The dosage of aralen for adults would be 1 tablet (0.25 grammes of base) and for children between 6 and 15 years one half-tablet (0.125 grammes of base) once weekly. The dosage for paludrine would be three tablets (0.3 grammes) for adults and for children aged 6-15 years two tablets (0.2 grammes) once weekly.

Drug administration should start one month before the malaria season commences and be continued for one month after transmission ceases. Drugs would need to be administered under strict supervision and an accurate roster kept for the purpose.

In all suspected febrile attacks blood examinations would be made. When possible spleen and parasite rates would be determined at monthly or two-monthly intervals. Whenever feasible, the sporozoite rates of mosquitoes trapped in the villages should be made for purposes of comparison. It is possible that the sporozoite rate in the paludrine treated villages would be lower than in the aralen treated villages.

Observation should be continued throughout the period of non-transmission to determine the general health of the village population and the incidence of vivax relapses.

(b) A comparison in two other similar malaria-infected villages should be made, the population over five years receiving drugs as follows:

(1) One village should receive one half-tablet of aralen (0.125 grammes of base) twice a week.

(2) Another village should receive paludrine 0.1 grammeme twice a week – i.e. Wednesdays and Sundays.

Similar parasite and spleen surveys should be made in the children under five years, and in the other age groups as have already been described. A similar follow-up during the period of non-transmission should be instituted.
Therapy

Throughout, overt attacks in both children and adults should be treated with therapeutic doses of the same drug as was used for suppressive purposes, i.e. aralen or paludrine. This would afford an index to the possible development of aralen-resistant or paludrine-resistant strains.

(c) In two other villages of high endemicity, similar regimens would be instituted, but here paludrine or aralen would be compared in the same village. Children under five years would receive no drugs unless they developed overt attacks of malaria. The other age groups would be divided into two halves and receive suppressive drugs as follows:

**Village 1** – One half of the adults would receive 0.3 grammes of paludrine once weekly, and the other half 0.25 of aralen once a week. Children (6–15 years) would receive 0.2 grammes of paludrine, or 0.125 grammes of aralen base.

**Village 2** – One half of the adults would receive 0.1 gram of paludrine twice a week and the other half 0.125 grammes of aralen base twice a week, i.e. at 3–4 day intervals. Children 6–15 years could receive the adult dose of paludrine i.e. 0.1 gramme twice weekly. The adult dosage of aralen would probably be regarded as excessive for children; one quarter of a tablet, i.e. 62.5 mg. twice weekly might be substituted.

(2) Extirpation of malaria from village areas by chemotherapy.

Two areas with similar parasite and spleen rates should be selected. In one area "A" all the population should receive paludrine except one control village on the periphery of the area. In the other area "B" all should receive aralen except one village used as a control located on the periphery of the area.

Details regarding this type of field trial and dosage to be adopted could be considered later.

**SECTION VII**

**DDT**

The discovery of the insecticidal properties of DDT has meant the introduction of a very powerful arm in the control of malaria. It has been used as a larvicide and as a mosquitoicide and found very effective. The final general use of this insecticide, larvicide or as mosquitoicide will depend on future research.

As a larvicide DDT may probably be of restricted use in ordinary anti-anneliaine work as compared to its employment as a mosquitoicide. As a larvicide it may result in being a more expensive measure, and therefore its effects in comparison with those obtained when used as mosquitoicide, in relation to their relative cost, should be studied. In countries where the malaria season coincides with the rainfall it may have a limited effect which may reduce its
economic use. Also, and specially when used from aeroplanes, it may interfere with the normal biological cycles of the treated environment, what may upset the economy of the region, not only from the standpoint of animals but also of plants, both of crops and trees. There is no doubt that as an emergency measure DDT as larvicide has a wide usefulness. A great deal of study should be given to these points and special care should be taken not to carry on experiments with DDT as a larvicide in districts where it is also used as a mosquitoicide because a decrease of density of anopheles has been observed in places where it has only been used as a mosquitoicide.

It is probable that the widest use of DDT will be based on its utilisation as a mosquitoicide to control malaria by the destruction of the adult vector insect. As this requires its use as a house-spray, it will also affect other domestic insects particularly flies, and in this way DDT may indirectly influence the local morbidity and mortality from causes other than malaria. The future success of a world-wide malaria control by DDT will depend on the solution of a large number of problems which need further study.

A country-wide programme by DDT house spraying will depend on the budgetary facilities that each country may have, and as there are many nations of low economic level where the malaria problem is extremely important, it is basic that special attention should be given to reducing the cost of the work. It should be remembered that in many field experiments to control malaria more emphasis is put on the decrease in the disease than on the actual amount of money involved to obtain such reduction. At the present time enough is known of the possibilities of DDT so that it is time for giving serious consideration to problems of cost. It is felt that at present, when all the emergencies of the war are over, the World Health Organization, Interim Commission should not back routine programmes to control malaria by DDT which would be out of financial reach by the health authorities of the aided countries. On the other hand, it is considered that any effort on the part of the World Health Organization to help in the development of low cost methods to control malaria by DDT house spraying would be very important.

The Committee in this respect wants to emphasize that, with this powerful arm, time has come when more effort should be devoted to develop methods for more practical and economical control of the disease under consideration.

The reduction of cost of a DDT programme will rest on the increase of knowledge on the following points:

(a) bionomics of the anopheles,
(b) methods of application, and
(c) organization measures.

Attention should be given therefore to stimulating efforts in this direction in the different areas of the World.

In reference to cost, the Committee wants to call attention to the recently observed trend in the market to increase the price of DDT which at present is hard to understand. It should be
recalled that in industry it generally happens that the larger the amounts of a given material, the lower are the prices of its production. Steps should be taken to advise the entities concerned to give consideration to this problem as it is suspected that an artificial increase in price of DDT may be seen in the near future which may be a hindrance in its wider use.

It is suspected, as mentioned above, that a decrease in morbidity and mortality from diseases other than malaria may be obtained by the wide use of DDT, in a similar way as was observed after the introduction of better water supplies and chlorine when a reduction was noticed in diseases other than typhoid and diarrhoea and dysentery. DDT probably will have to be used as a recurring measure, as chlorine is used in water supplies, and therefore expenditures may be expected to be maintained. Because of this fact, special attention should be paid to the collateral benefits on general morbidity and mortality just mentioned, to avoid the possibility of budgetary reduction which over-optimistic health authorities may impose.

SECTION VIII

Recommendations for a second meeting of the Expert Committee on Malaria in 1947.

There will perforce be a considerable time interval between the present meeting of the Expert Committee and the first meeting of the definitive Malaria Committee of the World Health Organization, recommended in this report. Therefore, it is urged that the World Health Organization Interim Commission at its next session authorize and provide for a second meeting of this Committee, to be held in November 1947. Such a meeting is essential if the World Health Organization desires the advice and guidance of its malaria experts in regard to its 1948 malaria programme which involves the expenditure of a considerable sum of money. It is strongly felt that all malaria projects of the World Health Organization should be reviewed by the WHO Malaria Committee, as a matter of sound policy. There has been no opportunity for the Expert Committee to study the 1948 malaria programme and it would seem advisable to make provision for such a review before the end of this year. Moreover, there are other matters which should receive attention without delay. These include the preparation and dissemination of reports regarding new antimalariaials and insecticides and the inauguration of a World Health Organization malaria fellowship programme.

SECTION IX

Miscellaneous

Draft Resolution presented by Dr. Ciuca

The Committee draws attention to the serious malaria epidemic in Tulcea (Roumania) where the supply of antimalarial drugs and insecticides is grossly inadequate. This epidemic
threatens to extend also to neighbouring regions in the country and even to cross the border into adjacent countries.

The Committee recommends that the Secretariat collect more complete information and that it approach the League of Red Cross Societies with a view to supplying the necessary antimalarial drugs and insecticides to combat this serious emergency.

SECTION X

Recommended Resolutions

The Expert Committee on Malaria submits the following recommended Resolutions for the consideration of the Interim Commission to be placed before the World Health Assembly:

I

Whereas the World Health Organization, for the application of its statutory functions in the field of malaria, would benefit from the advice of a group of outstanding malariologists conversant with the many aspects of the malaria problem in the different parts of the world, as regards malaria research, epidemiology, therapy, control and eradication,

The First World Health Assembly resolves:

That the Executive Board be instructed to establish, during its first session, a Malaria Committee of the World Health Organization with the following terms of reference:

a) to act as an expert malaria advisory body to the World Health Organization and, when requested by the Director-General, to other specialized agencies of the United Nations and to Governments requesting advice or technical assistance in the field of malaria;

b) to act as an international co-ordinating and intelligence centre in the field of malaria;

c) to study and stimulate and, where appropriate, to recommend the financing of malaria research and field investigations, to develop specialized malaria training through fellowships or otherwise and to promote co-operation and agreement among the nations in the field of malaria research, epidemiology, legislation, therapy, prevention, control or eradication.
2. That the Malaria Committee of the World Health Organization shall consist of not less than nine experts, appointed for three years and eligible for reappointment.

3. That the Malaria Committee of the World Health Organization be empowered to elect its own chairman, adopt its own rules of procedure, and, with the approval of the Director-General, to invite to its meetings technical experts when deemed necessary.

4. That the Chairman of the Executive Board, in agreement with the Director-General, appoint the first nine members selecting them from the annexed list presented by the Expert Committee on Malaria of the Interim Commission, and that henceforward the selection for new appointments be made from a list, including two candidates for each nomination, presented by the Malaria Committee of the World Health Organization.

5. That, when the World Health Assembly defines geographic areas for Regional Organizations, there be established at once, if malaria is a problem, Regional Malaria Commissions appointed by the Regional Director.

II

Whereas the Darling Foundation was created by private funds with a view to honouring the memory of Dr. S.T. Darling, killed by accident during a study mission of the Malaria Commission of the League of Nations;

Whereas the Darling Foundation had the purpose of granting periodically a medal and a prize to a malarialogist who particularly distinguished himself with his work;

Whereas, with the liquidation of the League of Nations, the Statutes of the Darling Foundation are no longer applicable;

The First World Health Assembly resolves:

1. That the Malaria Committee of the World Health Organization, in consultation with the Director-General, draft the new statutes of the Foundation and submit those for approval to the Executive Board;

2. That such Statutes should entrust the Malaria Committee with the selection of the candidate to whom the medal and the prize should be attributed;

3. That the medal should be solely awarded by the World Health Organization and that the Director-General should be the administrator of the Fund of the Darling Foundation.