ANTI-MALARIA CAMPAIGN

B·N·A·F

AMENDED AND REVISED EDITION

This memorandum includes the information issued in the pamphlet entitled «Anti-Malaria Campaign in B.N.A.F.» published under G.R.O. 8/104 of 19 Mar. 43, together with additional matter on the subject of malaria.

Nothing has been included here which is not of practical importance in the control of malaria as it affects the soldier. The degree of attention paid to the principles and requirements outlined in this pamphlet may mean, for the reader, the difference between chronic illness and health, between a long life and a short one ; and the response of the individual may decide between failure and success of the campaigns to be launched from North Africa.

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I. Malaria Information

1. Malaria is a disease caused by a germ. The symptoms are:- Pains in the back, headache, hot and cold shivers, rise in temperature. If you feel these symptoms you MUST report sick; DON'T try to cure yourself--firstly because you won't succeed; secondly because malaria is recurring, becoming worse each time a fresh attack occurs.

2. When improperly nursed or badly managed malaria can ruin your health permanently ; it can destroy the fighting efficiency of an army. Yet it is a disease which can be avoided if certain precautions are taken.

3. Malaria is prevalent and becomes increasingly severe throughout North Africa and in Southern Europe from May to November. During the hot weather season, malaria may become the dominating factor in planning and executing a military campaign.

4. Under these circumstances the disease can kill or injure any individual as surely as a bullet ; our ability to fight it successfully demands as high a degree of training and discipline as does the technique of modern warfare.

5. Malaria is not only a crippling infection but its consequences involve the setting aside of hospital beds required for the proper treatment of battle casualties.

6. In some ways malaria is more formidable than the human enemy. Its sphere of activity may cover the whole theatre of operations. It is always threatening you and you can never afford to relax your watch.

7. A battle, even a campaign, can be lost without a bullet being fired. History records many instances.

8. But just as a sandbag, a tank, or a pill box can afford you protection from bullets, so also can protection be given you against this disease if you will only take advantage of it.

9. In their duty of looking after the welfare and health of their men. all Officers must appreciate the important part that anti-malarial measures play. The responsibility is theirs and not the medical officer's ; he is only the expert adviser.

10. Measures of attack and defence cannot be left to the medical officer. To be effective every man from the commander to the private soldier must play his part. There must be no shirkers. The same strict discipline is demanded as is required in battle.

11. *How is Malaria contracted?* Malaria is spread in one way only--by mosquitoes. In fact it is carried only by the female mosquito of a kind known as ANOPHELES. Not all Anopheles can spread malaria. Only those which are infected can transmit the disease. The malaria-carrying mosquito bites only after sundown and during the hours of darkness.

12. Other diseases such as Dengue and Yellow Fever are spread by other kinds of mosquitoes. As it is generally impossible for any man without special training to distinguish the different kinds or the sex of mosquitoes it is best to *treat all mosquitoes as enemies.*

13. The female mosquito lives on blood. She becomes infected by sucking the blood of a previously infected individual. After the mosquito has had its infective blood meal it takes at least ten days to incubate the germs before she can infect a healthy individual. Then,

when she bites you she will leave some of these new fledged germs in your blood.

14. Thus it will be observed that for malaria transmission three things are necessary :---

(a) An infected person.

(b) An infective mosquito.

(c) A healthy man--possibly yourself.

15. *HOW IS MALARIA PREVENTED ?*

Special unit orders should be drafted as indicated below and modified as may be necessary to suit particular situations. Such orders should he repeated at frequent intervals and kept vigourously in action throughout the malaria season. The following preventive measures are VERY important.

16. *Protective Medication.* Atebrin (Mepacrine) must be issued with the rations on the scale of 0.4 gr. per man per week during the period 22 April to 30 November. The dose is ONE (0.1) gr. tablet on Monday, Tuesday, Thursday and Friday, taken, unless otherwise authorised by the unit commander, during or after meals. These tablets build up substances in the bloodstream to fight the malaria germs so that if the soldier is bitten by an infected mosquito he will have a milder attack or no attack at all.

Instructions upon the procedure and technique of Atebrin adminstration are given in Appendix < E >.

17. *Personal Protection. (a)* Mosquito nets must be used throughout the night by all ranks not on duty. **

(b) Between sunset and sunrise (when not otherwise protected) all ranks must wear slacks and boots and long-sleeved shirts, with sleeves fastened at the wrists and collars closed. Sentries must wear veils and gauntlets in addition where possible.

(c) Anti-mosquito cream must be smeared on all exposed parts of the body from sundown onwards at 2-hourly intervals until the solider is securely protected within the mosquito net.

18. *Site Selection and Removal or Treatment of Native Malaria Carriers.*

(a) Careful selection of camp sites, where possible at least 2,000 yards away from swamps and native dwellings. High sloping ground is ALWAYS preferable to flat land. Medical advice should be sought in selecting camp sites.

(b) Where practicable in collaboration with the French Authorities, temporary native huts and encampments should be removed at least 2,000 yards, or further where possible, from the vicinity of camp sites.

(c) Native huts and dwellings should be out of bounds between sundown and sunrise.

19. *Adult Mosquito Killing.* So long as supplies of flysol are available all occupied barrack rooms, billets and tents should be sprayed before bedtime and as soon after reveille as possible. This measure has also the effect of keeping sandflies at bay. (*See Appendix <D >)*

** *Except in the case of units quartered in the part of Algiers west of the grid line* 74, *and within a radius of* 5 *kilometres from the Naval Offices (Map ref.* 740130*), all ranks are being issued with a mosquito net.*

20. *Destruction of Mosquito Larvae.* (a) < Dry day > should be observed on Monday of each week, when all receptacles containing water, (unless otherwise dealt with to prevent mosquito breeding) should be emptied and left dry for at least two hours.

(b) All empty receptacles that would hold water should be stacked upside down.

(c) Nothing that can hold water should be left lying around.

(d) Adequate measures of larva control should also be established up to at least two kilometers around camp sites.

21. *Management of Fever Cases.* (a) Officers and men should report sick at once if they have fever. On no account will they treat themselves.

(b) Medical Officers will ensure that all persons sick with malaria are admitted to a medical unit, where they will be given the standard course of treatment laid down in the < Memorandum on Malaria > with any modifications later introduced, before being returned to their unit or base depot.

II. Organization and Training

(G.R.O. 8/104 of 19 *Mar. 43 refers)*

1. *Unit Anti-Mosquito Squad.*

Every unit will have, in addition to its other sanitary personnel, an anti-mosquito squad formed from unit personnel. This will consist, of 1 N.C.O. and 3 O.R.'s. per infantry Coy. or similar unit. A trained reserve of 100% will be maintained. Unit anti-mosquito squads will be trained by unit medical officers who will supervise their work. They will carry out anti-mosquito measures within their lines and over an area extending to 2 kilometres outside.

A list of equipment etc., is given in Appendices < B > and < C >.

2. *Malaria Control Unit.*

(Formation of these units in this theatre is now approved vide A.F.H.Q. letter G-1(b)1003/37/A.1 dated 25 Mar 43).

These units consist of 1 Officer (non-medical) and 1 N.C.O. and 5 O.R.'s. (W.E. VI/137/1). They are mobilised on a basis of 1 or more per Field Hygiene Section. They control the work of native labour (referred to below), the number depending on the work to be done and its distribution. Six sections is generally considered a practical number. The unit is employed on minor anti-larval work and for anti-mosquito spraying. The unit is trained by a Fld. Hyg. Sec. and is usually attached to such a unit, but may be attached to any medical unit.

3. *Native Labour.*

W.E. VI/136/1 authorises the establishment of anti-malaria sections or squads consisting of a native supervisor and a gang of 23 native labourers. Up to 6 are allowed per division and 12 per Base or L. of C. area. Application should he made to the Directorate of Labour for numbers required. These units carry out the anti-mosquito work outside unit lines or they may be detailed for extensive works required, inside the unit 2 kilometres radius, which are beyond the scope of unit anti-mosquito squads. Their equipment includes spades, billhooks, sprayers for <<Malariol>> and blowers and a mixer for Paris Green (Vide App. << A >>). Where more than 12 sections are required per area, the area commander may obtain authority from A.F.H.Q. to take on the requisite numbers.

4. *Field Hygiene Sections.*

In malarious countries such as those in which this campaign is being waged, one of the chief concerns of a Fld. Hyg. Sec., is to organise

and supervise anti-mosquito measures in the area to which it has been allotted. Every part of the theatre occupied or likely to be occupied by troops must be covered. Fld. Hyg. Secs. are responsible for drawing equipment (vide App. « A ») authorised and for issuing to malaria control units as required for their use and for the use of anti-malaria sections or squads under their control.

5. *Station Malaria Committees.*

Commanders will set up committees as defined in G.R.O. No. 20 of 5.2.43, to advise them on the application to their particular area of recognised anti-malaria principles to be applied. They will maintain the closest liason not only with the R.N., R.A.F., and American land, air and sea forces, but also with the French civil and military authorities in the area so that the works of the various services can be co-ordinated.

6. *Malaria Field Laboratory*

This consists of an expert body of Officers, 3 Malariologists and 1 Entomologist and a number of O.R.'s specially trained in the work. The unit carries out malaria surveys, advises on the measures to be undertaken, and inspects them when being put into effect. It also runs courses of instruction for medical and non-medical malaria officers. The Officer Commanding, Mal. Fld. Lab., will be the special adviser to the D.M.S., on all matters connected with prevention and control of malaria. He will exercise technical supervision over all anti-malarial operations in the area, will advise in regard to courses of instruction in anti-malarial work, and will report periodically on the efficiency and sufficiency of all equipment and supplies needed for malaria control.

III. Anti-Malaria Control Measures

1. *Selection of areas for base installations, camp sites, bivouacs, etc.*

The selection of a healthy site is one of the most important anti-malarial measures. Whenever possible, sites for installations camps and bivouacs, must be at least 2 kilometres from mosquito breeding grounds and native dwellings (which provide the reservoir of malaria infection) If it is found essential for a site to be within 2 kilometres of native huts the question of the removal of these latter should be considered.

A representative of the medical services will invariably be a member of the reconnaissance party to select sites, so that he can advise on projected site from the malaria point of view. Early notice of such reconnaissance will be give to the medical branch of the H.Q. Formation concerned so that the most suitable officer available may be detailed, and the advice of the local civil health authorities will be solicited.

2. *Control measures inside camps, and up to 2 kilometres outside.*

These measures are normally the responsibility of the unit. In exceptional conditions Formation Commanders may provide assistance from the native labour (anti-mosquito sections) at his disposal.

3. *Control measures outside camps.*

Malarious localities outside those areas for which units are responsible, may be of considerable danger to troops in the vicinity. Large schemes may be necessary, involving the drainage of marshes canalisation of large « oueds ». It is most important that the local civil authorities be consulted with a view to securing their advice, the ad-

vantage of their local knowledge and their co-operation in the execution of the work required.

On the advice of his Station Malaria Committee the Commander may act as follows :---

(a) He may order the necessary work to be undertaken by (i) troops or (ii) one or more anti-malaria sections of native labour working under a malaria control unit. The work will be supervised by a Fld. Hyg. Sec., or by the nearest medical unit. Or

(b) He may arrange for the local civil health authorities to put the work in hand.

In either case the closest co-operation between civil and military authorities is essential.

In special circumstances where the military supervision of anti-malaria sections is not possible, the foreman may be a civilian trained specially in anti-malaria measures, and engaged at rates to be determined by A.F.H.Q.

IV. Responsibilities of an O.C. Unit

1. Commanding Officers are reminded that they are responsible for the maintenance of the health of their men, and that they incur a grave responsibility if they neglect to enforce orders on this subject. Their co-operation and that of every Officer, N.C.O. and Man is especially necessary in malaria control and severe disciplinary action should be taken in all cases of disobedience to orders.

2. The officers Commanding units are responsible for all Anti-Malaria measures within their own areas. These areas will generally include a circle of territory with a circumference of not less than 2 kilometres from the outskirts of the camping site.

3. Officers Commanding are required to provide one anti-malaria squad of 1 N.C.O. and 3 men per company or equivalent unit for carrying out mosquito destruction or such other duties as may be specified by the Officer Commanding a Field Hygiene Section.

4. The O.C's. responsibilities include supervision of the following:---

(a) That protective medication is taken and that the tablets are swallowed in accordance with the instructions issued.

(b) That each Officer, N.C.O. and man is issued with a mosquito net (either a hooped-net, bar-net, bivouac-sandfly-curtain, or mosquito-proofed-bivouac-tent). That frequent inspections are made at night to ensure that they are properly used and in a perfect state of repair.

(c) That clothing is worn so as to afford the maximum protection against mosquito bites between sunset and sunrise.

(d) That each Officer, N.C.O. and man has a proper container with anti-mosquito cream. Special attention should be given to its use by all ranks engaged on night duties and during night operations or alarms in malarial areas.

(e) That guards and sentries are provided with gloves and veils for use after dusk when circumstances permit and in particular where mosquitoes are troublesome and anti-mosquito cream proves insufficient to repel them.

(f) That medical advice is sought in selecting camp sites. That native huts and encampments are removed as far as possible from the camp. That soldiers do not stray into native habitations after dusk and that measures are taken to prevent dangerous mosquito breeding within range of the camp areas.

(g) That the area surrounding the camp site is surveyed weekly with a view to detecting probable mosquito breeding places. That the results of such surveys are recorded on a map which will at all times be available for inspection. Swamps, marshy ground, pools and stagnant water of every type are potential breeding places.

(h) That such breeding places are removed wherever possible either by canalisation of streams, including clearing of banks and straightening water courses, by drainage of marshy areas or by cleaning and repairing existing drains, ditches and irrigation canals.

(i) That all breeding places which cannot be dealt with in this way are effectivey treated with Malariol or Paris Green.

APPENDIX « A »—« SQUAD SET »

FIELD EQUIPMENT OF ANTI-MALARIAL SECTIONS

(Six sets per Division and twelve per Base or L. of C. Area)

Shaft and handle for Rotary Mixer	1	
Axes, felling, with handle	2	**
Axes, hammer-headed	4	
Axes, pick, heads	10	**
Axes, pick, helves	10	**
Brooms, bass	6	**
Crowbars	2	**
Gavals, stone	2	
Gloves, hedging prs.	6	**
Hammers, sledge	1	**
Hooks, bill	4	**
Knives, long hedging	4	
Points steel or jumpers	2	
Rakes, garden	6	
Saws, hand	1	**
Scythe	1	
Shovels, G.S	12	**
Sickles, or hooks reaping	2	**
Stones. scythe rub	1	
Wheelbarrows	2	
Malariol in drums (40 or 60 galls.) (R.A.S.C. Supply)	4	drums
Boots, gum, long	2	**
Dust gun	2	
Sprayer, Knapsack. 4-Oak, Kent and Mysto types	2	**
Collectors Outfit Comp. (Medical Supply)	1	
Sieves, double (12 and 30 mesh per inch)	2	
Ladles, white enamelled	2	**

** *Footnote ;* Due to the present shortage of certain items comprising an Anti-Malarial Squad Set, a modified set will be issued consisting of the items starred.

APPENDIX «B»---«REGIMENTAL SET»

Anti-Malarial Equipment for Regimental Units, per Company of 150 or equivalent unit.

Containers for anti-mosquito cream	100% of strength
Sprayers, hand (4-Oak 100 Mysto types)	1
Ladles, white enamelled	1
Shovels, G.S.	1

APPENDIX «C»

Scales of R.A.S.C. Supplies for Units.

These commodities will be issued to units as required. The scales are the maximum which it is considered would be needed for 1,000 men in one month in a highly malarious area.

Anti-Mosquito Cream	375 lbs.
Anti-Mosquito Spray (Flysol)	140 galls
Malariol	180 galls **
Paris Green (as an alternative to Malariol)	112 lbs.

** This scale will not be exceeded without reference to the D.D's..M.S. Formations.

APPENDIX «D»

Anti-Mosquito Spraying

1. *Requirements*

   (a) Flysol Guns for use with Flysol are a R.A.O.C. supply, and are authorised for 5% of the strength.
   These pumps are similar to the ordinary <Flit Guns>. In addition <Sprayers, hand> are authorised on the scale of 1 per 150 men in certain areas.

   (b) Spray mixture.

   <Flysol> (anti-mosquito spray fluid) is used and is a R.A.S.C. (S.T.) supply. The authorised maximum scale for anti-mosquito measure is 140 galls. per 1,000 men per month.

2. *Application of Mosquito Spraying.*

   (a) The object to be obtained is to produce a fine cloud of spray in the quarter to be treated. The cloud should penetrate to all corners. It is estimated the amount of Flysol required to create an adequate cloud is 1 ounce per 3,000 cubic feet of space in the barrack, hut, tent or bivouac treated.

   The following will serve as a guide in the amounts required:---

   (i) Barrack room 60” x 18" required 4 1/2 ozs. or about 400 full strokes of the pump or flit gun.
   (ii) Tents I.P. Privates require 3/4 oz or about 75 full strokes.
   (iii) Tents I. P. Staff Sergeant require 1/4 oz. or about 25 full strokes.
   (iv) Tents I.P. 180 lbs. require 1/4 oz. or 25 full strokes.
   (v) Tents I.P. 160 lbs. require 1/4 oz. or about 21 full strokes.
   (vi) Tents I.P. R.D. require 1/3 oz. or about 35 full strokes.
   (vii) Tents C.D. or C.F. require 1/5 oz. or about 20 full strokes.

(b) Spraying is most efficacious when carried out as soon as possible after dawn in standing camps in order to catch the mosquitoes before they are disturbed and leave the quarters.

(c) Before spraying, rooms or huts should be closed up as completely as possible. In the case of tents, the flaps should be lowered. After spraying, quarters should be left closed for at least 15 minutes.

(d) Units must arrange the details of spraying operations to suit their circumstances. Special unit squads may be employed for this work in the case of barracks, or huts, but in the case of tents it may be more convenient to detail one man to take charge of spraying each tent. Constant change of personnel engaged in spraying is not desirable.

APPENDIX « E »

REVISED NOTES ON THE PROCEDURE AND TECHNIQUE OF ATEBRIN/MEPACRINE ADMINISTRATION

1. Atebrin (Mepacrine) is issued with the rations on the scale of 0.4 grams per week. This administration will continue throughout the malaria season in North Africa and Southern Europe. The dose is one (0.1 gram) tablet on Monday, Tuesday, Thursday and Friday taken (unless otherwise authorised by the Unit Commander *), immediately after the evening meal. It should be swallowed with plenty of fluid (Tea, coffee or water).

Responsibility in supervising that the appropriate number of tablets are despatched with every ration is the duty of the issuing officer at Detail Issue Depots **. The issue should be checked on arrival at unit headquarters and handed to the Orderly Officer.

Arrangements have been made that troops arriving in this theatre of war shall have had a full weeks course of protective medication prior to landing.

Quinine is issued to flying personnel of R.A.F. instead of Atebrin ; this does not apply to R.A.F. Ground Staff.

American Troops attached to British Units will be supplied through British channels. British personnel serving with American Troops and rationed by them will be supplied with Atebrin under U.S. arrangements.

On the recommendation of a Medical Officer divided doses (i.e. 1/2 tablet at breakfast and 1/2 tablet at lunch may be given to any officer or man who has difficuIty in acquiring tolerance provided that the total dosage taken weekly amounts to 0.4 grams.

* Those units who desire to continue or to adopt the original dose of two tablets each on Mondays and Thursdays may do so, provided the administration is uniform throughout the unit concerned.

** The tablets are issued in bottles of 1,000 and 100 each, (Atebrine U.S.A.,) and 500 each (Mepacrine U.K.). When these bottles must be split to make up smaller individual doses, the necessary number of tablets should be put in packets or envelopes for distribution. Broken or powdered tablets should be carefully preserved and returned, correctly labelled to the nearest medical unit for dispensing. In view of the unique value of the drug and the shortage of supplies, a *very serious view should be taken of any wastage.*

2. The importance and consequences of protective medication should be explained to the troops in a simple talk. The outline for such a lecture has already been issued as an appendix to medical circular letter No. 2 issued on 5 April 43. Further copies may be issued on demand.

Medical Officers are expected to foster propaganda favourable to this prophylactic medication amongst officers and men. It should be the rule amongst all Officers to refrain from expressing an adverse opinion on protective medication with Atebrin whatever their own views may be.

3. The Orderly Officer of the day should be responsible that the tablet is administered and actually swallowed by N.C.Os and O.Rs. He should attend in person taking his own tablet in the presence of the men. He should make an entry in the Orderly Officer's book to the effect that the administration has been carried out under his supervision.

The Orderly Officer should also supervise the administration to guards and others who may not have been available at meal time. If for any reason any man is absent for whom rations have been drawn it should be the duty of the Orderly Officer to record this fact in his book. Officers should swallow the tablet on the days prescribed in the presence of the O.C. or his second in command.

4. The Medical Officers should as often as practicable, attend the administration and should report any laxity in carrying out the routine to the Commanding Officer or A.D.M.S. The testing of urine will not ordinarily be done except in case of suspected malaria patients on admission to hospital. The official test for atebrine in the urine has been published in Medical Administrative Instructions, Serial No. 5, and is repeated in para. 9 herein. Special enquiry should be made concerning any patient suffering from malaria who yields a negative urine test. Details of such enquiry should be sent to A.Ds.M.S. for transmission to D.M.S., A.F.H.Q.

5. Officers Commanding Units, N.C.Os. and other ranks in charge of detachments or parties will be responsible for carrying out orders in connection with protective medication. They should also impress on their men the importance of taking their medicine as required, as well as of carrying out all orders relating to personal mosquito prophylaxis. It should be emphasised that failure to do so may not only seriously affect the health of the individual but may materially affect the success of the campaign.

6. It must be appreciated that protective medication gives, at best, only a relative protection against malaria. Thus, in places where insufficient use is made of subsidiary safeguards such as protective clothing, repellant ointment and mosquito nets, or where there are many virulently infected anopheles, there is likely to be a «break through» in the protective medication. In this event the only recourse may be to increase the dose of Atebrin.

7. It has been decided that where a malarial rate amongst troops of more than 20 per thousand per week is experienced the administration of Atebrin should be at the rate of 0.1 grams (1 tablet) on six consecutive days (0.6 grams) per week. This ruling will include also the increased administration of Atebrin to troops moving into an area where malaria of similar severity has been experienced and where subsequently no adequate anti-larval measures have been taken.

8. Medical Officers are authorised with the concurrence of their Commanding Officers to issue a certificate to any individual suffering severe Atebrin intolerance. A record of this circumstance should then be endorsed in A.B. 439 or A.B. 64. The soliders so certified should cease taking Atebrin. It is expected that the numbers of such persons will not ordinarily exceed 1% of the total force. It is empasised that a certificate of intolerance to Atebrin should only be given after proof of an exhaustive trial having been made by the individuals concernced under supervision of the certifying Medical Officer. Medical Officers are required to submit a return giving details of all cases of idiosyncracy or intolerance to Atebrin. The numbers taking protective medication and the percentage of those unable to do so should be put on record.

9. *Test for Atebrin (Mepacrine) in Urine.*

No ordinary laboratory test can be relied upon to reveal the presence of the drug until there is a considerable concentration of the dye in the body. Clear cut positive results may not be obtained until 8 doses (0.8 gms.) have been taken.

The test is as follows:---

(a) Collect 200-250 ccs of urine in glass stoppered bottle. Allow to cool. (N.B. Bottles with cork or rubber stopper should NOT be used. If a glass stoppered bottle is not available, the bottle can be closed with a finger while the other extraction is being performed).

(b) Render the urine strongly alkaline to litmus paper, using powdered sodium or potassium carbonate.

(c) Add 5-10 ccs of Ether and shake well.

(d) Stand for a few minutes to allow the Ether layer to separate. It will sometimes be noted that there is a yellow colouration in the extract. If this occurs it is strongly suggestive of the presence of Atebrin.

(e) Pipette off about 5 ccs of this layer into a small test tube and evaporate the Ether.

(f) To the deposit add 1 or 2 drops of 50% acetic acid or a similar quantity of concentrated sulphuric acid. If Atebrin is present there will be a distinct *yellow* colouration and the solution is fluorescent. Acetic acid gives the better result. H2SO4 may cause a slight brown colouration in the absence of Atebrin, due to charring of debris. To detect fluorescence the test tube should be held against a dark background and viewed at an angle to transmittcd light.

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