The Abolition of Flies

in

Camps, Billets and Hospitals.

CIRCULAR MEMORANDUM No. 8.

Director General, Medical Services,
British Forces in the Field.

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House flies under certain circumstances assist in spreading various dangerous diseases, and may even cause epidemics. Within the area occupied by the British Forces in the Field there are now concentrated enormous numbers of men and horses, resulting in the production of abnormal quantities of stable manure and other waste organic matter, while in places along the line of the actual front there are many unburied bodies. In consequence of these exceptional conditions, flies in unparalleled numbers will inevitably make their appearance in the course of the ensuing summer and autumn, unless adequate measures be taken to prevent these insects from breeding.

The most suitable preventive methods, which should be adopted at once, are detailed in the following Memorandum.

The carrying out of the measures recommended must be secured by means of constant expert supervision.

Continual search should be made for breeding places which may have escaped detection.

The appearance of house flies in any locality in excessive numbers should at once be reported through the usual channels to the D.G.M.S., G.H.Q.

Attention will be directed to this subject by all officers responsible for the sanitary supervision of troops and areas.

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Director General, Medical Services,
British Forces in the Field.

G.H.Q.,
24*th April*, 1914.

Copies to all :—
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D.Ds.M.S.,
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M.Os. i/c Troops.

The Abolition of Flies in Camps, Billets and Hospitals.

Diseases conveyed by flies.

1. There is evidence, more or less complete, that infection of enteric fever, dysentery, cholera, diarrhœa, erysipelas and conjunctivitis may be transmitted by flies, particularly the house fly. To carry disease flies must have contact with specific organisms, of which the most dangerous under the present conditions occur in human fæces. The virus of disease is transmitted by flies usually through their dejecta, but may also be conveyed on their legs, wings or bodies. In this way infection may be carried directly to the lips of man, or indirectly through his food.

Fly development.

2. Deposited in suitable media in the presence of heat and moisture, the eggs of house flies hatch into larvæ in from six to twenty-four hours. The larvæ becomes pupæ or chrysalids in from four to six days, and the adult flies emerge about five days later. Complete development thus takes from ten to twelve days, but in very hot weather may be accomplished in seven days.

Breeding places.

3. The abolition of flies is best secured by **attacking their breeding-places**—usually horse manure, though house flies will also breed in human excreta, garbage or other organic refuse. Ninety per cent. of all house flies lay their eggs in stable manure. Uncovered accumulations of all such substances constitute a risk of infection, and should, therefore, be sought out and put in a state of defence against deposition and development of eggs, or burnt, buried or removed at least once in every seven days.

Treatment of manure.

4. (i.) EXISTING MANURE HEAPS IN FARMYARDS.—Old manure is less dangerous than fresh heaps, since flies, although attracted by it when in a fresh state, do not breed readily in stale or fermented manure. A manure heap in a farmyard, however, if additions to it are constantly being made, is a source of danger, and should in any case receive special treatment. Fresh additions should be prohibited; the heap should be concentrated as much as possible, and should then be limed and covered over (top and

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sides) with one foot of earth, well beaten down with spades. Fly maggots congregate chiefly at the outer edges of manure heaps, but they also tend to migrate and may even be found some distance away in wall crevices, under rubbish, or several inches beneath the soil. Attention should therefore be paid to the sides of the manure pit, where exposed by concentrating the manure, and these should be well sprayed with cresol, and the spraying repeated after a few days. If it be necessary to open the heap after it has been covered, in order to withdraw manure, the exposed surfaces must, as soon as possible, again be protected as described above.

(ii.) FRESH ACCUMULATIONS OF STABLE MANURE BELONGING TO INHABITANTS.—These should, if possible, be carted to a general dumping ground several hundred yards from the nearest farm or village, and there either concentrated and sprayed once a week with cresol, or spread out to dry. Although somewhat resistant to drying and sunlight, fly larvæ usually seek cover and moisture. On the other hand, the eggs are susceptible to dessiccation, which prevents hatching, and thus in dry weather the spreading of manure on suitable dumping grounds may give good results.

(iii.) MANURE (AND SCRAPINGS) FROM HORSE LINES.—These **must be incinerated where possible.** When this is impracticable, horse line manure and scrapings should be either:—

(*a*) Removed in carts or by means of a tram-line, where one exists or can be made, to a dumping ground as far from the camp or billeting area as possible, and preferably in a valley. Here it should be limed and earthed over (one foot of earth on top and sides of the heap) as it is deposited, or spread out and burned when dry. To avoid nuisance from heaps awaiting removal, the manure may be temporarily stored in the cart used to carry it away, or in well-covered barrels into which it should be tightly rammed. When sold to farmers, precautions and supervision are necessary pending and after removal.

(*b*) Made into heaps, which may be dealt with by either of the following methods:—

(i.) Limed over and covered with an even layer of earth twelve inches deep.

(ii.) Sprayed with kerosene or cresol, or with borax solution ($\frac{3}{4}$-lb. to the gallon).

(iii.) Sprayed with kerosene and the top layer burned.

The treatment should be applied particularly round the margin of the heap, and to the walls enclosing it if such exist, and each fresh addition of manure must be treated immediately it is thrown on. Crude borax, in the proportion of one pound to fifteen cubic feet of manure, is said to have been tried with considerable success. Though destructive to the ova and larvæ of flies, it is non-poisonous and does not lessen the value of the manure.

Stables and horse lines.

5. Horses should not be stabled or picketed close to billets or dwelling huts, or near kitchens and dining rooms in standing camps. Cleanliness of stables and horse lines, and the daily removal of horse droppings and manure must be ensured. When possible fresh sawdust should be used instead of litter. A single neglected stable or horse line may cause a plague of flies in an entire camp. Picket lines should be burned over once a week.

Disposal of human excreta.

6. Particular attention must be paid to the disposal of excreta either by incineration or by covering with earth. Trench latrines should be of the shallow variety whenever possible, and constantly supervised to ensure that the excreta are kept covered with earth. Less than one foot of dry earth over excreta will not infallibly prevent flies from emerging if eggs have been deposited before the fæces were covered.

When latrine buckets are used sufficient cresol solution should be added to cover the excreta completely. If the contents are to be incinerated, kerosene or crude tar-oil may be used instead.

DISPOSAL OF NIGHT-SOIL FROM PRIVIES BELONGING TO INHABITANTS.—Whenever it is necessary for privies to be cleaned out, arrangements must be made for the contents to be buried in deep pits. The practice of **spreading night-soil on the surface of the ground** in the vicinity of billets and other inhabited buildings **must be absolutely prohibited.**

Garbage.

7. All garbage, kitchen and other refuse, including empty meat and jam tins, should be placed in covered watertight receptacles, and burnt as soon as possible. The receptacles should be regularly cleaned with cresol solution or, after washing, smeared with crude tar-oil. Liquid kitchen

garbage should be kept separate from dry. All camp refuse should be burnt where practicable: otherwise it must be buried at a sufficient depth. Fresh additions to refuse pits are to be covered over at once with a layer of earth, not less than one foot in depth. Chloride of lime, if used, must be renewed periodically.

OLD COLLECTIONS OF GARBAGE.—Where incineration, removal, or burial is not practicable, these should be dealt with by the methods given in para. 4 (iii.), (b).

Pigs.

8. The keeping of pigs in the close proximity of standing camps should be prohibited.

Carcases.

9. Carcases of animals must be efficiently buried.

Dining rooms and kitchens.

10. Floors of dining rooms and kitchens must be kept free from grease and organic matter; tables, meat blocks, and kitchen utensils must be cleaned immediately after use.

Cleanliness in handling food.

11. Men should be warned of the necessity for cleanliness in the handling of food of all kinds.

Prevention of access of flies to food.

12. The utmost precautions should be taken to prevent the access of flies to food. Where practicable, all kitchens, meat stores and dining rooms should be fly proofed by wire meshing. Food in hospitals should be covered with gauze.

Chloride of lime.

13. Chloride of lime should be freely used where any pollution of the ground has occurred, especially around kitchens and latrines. Living larvæ which may be present in the soil are likely to be destroyed if the earth be impregnated with lime or chloride of lime.

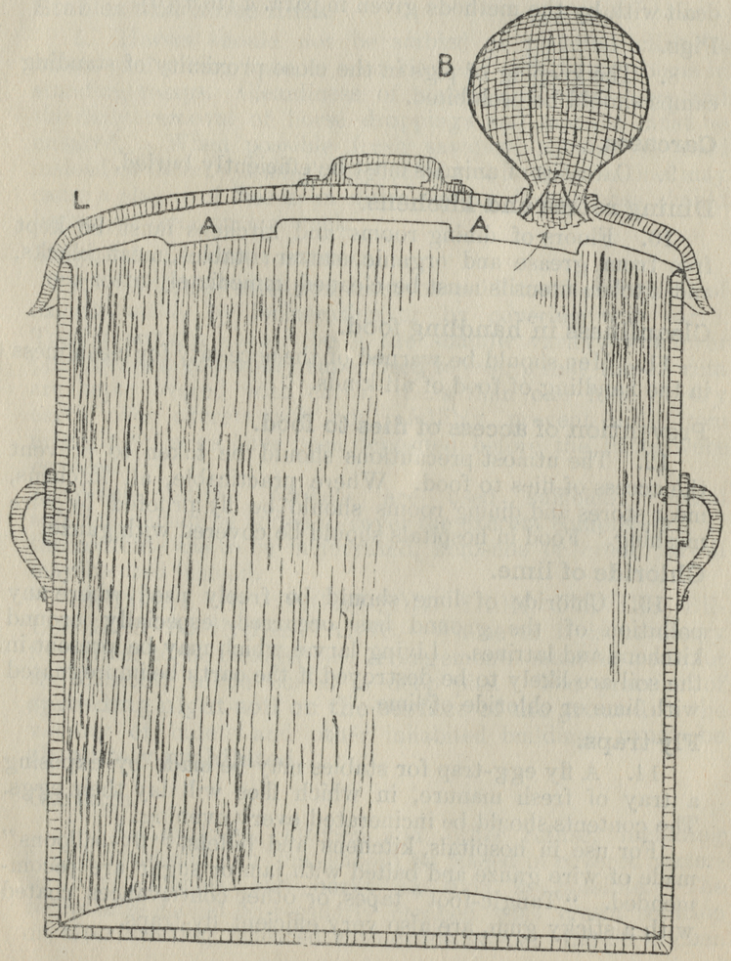
Fly traps.

14. A fly egg-trap for stables may be made by exposing a tray of fresh manure, in which flies will lay their eggs. The contents should be incinerated every evening.

For use in hospitals, kitchens and billets, "fly-balloons" made of wire gauze and baited with jam or sugar are recommended. "Tangle-foot" tapes, or other contrivances coated with a sticky gum, are also very efficient fly-traps.

The subjoined illustration shows how an iron refuse bin may be adapted to form a fly-trap.

Galvanised iron refuse bin adapted to form a fly-trap, while still serving as a receptacle for refuse. Sectional view, showing method of arrangement.



The lid (L) is converted so as to rest on the top of the bin, instead of fitting inside it, as is usually the case. The rim of the lid, when the latter is in position, should be two or three inches below that of the bin. A hole is then cut in the lid to allow of the insertion of the neck of a wire gauze fly-balloon or trap (B); the neck of the balloon should fit tightly in the hole, but be capable of being readily withdrawn. To complete the bin for use as a fly-trap half-a-dozen notches (A A), each four inches long and one inch deep, are cut in the rim of the bin. When the bin is in use, flies, attracted by the smell, crawl beneath the rim of the lid and enter the bin by the notches (A A), afterwards flying towards the light in the direction of the arrow, and being caught in the balloon (B). The latter, when full, can be immersed in boiling water to destroy the flies.

Fly poisons.

15. A fly-poison which is harmless to man, can be made by mixing one teaspoonful of formalin with eight teaspoonfuls of milk (or condensed milk diluted 1-1 with water). This mixture should be placed in open saucers and exposed in living rooms and other places, care being taken that no other liquid is accessible. The flies which drink of it die in from fifteen to twenty minutes.

Under **strict supervision** and with due **precautions** to ensure the safety of man and animals, sodium arsenite, as employed in South Africa, may be used in base camps. An effective formula is 1 lb. of the poison and 12 lbs. of coarse black sugar or treacle dissolved in 20 gallons of water, but the exact proportions are not material. The arsenite, which is not readily soluble in cold water, should be dissolved first in a little boiling water, and can then be added to the sweet solution. This poisoned bait is distributed where flies congregate, by being sprayed with a syringe or spray-pump over such places as manure heaps and the surrounding vegetation; or leafy branches are dipped in the solution and hung up, out of harm's way, over latrines, etc. Where the poison is sprayed on and about manure heaps, or elsewhere in the open, it need only be applied very lightly, and must, of course, be renewed after rain. When thoroughly carried out and combined with the measures detailed above for the covering over or destruction of breeding places, this method has given excellent results.

Co-operation of municipal authorities necessary.

16. In towns and billeting areas efforts towards the abolition of flies will, to some extent, be frustrated unless the co-operation of the municipal authorities be obtained.