- Moore, C. R. (1935). Chapter XVIII, *Glandular Physiology and Therapy*, Chicago.
- Parkes, A. S. (1936). *Lancet*, 2, 674.
- Reichstein, T. (1936). *Helv. chim. Acta*, 19, 223.
- Ruzicka, L., et al. (1934). *Ibid.*, 17; (1935) 18, 210, 986, 994, 1264, 1487.
- and Wettstein, A. (1936). *Ibid.*, 19, 1141.
- Schoeller, W., and Gehrke, M. (1931). *Wien Arch. inn. Med.*, 21, 329.
- Selye, H., McEuen, C. S., and Collip, J. B. (1936). *Proc. Soc. exp. Biol.*, N.Y., 34, 201.
- Tschopp, E. (1936). *Arch. Int. Pharmacodyn. et Therap.*, 52, 381.
- Voss, H. E., and Loewe, S. (1930). *Dtsch. med. Wschr.*, 30, 1.
- Wolff, E., and Ginglinger, A. (1936). *C. r. Soc. Biol.*, Paris, 121, 1476.
- Womack, E. B., and Koch, F. C. (1932). *Endocrinol.*, 16, 273.
- Zuckerman, S. (1936). *Lancet*, 2, 1259.
- and Parkes, A. S. (1936). *Lancet*, 1, 242.

COAL-TAR NAPHTHA DISTILLATES FOR DESTRUCTION OF BED-BUGS*

BY

S. A. ASHMORE, B.Sc., A.I.C.

Government Laboratory

AND

A. W. McKENNY HUGHES, D.I.C., F.R.E.S.

British Museum (Natural History)

A number of experiments both in the laboratory and in the field have been carried out which show that the vapour of certain coal-tar naphtha distillates is lethal to the bed-bug (*Cimex lectularius* Linn.). Toxicity experiments have also been carried out by Dr. G. R. Cameron at University College Hospital Medical School, London, and these tests have shown that animals kept for prolonged periods in an atmosphere saturated with the vapour have not been injuriously affected in any way and afford some considerable assurance that no danger to man from this cause is to be apprehended.

A method for applying these naphtha distillates to the disinfection of houses has been developed, and consists essentially in spraying the walls and ceilings of rooms which have previously been made gas-tight by any of the usual methods of sealing. Special attention is given to likely harbourages such as skirting-boards, architraves, etc., a high-pressure hand syringe being used for spraying such harbourages. Gas masks with a suitable filter are worn during the process. To ensure satisfactory results it is important that sufficient vapour concentration be maintained, and for this purpose fumigation should not be begun at a temperature of less than 60° F. It is an advantage to work at as much above this temperature as is practicable.

The quantity of naphtha used in the experiments is on the basis of 1 gallon for each 750 cubic feet of room space. The rooms are kept sealed for eighteen to twenty-four hours, and at the end of this time are rapidly ventilated by opening doors, windows, fireplaces, etc. The vapour clears very quickly, and it is possible to enter a room after a few minutes' ventilation without experiencing any discomfort. It has, moreover, been shown that there is no tendency for a concentration of vapour to "build up" if after ventilation the doors and windows are again closed for several hours.

The desirability of a high initial temperature is emphasized, and only in very hot weather with air temperatures of 70° to 80° F. should pre-heating of houses be dispensed with. In the experiments a very effective paraffin stove, working on the primus principle, has been used, but in any case sufficient time must be given to warm walls, ceilings, etc., thoroughly. Owing to the inflammable nature of the naphtha, fires or other sources of heat must be extinguished, and, if portable, removed from the rooms before fumigation is started, and smoking and the use of naked lights must be prohibited while the naphtha

is being handled in any way. The experiments indicate that after a house has been warmed it is advisable in most instances to spray the roof space before the rooms are treated.

Results

Successful results have been obtained in the disinfection of upwards of two hundred houses and flats of varied constructional detail. Failure has been reported in a few cases, but this, we think, has been incidental to the development of a suitable technique for applying the naphtha. After fumigation for twenty-four hours dead bugs will sometimes be seen on the floors, but usually they will be found dead in their customary hiding-places—for example, behind skirting-boards, picture rails, etc.

The naphtha used is derived by the distillation of coal tar, and consists of a complex mixture of aromatic hydrocarbons and associated bodies, and the constituent or mixture of constituents which is toxic to the bed-bug is not known. The following specification has been drafted to govern the supply of coal-tar naphtha as used in these experiments.

SPECIFICATION FOR HEAVY COAL-TAR NAPHTHA

1. *Colour*.—Shall not be darker than a freshly prepared solution of 1 ml. of N/10 iodine in 1,000 ml. of distilled water.
2. *Specific Gravity*.—Not less than 0.835 and not greater than 0.910.
3. *Water*.—Shall be free from water and other visible impurities at 15.5° C.
4. *Distillation Range*.—Method as defined in B.S.I. Specification No. 479 for Coal-tar Naphthas.
Up to 160° C. not more than 5 ml.
Up to 190° C. not less than 90 ml.
5. *Flash-point (Abel)*.—Not less than 105° F.
6. *Tar Acids and Tar Bases*.—Not more than 0.25 per cent. of tar acids and 0.25 per cent. of tar bases.

Further research into various aspects of the question of the use of heavy coal-tar naphthas for the destruction of bed-bugs is in progress, and new methods for more effective application are in course of development. As will be seen from these preliminary notes the use of coal-tar distillates for the destruction of the bed-bug is still in the experimental stage, but the results so far achieved are promising and indicate that further research on these lines may produce valuable results.

As was to be anticipated failures have occurred, not, however, owing to defects in heavy naphtha as a toxic agent for destruction of bed-bugs, but owing to defects in the methods of employing it for that purpose. If, therefore, those responsible for the management of house property adopt this method of treatment for eradication of bed-bugs it is important that they should realize that the technique of fumigation with heavy naphtha is still the subject of test and research, and that the cause of any failure is first to be sought in the method used. In the event of failure, the circumstances of the particular case should be carefully investigated, especially in regard to the temperature at the time of fumigation, to the sealing of the premises, and to the distribution of the vapour.

The eighth International Congress of the Haute Culture Médicale will be held at Algiers from March 25 to April 6. There will be sessions on tropical and subtropical diseases, syphilography and dermatology, cardiovascular affections, blood disorders, and social medicine. During the congress there will be a special commemoration of the pioneers in the campaign against malaria, and also excursions, receptions, and entertainments; in the first of these, which will be broadcast, Dr. P. H. Manson-Bahr will participate. At the end it is hoped to arrange visits to Morocco and Tunis. The travel arrangements are in the hands of Messrs. Cook, Wagons-lits, and further information can be obtained from the congress secretary, M. Tomarkin, Institut Alfred Fournier, 25, Boulevard Saint-Jacques, Paris, XIV.

* Abstract of a report to the Bed-bug Infestation Committee of the Medical Research Council.