penetration of lethal quantities against Japanese beetle larvæ was only 1–3 inches.

The U.S. Department of Agriculture[3] gives a formulation for use against Japanese beetle larvæ consisting of (percentages by weight): 2½ ethylene dibromide, 2½ detergent, 95 organic diluent (*iso*propyl alcohol). In our laboratory, formulations of 50 per cent ethylene dibromide (by weight) dissolved in organic diluents were allowed to vaporize in flasks containing a known weight of moist sandy loam soil and the sorption was determined by measuring the residual vapour concentration. The results were compared with that for pure ethylene dibromide. The sorption isotherms showed enhanced sorption of ethylene dibromide when it was dissolved in organic diluents, being 3 times greater with alcohols and 3½ times greater with hydrocarbons.

Thus, the use of emulsions and organic diluents may markedly affect the dispersion of the toxic agent through the soil.

F. T. Phillips

Imperial College Field Station,
Sunninghill,
Ascot, Berks.

[1] Staniland and Stone, *J. Helminth*, **27**, Nos. 1 and 2, 41 (1953).
[2] Fleming and Baker, Tech. Bull., U.S. Dept. Agric., No. 478 (1935).
[3] U.S. Dept. Agric., *ARS*-33-4 (Dec., 1954).

ENTOMOLOGY

Role of Cholesterol in House Fly Reproduction

It is well established that immature insects, including the larvæ of *Musca vicina* Macq., require a dietary source of sterols for growth and development[1,2]. Chauvin[3] reported that sterols are necessary for reproduction in the German cockroach but did not present supporting evidence or describe the effect of sterol deficiency on the reproductive processses. The house fly, which has been found to lack the mechanism for sterol biosynthesis from ^{14}C-sodium acetate[4], utilizes a high percentage of administered ^{14}C-cholesterol in egg production[5]. The following study was undertaken to determine the effect of dietary cholesterol on reproduction of the house fly.

Adult house flies (*Musca domestica* L.) reared by the *CSMA* procedure[6], were allowed to emerge from puparia placed in screen cages, and feed on a synthetic diet consisting of vitamin-free casein, sucrose, sodium oleate, Wesson's salts, zinc chloride, nucleic acids, and a mixture of B vitamins. Cholesterol, when present, was added to the diet at 0·1 per cent. This diet was as good as or better than our Laboratory's standard diet, sucrose-defatted dry milk solids (1:1), when compared as to adult survival, egg production, egg hatch, and larval viability. Eggs were first collected on the sixth day after the end of emergence and then on every other day until nine collections had been made. The eggs obtained at each collection were suspended in water, thoroughly mixed, and duplicate aliquots of approximately 200 eggs were placed on moist filter paper in Petri dishes. The per centage hatch was recorded after 24 hr.

When the flies were fed on the synthetic diet plus cholesterol, the hatch remained fairly constant (82–96 per cent) (Fig. 1). When cholesterol was omitted from the diet, the hatch was initially lower and decreased rapidly until by the fourth egg collection it was only about 5 per cent. If at this time these flies were given the diet plus cholesterol, the hatch increased progressively until by the ninth collection it was 83 per cent. When the larvæ were reared to adults on the *CSMA* medium, only about

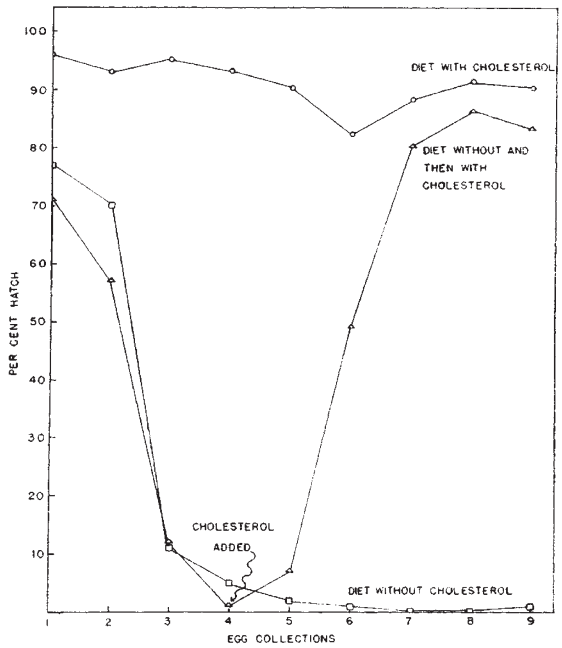

Fig. 1. Effect of dietary cholesterol on egg hatch in the house fly

50 per cent of those that hatched from the sterol-deficient diet became adults as compared with 91 per cent from the diet containing cholesterol.

From these results it appears that a cholesterol-deficient diet not only prevents egg hatch but also inhibits larval development in a medium containing sterols. However, the lack of a dietary sterol had no effect on total egg production.

The full details of this and continued investigations will be published elsewhere.

Ronald E. Monroe

Entomology Research Division,
Agricultural Research Service
(U.S. Department of Agriculture),
Insect Physiology Laboratory,
Beltsville, Maryland.

[1] Albritton, E. C., 'Standard Values in Nutrition and Metabolism', **28**, 295 (*WADC* Tech. Rep., 1953).
[2] Levinson, Z. H., and Bergmann, E. D., *Biochem. J.*, **65**, 254 (1957).
[3] Chauvin, M. R., *C. R. Acad. Sci., Paris*, **229**, 902 (1949).
[4] Robbins, W. E., Kaplanis, J. N., Louloudes, S. J., and Monroe, R. E., *Ann. Ent. Soc. America* (in the press).
[5] Kaplanis, J. N., Robbins, W. E., and Tabor, L. A. (unpublished work).
[6] Chemical Specialty Manufacturers Association. Peet-Grady Method. 'Soap and Sanitary Chem. Blue Book', **249**, 267 (1955).

BACTERIOLOGY

Difference between the Catalases of Acid-fast Bacilli

It is well known fact that acid-fast bacilli, virulent and rendered resistant to isonicotinic acid hydrazide become catalase-negative. The saprophytic bacilli, on the other hand, grown in even high concentrations of isonicotinic acid hydrazide always preserve at least some residual catalase activity[1,2]. This difference implies that there are different catalases in the above-mentioned strains of acid-fast bacilli.

Our investigations revealed that the catalase of virulent bacilli (*H37Rv*) has both higher activation energy and lower susceptibility to sodium azide, than that of saprophytic bacilli (*M. smegmatis*).