because regular extrusion of the polar body means that they are almost certainly haploid. Study of the induced nuclei in 1-cell and 2-cell eggs may thus help to throw light upon the conditions influencing size and form in normal pronuclei and nuclei. This problem is the subject of a more detailed report which is being prepared for publication elsewhere.

C. R. Austin
A. W. H. Braden
Division of Animal Health and Production
(Commonwealth Scientific and
Industrial Research Organization),
McMaster Laboratory,
Glebe, N.S.W.
March 19.

[1] Thibault, C., *Ann. Sci. Nat. Zool.*, **11**, 136 (1949).
[2] Pincus, G., and Shapiro, H., *Proc. Amer. Phil. Soc.*, **83**, 631 (1940).
[3] Austin, C. R., and Braden, A. W. H., *Aust. J. Biol. Sci.* (in the press).
[4] Austin, C. R., *J. Endocrin.*, **6**, 104 (1949).
[5] Austin, C. R., and Braden, A. W. H., *Aust. J. Biol. Sci.* (in the press).

Metabolism of Gamma-Benzene Hexachloride in the Animal Body

In order to gain a better insight into the means of defence against benzene hexachloride (BHC) intoxication, which the animal organism has at its disposal, the metabolism of this insecticide has been the object of investigations in our laboratory.

For the quantitative assay of the toxicant in animal tissues we used a method[1] which combines the simplicity of the method described by Reith[2] for qualitative purposes with the accuracy of the method published by Schechter and Hornstein[3]. The principle of this method consists of dechlorination of BHC to benzene by means of zinc dust in acetic acid, nitration of benzene to dinitrobenzene and colorimetric determination of the intensely violet-red reaction product formed by the latter compound with methyl ethyl ketone and alkali.

A series of related substances has been tested by this method. Only the four principal isomers of BHC and benzene gave a positive reaction. No colour at all was obtained with phenol, meso-inositol, hexamethoxy cyclohexane, trichloro benzene and monochloro cyclohexane. Moreover, scarcely any colour was obtained after running control analyses on the tissues of untreated animals. We are inclined to consider the method rather specific. Nevertheless it is possible that a positive colour reaction will be shown by metabolites of BHC.

After subcutaneous, intraperitoneal or intravenous injection of gamma-BHC into albino mice a rather rapid breakdown of the toxicant could be observed. A subcutaneously injected dose of 1 mgm. gamma-BHC was eliminated in the course of four days by a mouse of about 15 gm. weight. When 200 μgm. of gamma-BHC was injected intravenously (in peanut oil–Ringer emulsion) all the toxicant had disappeared within twenty-four hours. The excreta contained no BHC, or only negligible amounts; the amounts in brain, liver, kidney and muscle tissue after subcutaneous, intravenous and oral administration turned out to be rather low. Mostly only 20 μgm. or less per gram of tissue were found. Accumulation of the toxicant in these tissues could not be demonstrated. There are some indications that gamma-BHC may be accumulated in the fat depots of the body. However, it should be kept in mind that BHC was injected in oily solution.

A rather rapid breakdown of gamma-BHC was also observed in resistant houseflies; twenty-four hours after injection of 22 μgm. per gram of animals, only negligible amounts could be recovered. Here, too, none was found in the excreta. One of us (F. J. O.) deals with this subject in the following communication.

As to the nature of the metabolites of gamma-BHC we are entirely ignorant. It should be emphasized that breakdown in the above sense and detoxication (conversion into a non-toxic compound) need not parallel each other.

Investigations concerning the metabolism of other isomers of BHC are in progress now. Moreover, a closer study of the correlations between the symptoms of intoxication and the course of the metabolic changes after administration of different isomers of BHC is to be made.

K. van Asperen
F. J. Oppenoorth
Laboratory for Research on Biocides,
National Council for Agricultural Research
T.N.O.,
Vondellaan 6, Utrecht. Jan. 14.

[1] Asperen, K. van, and Oppenoorth, F. J., *Chemisch Weekblad* (in the press, 1954) (Dutch text only; publication in English will follow in due course).
[2] Reith, J. F., *Chemisch Weekblad*, **49**, 691 (1953) (Dutch text only).
[3] Schechter, M. S., and Hornstein, I., *Anal. Chem.*, **24**, 544 (1952).

Metabolism of Gamma-Benzene Hexachloride in Susceptible and Resistant Houseflies

The metabolism of gamma-BHC was studied in three strains of houseflies: a susceptible strain (S) and two gamma-BHC-resistant strains (R_1, R_2), one of which was also resistant to DDT (R_2). The method used was as described in the preceding communication.

The flies were injected into the thorax with 0·3 μgm. gamma-BHC in 0·3 mm.³ of an emulsion of peanut oil. Groups of seventy flies, thus receiving 22 μgm., were kept at 25° C. for varying periods of time, after which the amount of gamma-BHC was estimated. As no gamma-BHC was found in the excreta, a decrease of the amount of the toxicant in the flies indicates that it is metabolized.

It is shown in Fig. 1 that a rapid breakdown occurs in the resistant strains, and that the susceptible strain is also able to metabolize the poison. In the latter the process is slower at the beginning and eventually it ceases completely. This can perhaps be explained by the fact that in these flies heavy symptoms build up soon after injection, followed by death after a few hours.

In a number of experiments the abdomens were cut off thirty minutes after injection. It could be shown that the breakdown is going on for at least four hours in both parts of the body. It follows that neither the Malpighian tubes nor the fat body can be the only site of the breakdown. Thirty minutes after injection the abdomens, which represent only 25 per cent of the body-weight, contained more than half the poison present. As they contain 75 per cent of the body-fat, it is likely that storage in the fat depots occurs, which also seems to play a part in mice (see preceding communication).

A rapid breakdown in susceptible flies may perhaps also be inferred from the data of Bradbury *et al.*[1]. Using radioactive gamma-BHC they found an uptake of 34 μgm. per gram of flies in four hours, an amount which would rapidly have killed their flies if no