Fig. 2. Effect of pretreatment with 'Sesamex' (5 µg/fly) on the recovery, determined by gas-liquid chromatography², of chlordene epoxide from the housefly. Dotted curves, cuticle rinses; full lines, tissue extracts. Insecticide only, ●; insecticide plus 'Sesamex', ▲. Dose, 0.87 µg/fly

appears to lie between those of the two heptachlor epoxides and may be greater than the maximum so far observed since the recoveries from insect tissue were incomplete, even in the presence of 'Sesamex'. The results suggest that the different toxicities of the heptachlor epoxides (3) and (4) may be a true consequence of their stereochemical difference, while the apparent low toxicity of chlordene epoxide results from an increased liability to detoxication arising from the absence of the additional chlorine atom present in (3) and (4). Rather than possessing a more positive role in toxicity, therefore, this chlorine atom may serve simply to shield a vulnerable position of the chlordene molecule from direct hydroxylation while also screening the epoxide rings from enzymatic attack. A toxicological investigation of the chlordene epoxide having its oxygen ring in the same configuration as that of compound (4) would be of interest in relation to this hypothesis.

G. T. BROOKS
A. HARRISON

Agricultural Research Council,
Biochemistry Department,
Pest Infestation Laboratory,
Slough.

- ¹ Brooks, G. T., and Harrison, A., *Nature*, **198**, 1169 (1963).
- ² Brooks, G. T., and Harrison, A., *Biochem. Pharmacol.*, **13**, 827 (1964).
- ³ Brooks, G. T., and Harrison, A., *J. Insect Physiol.*, **10**, 633 (1964).
- ⁴ Davidow, B., and Radomski, J. L., *J. Pharmacol.*, **107**, 259 (1953).
- ⁵ Perry, A. S., Mattson, A. M., and Buckner, A. J., *J. Econ. Entomol.*, **51**, 346 (1958).
- ⁶ Riemschneider, R., *Wld. Rev. Pest Control*, **2**, 29 (1963).
- ⁷ Arvey Corporation, British patent 714,869 (1954).
- ⁸ Peri, C. A., *Gazz. chim. Ital.*, **85**, 1118 (1955).
- ⁹ Brooks, G. T., and Harrison, A., *Biochem. J.*, **87**, 5P (1963).
- ¹⁰ Brooks, G. T., and Harrison, A. (unpublished results).

MICROBIOLOGY

Nomenclature of Living Parasite Material

THE term 'strain', with its connotation of ancestry, descent, race or stock¹, is clearly appropriate for living material which is kept available for experimental purposes by being serially passaged in laboratory animals or in culture. Material maintained in this way, being continuously reproducing, is subject to selection. It may, therefore, alter in its biological characteristics in the process of passage and so be unsuitable for reference purposes for long-term experimentation and unrepresentative of the populations existing in Nature and from which it was derived.

It is to Weinman and McAllister² that the credit is due for directing attention to the fundamental significance of

the viable storage of parasitic organisms at low temperatures in affording material in which reproduction is arrested and biological characters are stabilized. A separate term is now required to convey this implication of the stabilization of biological characters in preserved material and to distinguish preserved from 'strain' material. The word 'stabilate' is now proposed for this purpose. A 'stabilate' may be defined as a population of an organism preserved in viable condition on a unique occasion. There will be only as many examples of a stabilate as there were individual samples of it laid down on the unique occasion. It will therefore be possible to designate each stabilate by a unique code letter or number.

We thank Prof. A. McIntosh, of the Department of English Language in the University of Edinburgh, for advice regarding the choice of a suitable word.

W. H. R. LUMSDEN
GILLIAN J. C. HARDY

Trypanosomiasis Research Unit,
Department of Bacteriology,
University of Edinburgh.

¹ *Shorter Oxford English Dictionary* (Oxford: Clarendon Press).

² Weinman, D., and McAllister, J., *Amer. J. Hyg.*, **45**, 102 (1947).

Distribution of Respiratory Quinones in 2,5-di-tert-amyl-p-benzoquinone-sensitive and -resistant Bacteria

A NUMBER of *p*-benzoquinones have been shown to inhibit bacterial growth¹⁻³ and the succinic oxidase activity of beef heart^{4,5}. In view of the role of quinones in the electron transport and coupled phosphorylation of bacteria⁶⁻⁸ it seemed of some interest to determine the relationship between susceptibility to *p*-benzoquinones and the distribution of respiratory benzoquinones and naphthoquinones in bacteria.

The susceptibility to 2,5-di-tert-amyl-*p*-benzoquinone (DAQ) of a number of strains of bacteria, the content of ubiquinone and vitamin K of which was known, was discovered by plating suitable dilutions of broth cultures on trypticase soy agar (Baltimore Biological Laboratory, Inc.) containing a range of concentrations of DAQ and incubating at 37° for 18-36 h. The lowest inhibitory concentration was taken as that which reduced the count of readily visible colonies to less than 1 per cent compared with control plates containing no DAQ; with some bacteria colony formation was completely inhibited, while with others minute colonies could be detected on careful examination. Although it was not possible to obtain a precise estimate of the colony count with *Proteus vulgaris*, due to spreading of the individual colonies, since there appeared to be no reduction in either the number of 'foci' or the overall amount of growth when plated on medium containing 300 µg/ml. of DAQ, the organism was recorded as being resistant to this concentration of DAQ. Table 1 shows that, of the small range of bacteria tested, those which contain vitamin K alone were sensitive to 30 µg/ml. or less of DAQ, while those bacteria which contain (1) ubiquinone either alone or in combination with vitamin K, or (2) neither of the two respiratory quinones, were resistant to at least 300 µg/ml. (the maximum concentration of DAQ which it is practicable to include in the medium).

We have previously reported that the antibacterial activity of DAQ appeared to be virtually restricted to strains of *Staphylococcus aureus*⁹. This was probably a reflexion of the screening method used and also the marked sensitivity of *Staph. aureus* to DAQ later demonstrated³. Although we have not investigated the respiratory quinones of *Staph. aureus*, in view of its sensitivity to DAQ it would probably contain only vitamin K; Bishop, Pandya and King¹⁰ have shown that *Staph. albus* contains vitamin K, but no ubiquinone.