LETTERS TO THE EDITORS

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IN THE PRESENT CIRCUMSTANCES, PROOFS OF "LETTERS" WILL NOT BE SUBMITTED TO CORRESPONDENTS OUTSIDE GREAT BRITAIN.

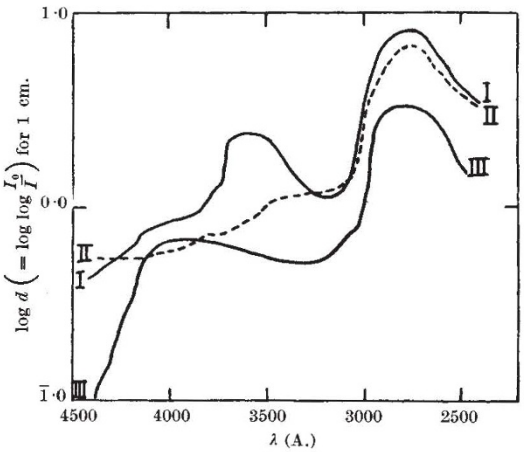
NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 308. CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Photo-Oxides of Carcinogenic Hydrocarbons

IN a recent note under the above title[1], Prof. J. W. Cook described a number of water-insoluble peroxidic photo-oxides derived from carcinogenic hydrocarbons. Experiments made in Cambridge during the past year indicate that a photochemical oxidation product, which is different in character both from those prepared by Cook and from the alkali-soluble materials prepared by Boyland, can be obtained from 3 : 4-benzpyrene under suitable conditions. 10 c.c. of a 0·1 per cent solution of the hydrocarbon in benzene (B.D.H., 'Specially Pure') is irradiated for one hour in an open Petri dish placed three inches below a neon-sensitized mercury lamp of the type described by Melville[2], nearly all the energy radiated from which is concentrated in the 2536 A. resonance line. The remaining benzene is quickly evaporated off in a current of air, and the dry residue is extracted with 10 c.c. of glass-distilled water or with weak alkali (*M.*/500 $NaHCO_3$) and filtered. The resulting solution is colourless—unlike the solid residue—and its absorption spectrum, I, contains two very well-defined bands, with maxima of intensity at about 3600 A. and 2760 A. respectively. When the aqueous solution is allowed to stand, the band at 3600 A. disappears, while that at 2760 A. becomes less intense, in the course of 3–4 hours, II. The spectrum is not of the dihydroanthracene type such as is that, for example, of the water-soluble endosuccinate derivative of 1 : 2 : 5 : 6-dibenzanthracene. It indicates, however, that a labile water-soluble photo-oxidation product can be prepared from 3 : 4-benzpyrene, even though this compound gives no photo-oxide of the peroxidic type. Schulman and Rideal[3] have shown that the labile constituent of the aqueous solution can be adsorbed readily on to protein monolayers. These observations may be correlated and compared with the experiments on the photodynamic activity of the hydrocarbons described by Mottram[4].

Benzene, irradiated under identical conditions, yields a small quantity of an oily residue which dissolves freely in water to give a clear yellow-coloured solution. The absorption spectrum of this solution, III, also contains a well-defined band at 2760 A.; but this is now associated with a very wide band the maximum of which is at about 3950 A., and the absorption curve passes through a *minimum* at 3600 A. This material cannot be identified with any of the usual impurities in benzene. The same result was obtained with highly purified specimens (i) obtained from the Bureau d'Etalons Physico-Chimiques in Brussels; (ii) prepared by the method described by Lowry and Allsopp[5]; and (iii) from B.D.H., 'Specially Pure', as used for the irradiation of 3 : 4-benzpyrene.

In preliminary experiments, embryonic chick heart has been grown for two passages (4–6 days) in a medium composed of fowl plasma and chick embryo extract to which had been added either (*a*) the aqueous extract from irradiated 3 : 4-benzpyrene, or (*b*) the aqueous extract from irradiated benzene. A high percentage of the mitotic cells in series (*a*) was abnormal, and prophase was prolonged, as compared with control cultures or with series (*b*).



(I am indebted to Dr. A. Glücksmann for making the cytological examination of these cultures.) It is concluded that the labile product from 3 : 4-benzpyrene may have high biological activity, and experiments to isolate the substance, to elucidate its chemical and biological nature and to determine the part played by the benzene solvent in its production, are in progress.

I am also indebted to Prof. E. K. Rideal and to Dr. H. B. Fell for much valuable advice and assistance.

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Jan. 29.

[1] Cook, J. W., Martin, R., and Roe, E. M. F., NATURE, **143**, 1020 (1939).
[2] Melville, H. W., *Trans. Farad. Soc.*, **32**, 1525 (1936).
[3] Schulman, J., and Rideal, E. K., NATURE, **144**, 100 (1939).
[4] Mottram, J. C., and Doniach, I., *Lancet*, 1156 (1938).
[5] Lowry, T. M., and Allsopp, C. B., *Proc. Roy. Soc.*, A, **133**, 48 (1931)