be explained by supposing somatic non-disjunction to have occurred¹. Little is known of the chemistry of mammalian pigments, but if the formation of red and black in cattle represents different levels of the same process, it may be that the anomalous condition shown by G. Lucy 17th was not chromosomal in origin, and that the explanation might lie in the influence of oxidation-reduction potentials, the work of Figge⁶ being very suggestive in this respect.

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¹ Dunn, L. C., *J. Genet.*, **29**, 317 (1934).

² Ibsen, H. L., *Genetics*, **18**, 441 (1933).

³ Chester Jones, I., *J. Genet.*, in the press.

⁴ Bogart, R., and Ibsen, H. L., *J. Genet.*, **35**, 31 (1937).

⁵ Figge, F. H. J., *J. Cell. Comp. Physiol.*, **15**, 233 (1940).

Risk of Contamination in Experimental Carcinogenesis

THE fluorescence of polycyclic aromatic hydrocarbons has afforded an extremely useful guide in most of the chemical and biological studies concerned with them. While making use of this property in examining various materials for possible traces of known carcinogens, several observations were made which seem worthy of note when grouped together.

When working in laboratories where both chemical and biological experiments are being carried out with various carcinogenic materials, one is constantly on guard against the risk of contamination. Indeed, attention has already been directed to this point by Earle¹ who, while conducting experiments on carcinogenesis in tissue cultures, concluded that alterations in the control cultures might possibly be due to a trace contamination of methylcholanthrene, and more recently by Hieger² in connexion with the risk presented by contamination from the city atmosphere. In these laboratories care has always been exercised to eliminate errors from this source, and all apparatus used in the course of an experiment has been hitherto examined under ultra-violet rays on the assumption that any traces of carcinogenic hydrocarbon would be detected, since most of these compounds also fluoresce in the solid state.

Observing this precaution and exposing solvents to the surrounding atmosphere as little as possible, an extract was made of toasted breadcrumbs, which on concentration and chromatographic analysis yielded a blue-violet fluorescent solution having a spectrum identical with that of 3:4-benzpyrene. A similar procedure was adopted with an extract of untoasted breadcrumbs to provide a control, and although a bluish-fluorescent solution was obtained from this, the fluorescent spectrum of this fraction showed no band structure even after repeated chromatography. At this juncture, some results were published by van Schelven³ claiming tumour induction in mice with benzene extracts of blackened bread and other burnt foodstuffs. An extract was therefore made of the black crusts of several loaves, and again a fraction was obtained which had a fluorescence spectrum corresponding with that of 3:4-benzpyrene. However, in the control of this experiment, which consisted merely of 500 ml. of benzene concentrated to 5 ml., a fraction was also obtained which had the characteristic 3:4-benzpyrene spectrum.

Obviously the precautions being taken were inadequate to remove the risk of contamination.

Preliminary investigations showed that most commercially available solvents possess a slight fluorescence, which becomes more evident, however, on the concentration of a large volume of solvent to small bulk; and that most apparatus on remaining in the laboratory atmosphere for a short time, even after cleaning with chromic acid, acquires a film of material which remains undetected in daylight and under the ultra-violet lamp, but which becomes strikingly apparent on the addition of a small quantity of benzene followed by examination under the ultra-violet lamp. No spectrographic evidence has been obtained suggesting the presence of traces of benzpyrene in the solvents, and while the fluorescence from this source is confusing when traces of fluorescent material are being sought, the most likely source of contamination from benzpyrene is the laboratory atmosphere.

These findings are significant when it is realized that a great deal of research has been and is being directed to the isolation of carcinogenic fractions from various sources, where large volumes of solvent are involved and the carcinogens are proving to be of a 'weak' nature. Another danger which is worthy of consideration is the possibility of contamination in a syringe being used for injection of a suspected carcinogen, due to inadequate cleaning and examination after use for injection of a potent carcinogen, especially where the syringe has a glass-metal joint and thorough inspection is not possible. We feel in this department that the problem is a serious one, and that the most stringent precautions should be adopted.

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¹ Earle, W. R., *J. Nat. Cancer Inst.*, **4**, 165 (1943).

² Hieger, I., *Cancer Res.*, **6**, 660 (1946).

³ Van Schelven, T., "Experiments on the Presence of Carcinogenic Substances in Human Surroundings" (Kosmos Publishing Co., Amsterdam, 1946).

A Variable Phase-Contrast System for Microscopy

MR. W. G. HARTLEY¹ has described a variable phase-contrast system for microscopy and considers the possibility of polarizing the diffracted rays and dioptric rays at right angles to one another before introducing a path difference by the use of birefringent material.

Some time ago, an investigation was undertaken into the possibility of developing a phase-contrast microscope in which (a) the amplitude was variable, (b) the phase-difference was variable, and (c) in which both were independently variable. This work culminated in the filing of Provisional Application No. 23700/46, and a description of an instrument was read before the Royal Society on March 13 by one of us.

Certain disadvantages result from the premature disclosure of the results of research work undertaken by industry, but it is perhaps as well to state that developments in the direction disclosed by Mr. Hartley have been proceeding for some eighteen months, and that the methods he describes have not been overlooked.

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¹ *Nature*, **159**, 880 (1947).