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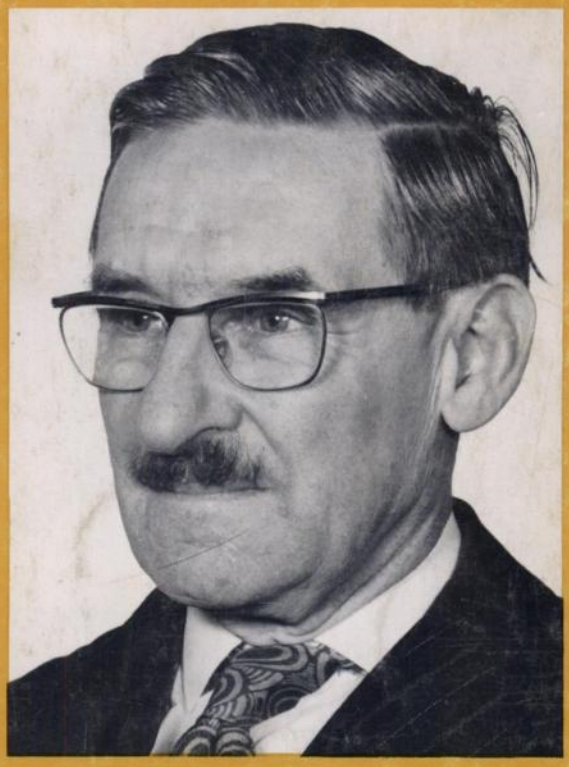

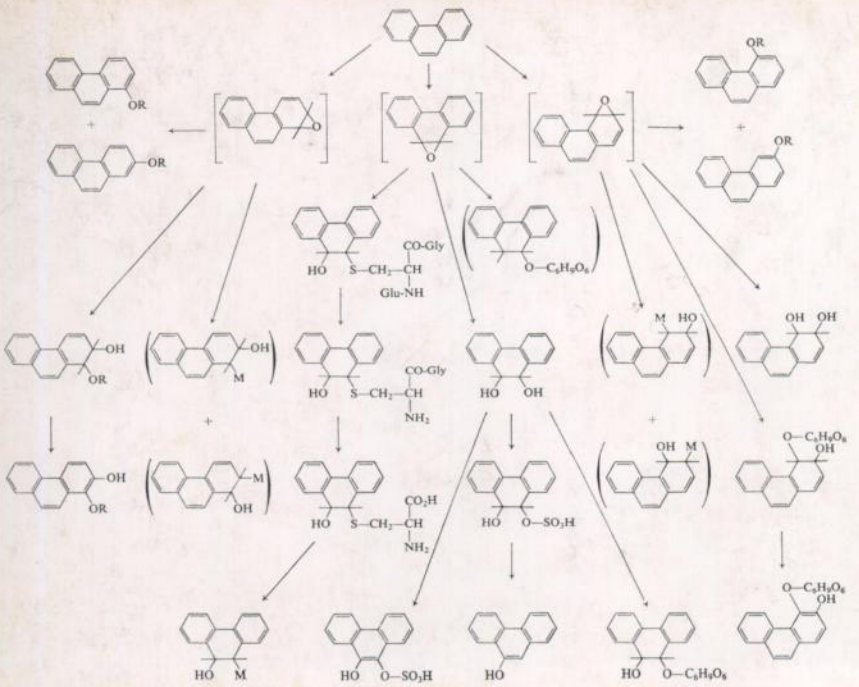

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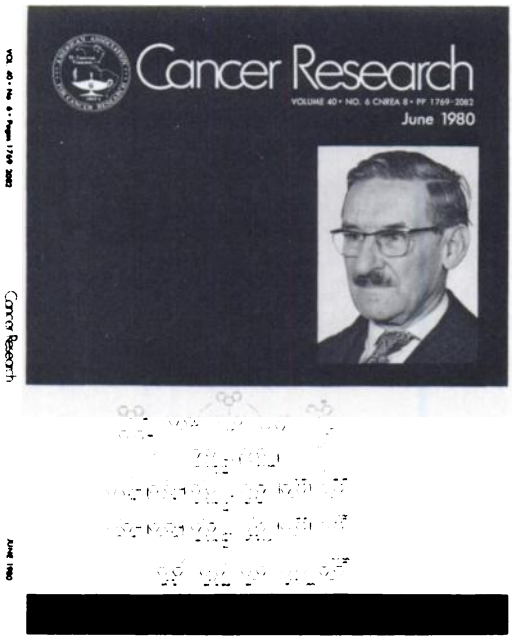

Dr. Eric Boyland is noted for his contributions to the metabolism of carcinogens, especially of the phenanthrene type.

Boyland was born in 1905 in Manchester, England. After graduating in applied chemistry and physiology from Manchester University, he worked on the biochemistry of alcoholic fermentation at the Lister Institute and then in Heidelberg on the biochemistry of muscle. In 1931, he joined the staff of the Research Institute of the Cancer Hospital (Free), which later became the Chester Beatty Research Institute associated with the Royal Marsden Hospital. Kennaway had just shown that 1,2,5,6-dibenzathracene induced cancer on mouse skin, and 3,4-benzopyrene was isolated from coal tar soon afterwards. Because these polycyclic hydrocarbons were chemically inert, stable compounds, Boyland thought that they must be metabolized in the body to chemically reactive forms. As only 100 mg of 1,2,5,6-dibenzanthracene were available, the metabolism of anthracene as a model compound was studied. By 1935, Boyland and Levi (Boyland, E., and Levi, A. A. Production of dihydroxyhydroanthracene from anthracene. Biochem. J., *29:* 2679, 1935) were able to show that anthracene was metabolized by a perhydroxylation reaction to a diol-1:2-dihydro-1:2-dihydroanthracene and precursor of mercapturic acid. Later work with Joan Booth and Peter Sims showed that the metabolic intermediates of the diols and mercapturic acids were epoxides. Studies of the metabolism of other aromatic compounds showed that the formation of epoxides was a general reaction in metabolism. As some epoxides were known to be carcinogenic, Boyland suggested in 1950 that the epoxides formed from carcinogenic hydrocarbons could be the reactive agents in carcinogenesis; later work by Sims and others has shown that epoxides are involved but not as directly as was first suggested.

The formation of mercapturic acids and glutathione reaction products from aromatic compounds led to the study of the reactions of glutathione with foreign compounds and to the discovery of glutathione-s-transferase by Booth, Boyland, and Sims in 1961 (Booth, J., Boyland, E., and Sims, P. An enzyme from rat liver catalyzing conjugations with glutathione. Biochem. J., *79:* 516, 1961) and of the specific epoxy glutathione transferase with K. Williams. In 1964, with I. Chasseaud, several different specific glutathione transferases were identified. This provided the first clear demonstration of the biological role of glutathione.

Because nitrogen mustards produced radiomimetic effects, including mutation, Boyland and Horning (Boyland, E., and Horning, E. S. Induction of tumors with nitrogen mustard. Br. J. Cancer, *3:* 118, 1949) tested nitrogen mustards and induced tumors in mice. This was the first demonstration of a carcinogenic alkylating agent. Boyland also worked on the chemotherapy of cancer; in 1955 he recommended the simultaneous use of more than one drug. He also investigated the metabolism of aromatic amines and tryptophan in relation to bladder cancer and the carcinogenicity of dibenzorbazoles and nitrosamines.

Boyland retired from the Chester Beatty Research Institute in 1970 to become a consultant to the International Agency for Research on Cancer in Lyon and then Visiting Professor of Environmental Toxicology at the London School of Hygiene and Tropical Medicine.

The photograph of Boyland was taken in 1972. The scheme of probable pathways in phenanthrene metabolism is that of Boyland and Sims (Boyland, E., and Sims, P. The metabolism of phenanthrene in rabbits and rats: dihydrodihydroxy compounds and related glucosiduronic acids. Biochem. J., *84:* 571, 1962). We are indebted to Dr. R. Montesano for the information and illustrations.

M. B. S.