the so-called "Oppenheimer Effect." In the first place, native asbestos cannot be *regarded* as chemically inert in the same way as many of the materials studied by the Oppenheimers and their colleagues, and secondly, the essential characteristic of the Oppenheimer Effect is that carcinogenesis only occurs when large bodies are implanted -- no effect being seen when the same materials are introduced in powdered form.

Summary

Recent epidemiological studies on lung cancer and mesothelioma have revitalized the subject of the mechanism of carcinogenesis by asbestos. In a parallel paper,[1] the chemistry of the three main types of asbestos is discussed. In this paper possible mechanisms of carcinogenesis, and experimental methods of elucidating them, are considered from a biological standpoint. The significance of oils naturally present in asbestos and of oils purposely or accidentally added to it, and the possible role of metal constituents, are discussed in some detail. It is regarded as unlikely that asbestos carcinogenesis is an example of the Oppenheimer Effect.

Acknowledgments

We wish to thank Mrs. M. A. Walters, B.Sc., who is collaborating with us in part of the biological work and Mrs. K. Foster and Miss M. Butt for help in preparation of the manuscript. The Anna Fuller Fund kindly provided full support for one of us (J.S.H.). We are most grateful for this help and for Professor A. Haddow's interest and encouragement.

References

1. Doll, R. 1955. Mortality from lung cancer in asbestos workers. Brit. J. Industr. Med. 12: 81.
2. Wagner, J. C., C. A. Sleggs & P. Marchand. 1960. Diffuse pleural mesothelioma and asbestos exposure in the North Western Cape Province. Brit. J. Industr. Med. 17: 260.
3. Editorial. 1964. Asbestos and malignancy. Brit. Med. J. 2: 202.
4. Ortiz, A. G. 1964. Cancer in Africa, especially in regions south of the Sahara. J. Nat. Cancer Inst. 33: 383.
5. Roe, F. J. C. & M. A. Walters. 1965. Some unsolved problems in lung cancer. Progr. Exp. Tumor Res. 6 (in press.)
6. Doll, R. & A. B. Hill. 1964. Mortality in relation to smoking: ten years' observations of British doctors. Brit. Med. J. 1: 1399.
7. Kerr, F. E. 1961. Amphibole asbestos in the Union of South Africa. *In* Seventh Commonwealth Mining and Metallurgical Congress. : 1–28. Johannesburg, South Africa.
8. Sluis-Cremer, G. K. 1965. Asbestosis in South Africa: certain geographical and environmental considerations. This Annal.
9. Enticknap, J. B. & W. J. Smither. 1964. Peritoneal tumours in asbestosis. Brit. J. Industr. Med. 21: 20.
10. Mancuso, T. F. & E. J. Coulter. 1963. Methodology in industrial health studies. Arch. Environm. Hlth. 6: 210.
11. Schmähl, D. 1958. Cancerogene Wirkung von Asbest bei Implantation an Ratten. Z. Krebsforsch. 62: 561.

8000 1047

PRODUCED BY FORD