was deemed unnecessary. Furthermore, Gardner[5] has stated that nonsiliceous dusts produce only transient inflammation of the skin and subcutaneous tissues after implantation and that the inflammation disappears after three or four days without ulceration. Since this work was reported before Gardner became interested in dusts of beryllium compounds, it is likely that his reference to nonsiliceous dusts was not meant to include compounds of beryllium. The work reported here has indicated that cutaneous implantation of beryllium oxide may induce appreciable granulomatous inflammation.

It may also be worthy of note that the paucity of reaction to particles of metallic beryllium (sample E), as well as to beryllium oxide calcined at higher temperatures (sample B), serves as a control to prove that the reaction observed as a result of implantation of the materials which produce significant reactions is not simply a nonspecific response to foreign material.

## COMMENT

Granulomatous lesions of the lungs in workers who had been exposed to compounds of beryllium were first recognized nearly 10 years ago; since then, there have been descriptions of granulomas of the dermis and of the subcutaneous tissues following implantation of phosphors containing beryllium and, in one instance, of fragments of metallic beryllium. Until recently, attempts to reproduce beryllium granulomas in laboratory animals have been unsuccessful. Vorwald[6] reported that certain compounds of beryllium caused granulomatous inflammation, but he stated that the reaction was not identical with that observed in man.

Granulomas of the lungs of rats similar to the nodules in human lungs have been reported more recently. This reaction was induced by intratracheal instillation of pure powder of beryllium oxide suspended in skimmed milk; in some instances the suspensions contained manganese dioxide in addition to the beryllium compound. It was stated by Davies and Harding,[7] who did this work, that the best examples of granulomas occurred in animals that had been given a mixture of beryllium oxide and manganese dioxide. This fact led them to infer that manganese dioxide may have served to "reenforce" the effects of beryllium oxide.

The fact that typical granulomas developed in the skin and subcutaneous tissues of pigs after phosphors had been implanted into these regions is further evidence that compounds of beryllium are related to such lesions. The reasons why pure metallic beryllium or beryllium oxide did not stimulate such a reaction in these animals are not known; one or more of several factors may be responsible, including variations in response of different species of animals, differences in the physical structure or chemical properties of the compounds or an augmenting effect of the zinc oxide or the silica present in the phosphors.

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5. Gardner, L. U.: Pathology, Human and Experimental, in Silicosis Symposium held in connection with the Trudeau School of Tuberculosis at Saranac Lake, N. Y., June 18-22, 1934, p. 32.

6. Paper read at Sixth Saranac Symposium, Saranac Lake, N. Y., Sept. 29 to Oct. 3, 1947, in Vorwald, A. J.: Pneumoconiosis: Beryllium, Bauxite and Compensation, New York, Paul B. Hoeber, Inc., 1950.

7. Davies, T. A. L., and Harding, H. E.: Beryllium Granulomata in the Lungs of Rats, Brit. J. Indust. Med. **7**:70-72 (April) 1950.