Since the absorption (and excretion) of vanadium has been demonstrated thus, the possibility of general poisoning exists and must be borne in mind in the remaining discussion of the organs.

Circulatory System.—As already mentioned, palpitation of the heart on exertion is a common symptom and is believed by Wyers [7] to be due to the effect of vanadium. In the present series, in which electrocardiographic examination was often recorded, and was made after exertion at least once in most cases, the incidence of extrasystoles (three cases) was found to be unexpectedly high as compared with that in a big control material. A case in which palpitation persisted long after heavy dust exposure and in which transient coronary insufficiency was demonstrated was most suggestive of heart disease. A few other pathologic electrocardiographic findings are probably of no importance. It seems that the possibility cannot be ruled out, but neither can it be established, that the objectively demonstrable pathologic changes in the heart may be associated with the exposure to vanadium. As to other examinations of the circulatory system, an accentuated pulmonary second sound (Wyers [7]) was not heard. The blood pressure was not raised as compared with that of a control of the same age, nor did it increase during the observation period (mean value at the beginning 139.3 ± 2.0 mm., mean value at the final examination 139.6 ± 2.2 mm.).

Blood.—From the results of the blood examinations it seemed probable that there had been a slight decrease in the hemoglobin level during the observation period, particularly in the group regularly employed in the factory, although it still remained within normal limits. At the first examination there was no difference (92.9 ± 1.8 per cent, and 92.5 ± 1.36 per cent, respectively). At the final examination the difference was greater for the "regulars" (7.8 ± 2.36 per cent) than for the other group (3.0 ± 2.07 per cent). (The same nurse made most of the determinations with the same standardized Autenrieth-Königsberger hemometer.) Statistical analysis also shows a slight decrease in the number of red cells during the same period in the "regulars" (4,960,000 ± 90,000, and 4,640,000 ± 120,000, respectively), which, however, did not cover a wide range and should also be considered to lie within normal limits. With regard to these phenomena and their pathogenesis (toxic effect? secondary factors, such as infections of the respiratory tract?) only future observation will afford the answer.

No tendency toward leukopenia was present, nor was there any eosinophilia in the material as a whole. Of a number of patients who had eosinophilia of 6 per cent or more, only one was found to be allergic to vanadium.

No red cells containing basophilic granules (stippled cells) were observed.

Liver.—As a lesion of the liver was theoretically possible, the urine was tested for urobilin according to Schlesinger's method. The number of positive reactions was no higher in this than in a control material. The values for serum bilirubin (according to Jendrassik and Gròf [14]) and alkaline phosphatase (Buch and Buch [15]) were normal, and Takata's test and the formaldehyde-gel test were negative in the examined cases. The fact that the thymol turbidity test (Shank and Hoagland)

14. Jendrassik, L., and Gròf, P.: Vereinfachte photometrische Methoden zur Bestimmung des Blutbilirubins, Biochem. Ztschr. **297**:81, 1938.

15. Buch, I., and Buch, H.: An Improved King and Armstrong Method for the Determination of Phosphatase Activity in Blood Serum, Acta med. scandinav. **101**:17 and 119, 1939.