so that the question has arisen whether or not they represent degenerated nucleoli which stain pink instead of blue. It should be added that indistinguishable lesions of the epithelial cells and nuclear inclusions have been found in experimental foot-and-mouth disease of the guinea pig.[6]

[1] Olitsky, P. K., *J. Exp. Med.*, 1927, xlv, 969.

[2] Lipschütz, B., *Arch. Dermat. u. Syph.*, 1921, cxxxvi, 428.

[3] Gins, H. A., *Centr. Bakt.*, 1 Abt., 1922, lxxxviii, 265.

[4] Trautwein, K., *Arch. f. wiss. u. prakt. Tierheilk.*, 1925, lii, 475.

[5] Ruhle, F., *ibid.*, 1926, liv, 197.

[6] For some of the specimens of foot-and-mouth disease tissues, we are deeply indebted to Dr. F. C. Minett.

3818

The Transfer of Normal and Irritated Omentums with Subsequent Streptococcus Immunity in Rabbits.

R. W. LINTON. (Introduced by F. P. Gay.)

Department of Bacteriology, College of Physicians and Surgeons, Columbia University.

In a recent paper[1] it was shown that if areas of granulation tissue are formed in the peritoneums of rabbits, these animals become immune to a subsequent intrapleural infection with a highly virulent hemolytic streptococcus. The intrapleural doses varied from 100 to 250 M.L.D. and successful recovery occurred in 75% of the cases. The protection appeared to be due to the migration of tissue macrophages or clasmatocytes from the peritoneal granulating areas into the pleural cavity and particularly into the subserous tissues of the diaphragmatic and parietal pleura.

The present report describes an extension of the transfer technique. A portion of the peritoneal granulating area is removed and inserted in the peritoneum of a normal rabbit. The method is as follows: A peritoneal focus of cells is built up in a rabbit by two or three intraperitoneal injections of an irritating substance, in this case a mixture of aleuronat and starch. Four days after the last injection the animal is sacrificed, and its omentum removed and carefully freed from any lumps of aleuronat which may have become adherent to it. It is then immediately inserted in the peritoneum of a normal rabbit, under complete anesthesia. An omentum of this type is at least twice normal size. Microscopically, it is found to

contain many times the number cells in the normal omentum. This increase is due principally to cells of the tissue macrophage or clasmatocyte type, as may be shown in animals stained with Trypan Blue.

At various intervals from 2 to 7 days after the insertion of the omentum, these animals were infected in the right pleural cavities with *Streptococcus hemolyticus,* varying in amount from 20 to 100 M.L.D. Sixty per cent of these animals were found to be protected. These experiments were controlled by the intrapleural infection of rabbits into whose peritoneums normal omentums had been inserted, and in some cases by the simultaneous infection of normal rabbits. No protection was afforded by the normal omentums, and the normal animals also died with typical infections. Histologically, rabbits which have recovered from intrapleural infections after omental transfer show in the serosal linings of their pleural cavities an increased number of tissue macrophages. Furthermore the percentage of clasmatocytes in the pleural exudates is somewhat higher than normal: 96% in contrast to the normal count of 85%.

A preliminary experiment has been conducted, using guinea pigs' omentums as the transferred material. Irritated omentums, prepared as in the case of the rabbits, from 2 pigs were transferred to each rabbit. Four days later these animals were given 20 M.L.D. of *Streptococcus hemolyticus* intrapleurally. Two of these animals survived and 2 died. The control rabbit, which had 2 normal guinea pig omentums, died with a typical empyema. The protection afforded by this method appears to exist only when relatively small doses of the infecting organism are given, *i. e.,* up to 50 M.L.D. When 50 to 100 M.L.D. are used the protection is inconstant, and beyond 100 M.L.D. is non-existent. Omentums which have been stained with Trypan Blue, during the course of the irritation, protect as well as unstained tissues.

[1] Linton, R. W., *Arch. of Path. and Lab. Med.,* in press.