been passed through a Berkefeld V filter and administered intravenously to patients with pernicious anemia does not produce a hematologic response probably because there is no extrinsic factor as such in the parenteral tissues to provide a substrate for interaction.

10536 P

A Pneumonia Virus of Swiss Mice.

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A virus capable of inducing fatal pneumonia in Swiss mice has been isolated from normal mouse lungs, and its immunological characteristics are now being studied in detail.

Twenty-one groups of normal Swiss mice were inoculated intranasally under ether anesthesia with 0.05 cc of lung-suspensions from uninoculated mice. Serial mouse-passage was carried on with each group, using 10% to 30% lung-suspensions. Passages were made at an average interval of 7 days; usually 6 mice were used in each group. The mice were obtained from 6 different breeders. Initially, passages were made without regard to the breeder from whom the mice had been obtained. Lately, however, passages have been made in mice from each individual breeder in order to determine the source of the virus. Definite areas of pulmonary consolidation were present in 43% of the groups in the third serial passage, and in 52% of the groups at the sixth passage. Death occurred as early as the fourth passage, and by the sixth passage deaths were recorded in 24% of the groups. Cultures of the mouse-lung suspensions were made routinely and were sterile in a great majority of instances. Rabbits were injected intraäbdominally with virus-containing material from various passages. They were bled before injection and again 8 to 10 days afterwards. Their serum was tested for the presence of antibodies capable of neutralizing the various strains of virus in the manner described by Magill and Francis.[1]

Fatal pneumonia was caused by 0.05 cc of a 10^{-3} to 10^{-4} dilution of infected mouse lung, and definite pulmonary consolidation was pro-

[1] Magill, T. P., and Francis, T., Jr., PROC. SOC. EXP. BIOL. AND MED., 1936, **35**, 463.

duced by 10^{-5} to 10^{-6} dilutions. The virus was filtrable through Berkefeld V and N candles, passed through graded collodion membranes[2] with an APD of 300 mμ, and was retained by a Seitz filter. Centrifugation for 1 hour at 13,000 rpm did not cause complete sedimentation of the virus. Virulence decreased very rapidly at room temperature, and in broth suspensions as much as 99% disappeared in 1 hour. Heating to 56°C for 30 minutes inactivated the virus. It has been preserved at –80°C and by drying in the frozen state. The virus has been carried in chick-embryo-Tyrode tissue-culture medium[3] through 10 successive transfers, although with considerable reduction in virulence. The virus was strictly pneumotropic for mice. The susceptibility of mice from various breeders showed marked differences.

Microscopically the pulmonary lesions showed dense peribronchial and perivascular accumulations of mononuclear cells with hyperemia and edema. The bronchial epithelium was well preserved and sometimes appeared hyperplastic. The intracerebral, intraabdominal, intravenous, or subcutaneous injection of the virus in mice produced no recognizable lesions. Neither the brains nor the livers of mice injected intracerebrally and intraäbdominally, respectively, showed the presence of the virus. Ferrets did not develop symptoms, fever, or pulmonary lesions when inoculated intranasally, nor did the virus become adapted to ferrets on serial passage. However, the virus could be recovered from the lungs of inoculated ferrets. Ferrets that received the virus intranasally were fully susceptible subsequently to the PR8 strain of influenza-virus. Mice actively immunized by 2 intraäbdominal injections of infected mouse lung were immune to intranasal inoculation of the virus, but were not immune to 10 lethal doses of PR8. Conversely, mice actively immunized in a similar manner with PR8 were not immune to 10 lethal doses of this pneumonia-virus of mice. Rabbits injected intraabdominally with 3.0 cc of either tissue-culture supernate or 10% saline suspension of infected mouse lung produced antibodies against the virus. Eleven strains have been isolated and antisera have been prepared against 6 of these. Cross-neutralization tests have shown these strains to be immunologically identical. Dochez, Mills, and Mulliken[4] and Gordon, Freeman, and Clampit[5] found viruses in the

[2] Bauer, J. H., and Hughes, T. P., *J. Gen. Physiol.*, 1934, **18**, 143.

[3] Li, C. P., and Rivers, T. M., *J. Exp. Med.*, 1930, **52**, 465.

[4] Dochez, A. R., Mills, K. C., and Mulliken, B., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 683.

[5] Gordon, F. B., Freeman, G., and Clampit, J. M., PROC. SOC. EXP. BIOL. AND MED., 1939, **39**, 450.

lungs of normal mice, but were unable to produce antisera against these agents.

Serum from laboratory workers in contact with mice and also from some human beings who have had no contact with mice neutralized 500 lethal doses of the virus. The serum of normal mice from certain breeders was also capable of neutralizing the virus. Cross-neutralization tests with numerous antisera against ferret, mouse, and tissue-culture strains of epidemic-influenza virus and against mouse and tissue-culture strains of this pneumonia-virus of mice have been difficult to assess. With certain of these antisera reciprocal cross-neutralization has been observed when 1 :2 dilutions of the sera were tested. The evidence available suggests the presence of a common minor antigenic component in both viruses.

10537

Black Widow Antivenin Production in Rabbits.

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Antiserum against the venom of the black widow spider has been successfully produced in sheep.* The size of this animal makes it necessary to use large numbers of spiders, about 3,000 per sheep over a 6 months' period. The death of an immunized animal consequently represents a considerable loss. In view of the ability of the rabbit to produce highly potent antipneumococcal sera we felt it worth while to investigate this animal's possibilities as a producer of antivenin.

Spiders were collected in the vicinity of Denver and the glands removed by the method previously described.[1] The venom-glands were macerated in saline, the debris removed by filtration through cotton and injections made subcutaneously. Three adult male rabbits, weighing approximately 4 kg, were immunized as follows: Injections were made every other day; for the first 2 weeks one-fourth the venom in one spider was given; for the next 2 weeks, one spider per injection; for the next 2 weeks, 2 spiders per injection and for the last 5 weeks 8 spiders per injection.

Tests for neutralizing power were made by adding varying amounts

* Anti-Black Widow Spider Serum, Squibbs.

1 D'Amour, F. E., Becker, F. E., and Van Riper, W., *Quart. Rev. Biol.*, 1936, **11**, 123.