in both blood and spinal fluid, showing the interesting fact that no partition-coefficient between the 2 fluids existed.

Curiosity as to the mechanism of the bacteriostatic and killing action of the drug led to experiments on its possible effect on the dehydrogenases of the pneumococcus. Sulfanilamide was studied comparatively with other well-known bactericidal agents, and the results follow. We used Type I Neufeld strain, and glucose was employed as a metabolite.

In these experiments the Thunberg technic was employed: one cc. of 1:5,000 methylene blue; one cc. of 0.01 M glucose; one cc. of pH 7.4 phosphate buffer; one cc. of washed cells of Type I Neufeld, mucoid, pneumococcus; and one cc. of the inhibitor were placed in a Thunberg tube. The tubes were exhausted, placed in a water-bath, and the rate of reduction of the methylene blue was noted.

With sodium glycocholate the inhibiting molarity of its concentrations was M/5,000 to M/2,000; with optochin hydrochloride, M/1,500 to M/1,000; with apoquinine hydrochloride, M/750 to M/250; with quinine acetate, M/1,000 to M/200; but with sulfanilamide, M/100 (0.17%). No inhibition of reducing power of Type I Neufeld pneumococcus in the presence of glucose at M/100 (0.17%), the highest concentration obtainable was shown with this technic.

The results show that whereas the ordinary bacteriostatic compounds inhibit the dehydrogenases (a part of the respiratory mechanism), the sulfanilamide does not affect these enzymes. This rules out an effect that the drug might have on the organisms.

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A Virus Disease of Swiss Mice Transmissible by Intranasal Inoculation.

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Mice have been extensively employed in the study of the virus of human influenza since the discovery by Andrewes, Laidlaw, and Smith,[1] and by Francis[2] that these animals are susceptible to intra-

[1] Andrewes, C. H., Laidlaw, P. P., and Smith, W., *Lancet*, 1934, **2**, 859.

[2] Francis, T., Jr., *Science*, 1934, **80**, 457.

nasal inoculation of ferret-passed virus. Francis[3] has recently shown that influenza virus cultivated in the chorio-allantoic membrane of the developing chick embryo is pathogenic for mice and does not require ferret passage to raise its virulence. Many of the immunological studies of influenza virus have been made by means of protection tests using mice as test animals. It is obvious, therefore, that if the virus of the common cold could be made virulent for mice, a similar and valuable immunological study of this virus could be made.

After a number of preliminary failures in attempts to infect mice by intranasal inoculation of the virus of common cold, we began, during the summer of 1936, to use virus for inoculation which was being cultivated in the chorio-allantoic membrane of the chick embryo. By this means, with comparatively little difficulty, 3 different strains of virus were established in mice and could be passed in series by intranasal inoculation of emulsions of infected lung. After the few passages necessary to establish the strains, all 3 produced fairly uniform lesions in the lungs. The mortality rate was much less than that reported for human influenza virus, only about 10% of the mice dying in 4 or 5 days. About 75%, however, showed fairly extensive pulmonary consolidation at autopsy. The areas of pulmonary consolidation were plum colored, often involving a whole lobe, and their gross appearance closely resembled that seen in mice infected with human influenza virus. The serological relationship to one another of the 3 strains of common cold virus was studied by means of protection tests in mice. Because of the relatively low virulence of the virus for mice some difficulties of interpretation were encountered. However, preliminary tests seemed to indicate that the 3 strains of cold virus were of the same serological type and that they differed serologically from influenza virus. Before the tests could be repeated on a larger scale, an event occurred which abruptly altered the character of the investigation. A change had just been made to a new source of supply of Swiss mice, when suddenly all the strains of virus appeared to undergo a remarkable increase in virulence, so that 80% of all mice inoculated died in a few days with extensive pulmonary consolidation. This was first interpreted as being an increase in virulence of the virus or perhaps an increased susceptibility on the part of the new mice. These explanations, however, proved not to be correct since a retest with sera which had formerly been protective showed that they no longer

[3] Francis, T., Jr., and Magill, T. P., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 134.

had any protective power. The conclusion, therefore, seemed justifiable that a new virus had been accidentally encountered.

The source of this virus was next investigated. Fifty normal mice of the variety in use were killed and autopsied; in 5 of these small areas of pulmonary consolidation were found, and in 12 others pin-point lesions were noted. An emulsion made from lungs showing these small lesions when passed by intranasal inoculation in a series of Swiss mice initiated a strain of the virus. Moreover, emulsions made from lungs appearing normal on gross inspection have also given rise to strains of this virus when passed from mouse to mouse by the intranasal route. The placing of apparently normal mice of the same strain in close cage contact with experimentally inoculated mice does not result in obvious pulmonary infection of the healthy contact mice. To date this virus has been recovered from normal Swiss mice obtained from 3 different sources of supply.

The characteristics of this virus disease are as follows: usually lung lesions are produced in the first series of mice to which the normal lung suspension is administered. Deaths begin to occur in the inoculated mice between the fourth and seventh passages, after which a high mortality rate is sustained. Death often takes place 48 hours after inoculation, occasionally 24 hours after. The areas of pulmonary consolidation are frequently smooth and grayish in appearance, but are often plum colored and similar in appearance to the lesions produced in the lungs of mice by human influenza virus. Microscopic sections show extensive cellular infiltration, chiefly mononuclear, and varying degrees of hemorrhage and edema. The virus is virulent in dilutions as high as 1:1,000,000; many mice inoculated with this dilution show well-developed pulmonary lesions, although some die without definite pulmonary consolidation. In general the mortality rate is considerably less with high dilutions of the material. The virus is readily filtrable through a Berkefeld V filter and collodion membrane with a pore diameter of 551.4 wov.

The serum of a rabbit given 3 intraperitoneal injections of mouse lung suspension containing virus did not appear to contain protective substances for mice against the virus. Weak and irregular protection was, however, obtained with certain normal human sera and with one anti-influenza virus serum.

Intranasal inoculation of ferrets produced a sharp early rise of temperature to about 105°, followed occasionally by a secondary rise. At times the ferrets showed respiratory symptoms. Some of the ferrets when retested later were found to be refractory to a second inoculation, suggesting that infection is followed by immunity. Mice, however, were not rendered immune by subcutaneous injections of the virus.

Mice are not susceptible to intracerebral, subcutaneous, or intraperitoneal injections of the virus. No effect is produced in rabbits by injection of virus either intraperitoneally or intracerebrally. Intratracheal instillation of the virus suspension in rabbits, however, resulted in an extensive pneumonia, mediastinitis and pericarditis. This infection was complicated by the presence of secondary bacteria. Guinea pigs were not affected by subcutaneous injection of the virus.

This short account indicates the presence in the lungs of certain strains of Swiss mice of a filtrable virus. This virus does not seem to cause obvious spontaneous disease, the carriers appearing healthy. There are present, however, in the lungs of a certain percentage of these mice easily visible macroscopic lesions. The virus seems to be present mainly in the respiratory tract and experimental infection takes place only after inoculation of the virus into the respiratory tract. Ferrets and perhaps rabbits are susceptible to infection with this virus. Subcutaneous and intraperitoneal inoculation of the virus does not result in infection in any of the species of animals used.

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Utilization of Vitamin B_1 From Fullers' Earth Adsorbates.

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We reported[1] our results with various methods of eluting vitamin B_1 from the international standard acid clay. The outcome of these experiments indicated that the vitamin on the acid clay was not entirely available to the test animal since the quinine sulfate extract was more effective than the clay itself in causing a remission of the symptoms of polyneuritis in rats. The experiments here reported were carried out to confirm those observations with a fuller's earth adsorbate of the vitamin.

One hundred cubic centimeters of a solution of crystalline vitamin B_1 containing 2500 curative doses, as determined by the Ammerman and Waterman[2] modification of the Smith curative procedure,

1 Sampson and Keresztesy, PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 30.

2 Ammerman and Waterman, *J. Nutrition*, 1935, **10**, 25.