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Observations on Psittacosis in Mammals.

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The observations of Bedson,¹ Krumwiede,*² Armstrong,³ and their coworkers indicate that the etiological agent of psittacosis is a filter-passer and in all probability not an ordinary bacterium. Moreover, it has been shown that, in addition to parrots, certain small birds, e.g., parrakeets and love-birds, are susceptible to the disease. Furthermore, Krumwiede, McGrath, and Oldenbusch² have been able to produce the disease in mice and to pass it in series by means of intraperitoneal injections of emulsions made from a mixture of the liver and spleen of infected animals. In view of the fact that man is susceptible to psittacosis and that certain birds, with which most of the experimental work in the past has been done, have the disease spontaneously and may be carriers of the virus, it seemed desirable to determine if mammals other than the mouse are suitable for experimental purposes in this field of investigation. The object of the present communication is to report that rabbits and guinea pigs are experimentally susceptible to psittacosis† provided they are inoculated and handled in a certain manner.

We have been able to confirm Krumwiede's observations concerning the susceptibility of mice to psittacosis. For many reasons, however, that need not be discussed here, the mouse proved to be an unsatisfactory experimental host. Therefore, we decided to investigate the susceptibility of other mammals to psittacosis. Rabbits and guinea pigs were inoculated intradermally, subcutaneously, and intraperitoneally with infectious emulsions of liver and spleen obtained from parrots. The results were of uncertain significance, and it soon became obvious that, if these animals were to be used,

* The material with which we are working was obtained from Dr. Krumwiede, who supplied us with a parrot strain and a human strain of the virus.

¹ Bedson, S. P., Western, G. T., and Simpson, S. L., *Lancet*, 1930, 1, 235 and 345.

² Krumwiede, C., McGrath, M., and Oldenbusch, C., *Science*, 1930, lxxi, 262.

³ Armstrong, C., McCoy, G. W., and Branham, S. E., *Public Health Rep.*, 1930, xlv, 725.

† That we are working with the virus of psittacosis is indicated by the fact that one of the investigators (G. P. B.), having been exposed in no other way than to our experimental animals, developed a typical attack of psittacosis 5 weeks after the inception of the work.

another procedure of handling them would be necessary. In view of the success met with in the investigations of many viruses when the experimental animals are inoculated intracerebrally, 0.25 cc. of an emulsion of liver and spleen from a parrot dead of psittacosis was injected into the brain of a rabbit. The animal became sick and at the proper time was sacrificed. From its brain an emulsion was made with which other animals were inoculated intracerebrally. In this manner the disease has been passed serially through 12 rabbits. With brain emulsion from the fifth rabbit in the series 4 mice (intraperitoneally) and a parrot (intramuscularly) were inoculated, and all of them developed psittacosis. A guinea pig inoculated intracerebrally with a brain emulsion from the sixth rabbit in the series became sick and was sacrificed. An emulsion was made from the brain, and other pigs were inoculated intracerebrally. In this way the virus has been passed serially through 6 lots of guinea pigs. A parrot and 4 mice inoculated intramuscularly and intraperitoneally respectively with a brain emulsion from a pig in the fifth group of the series developed psittacosis.

The intracerebral inoculation of psittacosis virus in rabbits and guinea pigs at times induces signs of involvement of the brain, meningitis or encephalitis. As a rule, however, the chief sign of the infection in these animals is an extremely high temperature, 104-108.5°F., occurring 2-7 days after inoculation. Such an elevation of temperature is not caused by brain emulsions from normal animals. Furthermore the virus that we have been passing from animal to animal is neither Virus III nor the causal agent of spontaneous encephalitis of rabbits, inasmuch as it is infectious for guinea pigs, mice and parrots. Moreover, ordinary aerobic and anaerobic bacteria are not present in the brain emulsions shown by animal inoculation to be infectious.

The pathological changes in the brain consist mainly of a reaction in the meninges and around the cortical blood vessels. This reaction is characterized by collections of fluid and mononuclear cells. There is probably also some degeneration of nerve cells. The pathological pictures observed in the lungs, liver, spleen, heart, intestines, and kidneys are similar to those reported as occurring in human cases that have died of psittacosis.

The results of the work indicate that we have been carrying a virus in rabbits and guinea pigs and that this virus is capable of producing psittacosis in parrots or a disease so similar to psittacosis that at present no difference can be detected.