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Susceptibility of Kangaroo Rats to Strains of Human Influenza Virus.*

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The difficulty of isolating certain strains of influenza virus, especially influenza B, by ferret inoculation has led to a search for more susceptible animals. This paper will report the results of preliminary experiments with 2 species of kangaroo rat (*Dipodomys deserti deserti* and *Dipodomys merriami simiolus*) which were trapped in Southern California and Arizona. Most of the results to be reported were obtained with *Dipodomys merriami simiolus* which appeared to be slightly more susceptible than the other species.

Results with Influenza A Virus. Eight kangaroo rats were inoculated intranasally under ether anesthesia with 10% lung suspension of the 352nd mouse passage of the strain PR8. Two died in 3 and 4 days respectively with massive consolidation of the lungs, 2 survived with consolidation of a considerable part of the lungs, and 4 showed no definite macroscopic lung lesions. Kangaroo rats inoculated with material from the consolidated lungs of the first passage developed only small lung lesions. Virus was demonstrated in the normal appearing lungs of 2 animals by subinoculation of mice and neutralizing antibodies for the strain PR8 were found in the serum of recovered animals. Of 4 kangaroo rats inoculated with the 97th direct ferret passage of strain PR8 none showed definite lung lesions. Two human throat washings demonstrated to contain the virus of influenza A by inoculation of ferrets were instilled into the noses of kangaroo rats and passage of material from the lungs and turbinates was carried out at intervals of 4 to 5 days. Neither lung lesions nor neutralizing antibodies to PR8 were demonstrated in any of the animals. The results indicate that mouse passage strains of influenza A are more virulent for *Dipodomys* than are strains from ferrets or human beings.

Results with Influenza B Virus. The Lee strain which was sent to us by Dr. Thomas Francis, Jr.,¹ (52nd mouse passage) and the

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¹ Francis, T., Jr., *Science*, 1940, **92**, 405.

TABLE I.
Lung Lesions and Virus in Kangaroo Rats Inoculated Intranasally with Virus of Influenza B.

Passage No.	Results with Lee strain		Results with Montgomery strain	
	lung lesions <i>Dipodomys</i>	subinoculations of mice	lung lesions <i>Dipodomys</i>	subinoculation of mice
1	±		+ , ± , ± , 0	6,7,7,8
2	+++	++++, ++, ++, ++, +	±, 0, 0, 0	8, ++++, ++, ++, ++
3	±, 0	7, 8, 8, 8	0, 0	+, ++, +, 0
4	+	++++, ++, 0, 0	0, 0	8, ++, ++, ++, +
5	0		0, 0	+, ++, ++, 0
6	+, +	3, 3, 4, 4		

Plus signs indicate size of macroscopic lung lesions in each animal; numbers in 3rd and 5th columns day of death of mice with ++++ lung lesions.

Montgomery strain isolated in this laboratory² (22nd mouse passage) were inoculated intranasally into a number of kangaroo rats and passages of lung material were done at intervals of 4 to 5 days. The results are summarized in Table I.

The development of lung lesions, particularly with the Montgomery strain, appeared to be irregular, but the presence of the virus in the lungs of infected kangaroo rats can be regularly demonstrated by subinoculation of mice. Neutralizing antibodies to the two strains of influenza B were demonstrated in the sera of kangaroo rats receiving the 1st and 6th *Dipodomys* passages of the Lee strain and the 1st and 4th passages of Montgomery strain.

The ferret passage material of the Montgomery strain which had not been adapted to mice produced no definite lung lesions in kangaroo rats even after repeated passage, but specific neutralizing antibodies were demonstrated in the sera of *Dipodomys* receiving this material. At the time of these studies, no throat washings from human cases of influenza B were available for testing.

Microscopic examination of sections of lungs from *Dipodomys* inoculated intranasally with the viruses of influenza A and B revealed peribronchial infiltration, scant exudate containing red cells and leucocytes in the bronchioles and alveoli, and evidences of desquamation and proliferation of the columnar epithelium in the bronchi. No bacteria, or at most only a few colonies, were grown by culturing the lungs on blood agar.

Although *Dipodomys deserti deserti* and *Dipodomys merriami simiolus* are definitely susceptible to mouse passage strains of the viruses of influenza A and B, further work must be done before definite statements can be made as to the value of these animals for primary isolation of influenza or other respiratory viruses.

² Eaton, M. D., and Beek, M. D., PROC. SOC. EXP. BIOL. AND MED., 1941, **48**, 177.