duration of positive Wassermann reactions in the latter case can be considerably shortened by treatment of the animals with neoarsphenamine.

Summary. Rabbits receiving normal hamster tissues intratesticularly or intraäbdominally developed, in the course of about 3 weeks after the injection, Wassermann and Kahn antibodies. These non-syphilitic antibodies persisted in the blood stream of these animals for about 4 to 5 weeks.

Injections of neoarsphenamine given to these rabbits did not shorten or modify the duration of positive Wassermann and Kahn reactions in these animals.

8602 C

Experimental Virus Infections in Chinese Hamster. I. Susceptibility to Fixed Rabies Virus.

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The characteristics of most viruses are best demonstrable by their effects on hosts. It is therefore desirable to determine the pathogenicity of a given virus for as many species of animals as possible. It seems to us of both practical and academic interest to find out the effect of various viruses upon the Chinese hamster, a species of rodent readily obtainable. In the present communication, the susceptibility of the Chinese hamster to fixed rabies virus is recorded.

A strain of fixed rabies virus after 137 rabbit passages from a local street virus, was used. The brain virus preserved in 50% glycerin was thoroughly ground in a sterile mortar and suspended in saline solution. Normal Chinese hamsters weighing 20-30 gm. were divided into several groups and each group was separately inoculated with various dilutions of the rabbit brain virus through different routes. In intracerebral inoculation, the hamsters were anesthetized and 0.05 cc. of the ground virus suspension was injected through an opening in the skull posterior to the eye and lateral to the mid-dorsal line. In intraperitoneal, intratesticular, intramuscular and subcutaneous injections, 0.5 cc. of virus suspension was introduced each time. The latter 2 routes of injec-

tion were always made over the right thigh. Animals, after injection, were kept separately in cages and observed for over one month.

After intracerebral inoculations, the infected animals began to show general weakness and tremor of different parts of the body in 5 to 8 days. This was followed by progressive unsteadiness of gait accompanied by weakness of the hind-legs, leading in 24 hours to definite paralysis. The upper limbs were found to be involved later. At the terminal stage all limbs became paralyzed, respiratory movements feeble and the skeletal muscles flabby. Definite convulsions usually appeared spontaneously, but occurred more frequently when the animals were irritated. When the infective dose was moderate (0.05 cc. 0.1% virus suspension) the animal died in 2-3 days after appearance of weakness of the hind-legs. When the infective dose was large (0.05 cc. 10% virus suspension) animals often died within 24 hours after onset of the general weakness, and no definite paralytic symptoms could be observed. In a few animals, symptoms of excitement were especially noticeable. They manifested the first sign of disease by jumping about in the cage almost continuously until exhausted. They did not show any special desire to bite, but, when irritated, would bite another animal introduced into the same cage. A few normal animals so bitten were observed for one month without showing any symptoms. The stage of excitement usually lasted for one or 2 days, being followed by profound general weakness and death within a few hours.

After other routes of inoculation, the infected animals showed symptoms and incubation periods similar to those shown by a moderate dose of the virus intracerebrally. All of these animals showed paralysis of hind-legs and rarely died within a day after paralysis was seen. None showed marked spontaneous excitability. Regardless of the routes of inoculation animals invariably died within 3 days after the onset of paralysis. Animals showing no symptoms and surviving over a month were considered to have escaped infection.

The percentages of death and periods of survival of infected animals are given in the accompanying table. The intracerebral route was found to be the most highly effective as some hamsters could still be infected with the original virus suspension diluted to 2 million parts. The other 4 routes of inoculation were far less effective as the infection was possible only with much more concentrated suspension of the virus. Of these 4, the intramuscular

TABLE I.
Showing Comparative Infectivity of Fixed Rabies Virus Introduced Through Different Routes.

Routes of inoculation	Dilution of brain virus	No. animals inoculated	No. animals died	% death	Day of deaths	Aver. day of deaths
Intracerebral	1:2 x 10^4	19	19	100	5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7, 8, 8, 9, 9, 9, 9, 10	7.3
	1:1 x 10^5	12	12	100	7, 7, 8, 8, 8, 8, 9, 9, 9, 10, 10, 10	8.6
	1:5 x 10^5	10	8	80	7, 8, 8, 8, 8, 8, 10, 10	8.4
	1:1 x 10^6	10	5	50	8, 8, 9, 10, 10	9.0
	1:2 x 10^6	10	2	20	10, 11	10.5
Intraperitoneal	1:10	10	3	30	7, 7, 8	7.3
	1:1 x 10^2	9	1	11	10	10.
	1:1 x 10^3	11	0	0	—	—
Subcutaneous	1:10	10	5	50	8, 9, 10, 10, 10	9.4
	1:1 x 10^2	10	1	10	10	10.
	1:1 x 10^3	12	0	0	—	—
Intramuscular	1:10	10	8	80	7, 8, 8, 9, 10, 10, 10, 9	8.9
	1:1 x 10^2	10	6	60	7, 8, 8, 10, 10, 11	9.0
	1:1 x 10^3	10	4	40	8, 9, 10, 10	9.3
Intratesticular	1:50	8	4	50	7, 8, 9, 9	8.3
	1:1 x 10^2	7	0	0	—	—
	1:1 x 10^3	7	0	0	—	—

route was slightly more effective than the other 3, and the intratesticular route was the least effective. It is of interest to note that no marked variation in the period of survival in relation to different routes of injection was observed, as one would expect from general experience in larger animals; on the other hand, its relation to the dose of inoculation was suggested. For instance, the average day of death was 7.3 days for the group injected intracerebrally with 1:20,000 dilution of the original virus suspension, and was increased to 9.0 days when the virus suspension injected was diluted to a million. However, when comparable concentration of virus inoculation was taken into consideration, the results suggested a slight lengthening of the time until death when the virus was given through routes other than the intracerebral one.

While most workers[1] have not been able to demonstrate Negri bodies in animals infected with fixed rabies virus, others[2] have claimed occasional success in certain species of animals. In view of this, it seemed of interest to ascertain whether Negri bodies could be found in hamsters infected with fixed rabies virus. Brains from hamsters in the paralytic stage of the disease 6 days after inoculation with the fixed virus either intracerebrally or subcutaneously were fixed for 24 hours in 95% alcohol containing 5% acetic acid. The sections stained by Harris' hematoxylin and eosin showed in the ganglion cells of Ammon's horn the presence of Negri bodies which were especially numerous in the Purkinje cells. The Negri bodies averaged 3 x 4 μ in size, but occasionally some as large as 4 x 6 μ were found.

From the brain of infected hamsters, the virus could be recovered. Up to the present, the virus has been carried to the 10th passage, and it has shown no significant change in pathogenicity.

1 Levaditi, C., Nicolau, S., et Schoen, R., *Ann. Inst. Pasteur,* 1926, **40**, 973.

2 Palawandow, H., Serebrennya, A. I., and Pugatsch, E. M., *Z. f. Hyg. u. Infektionskr.,* 1934, **116**, 433.