loci instead of being repeated on the same spot lung tumors rather than tumors of the skin are induced. For 3 of these stocks data are already available after using this technique. The animals were killed on the 300th day, thereby giving uniformity as to age. For the skin tumor experiment also the percentages are cited for the 300th day. The Bagg (a) group had a high incidence of lung tumors ($92.8 \pm 2.1\%$) and a low percentage of skin tumors ($13.2 \pm 2.6\%$). In Strain 62 the situation was reversed. There were only $12.9 \pm 4.1\%$ lung tumor and a higher incidence of skin tumor ($51.8 \pm 4.5\%$). Strain 1194 showed about the same degree of susceptibility to tumors in the 2 organs (22.4 ± 4.0 and $21.1 \pm 2.8\%$ respectively).

Data taken at the conclusion of the experiment in which the skin tumor technique was employed while not furnishing as strict a comparison provide additional evidence. The relationships here are similar to those already found except that in the 1194s the tumor incidence of the skin is now higher ($42.1 \pm 3.4\%$) than that of the lung ($16.2 \pm 2.9\%$). Both groups of Bagg mice have high lung tumor rates (81.5 ± 3.2 and $80.0 \pm 6.0\%$ respectively), and significantly lower skin tumor rates (34.2 ± 3.7 and $4.3 \pm 2.9\%$). The members of Strain 62 did not live long enough to give information as to their lung tumor susceptibility but the hairless mice show a high incidence of both tumor types ($73.6 \pm 4.1\%$ skin tumors and $73.8 \pm 4.6\%$ lung tumors). Evidently there is no correlation between the susceptibilities to tumor in the 2 organs. If these types are inherited separately there must be separate genes to represent them in the germplasm. More than one pair of Mendelian factors must be involved, though the exact number is undetermined.

7066 C

A Serological Difference Between Eastern and Western Equine Encephalomyelitis Virus.

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From cases of equine encephalomyelitis in New Jersey and Virginia a virus has been secured which closely resembles that found

in a similar disease in the western United States by Meyer, Haring, and Howitt.[1]

Like the western virus the strains isolated from eastern cases are highly pathogenic for guinea pigs, less so for mice, and mildly virulent for rabbits. Tests on other animals and detailed studies on the routes of infection have not been made. Infection has been produced in guinea pigs by subcutaneous, intraperitoneal, and intracerebral injection; mice have been infected by these routes and also by intranasal injection. Rabbits given virus intracerebrally usually die, but if it is given intra- or subcutaneously they recover and are then immune to intracerebral injection. Their sera will neutralize the virus injected. The virulence of the eastern virus for laboratory animals appears to be greater than that of 2 western strains we have obtained from horse brains sent from Utah. It differs little in virulence from a Nevada and a South Dakota strain that have both been adapted to guinea pigs.

Strains of the western and the eastern virus have been compared serologically and a distinct difference has been found. In order to detect this difference it was necessary to test decreasing amounts of the virus (brain suspension from infected guinea pig) against undiluted serum. An example of a test is given in Table I. It will be seen that had a 10% brain suspension alone been used, neutralizing antibodies could not have been detected.

TABLE I.
Intracerebral Tests on Guinea Pigs.
Test injection: 0.1 cc. mixture of equal parts of virus and undiluted serum incubated 2 hours.

Virus		Serum		
No.	Dilution of 10% suspension	Rabbit immune to 121 Va.	Rabbit immune to 114 Va.	Normal rabbit (control)
121 Va.	Undiluted	Died in 76 hrs.	Died in 73 hrs.	Died in 74 hrs.
	10^{-2}	Lived	" " 158 "	" " 90 "
	10^{-4}	Died in 24 hrs. accident	Lived	" " 99 "
	10^{-6}	Lived	"	Lived
S. D.	Undiluted	Died in 95 hrs.	Died in 90 hrs.	Died in 65 hrs.
	10^{-2}	" " 83 "	" " 98 "	" " 67 "
	10^{-4}	" " 85 "	" " 126 "	" " 99 "
	10^{-6}	" " 112 "	" " 108 "	" " 100 "
		Rabbit immune to S.D.	Horse convalescent—East. Md.	Normal rabbit (control)
Nevada 1	Undiluted	Died in 216 hrs.	Died in 59 hrs.	Died in 85 hrs.
	10^{-2}	Lived	" " 86 "	" " 92 "
	10^{-4}	"	" " 92 "	" " 128 "
	10^{-6}	"	Lived	Lived

[1] Meyer, K. F., Haring, C. M., and Howitt, B., *Science*, 1931, **74**, 227.

After a series of tests, a dilution of 10^{-3} of a 10% brain suspension was selected as suitable for neutralization experiments. Each mixture of serum and virus was tested by intracerebral injection into 2 guinea pigs. The animals were etherized before the injection. A summary of the tests made is given in Table II.

TABLE II.
Summary of Neutralization Tests.

Immune sera		Eastern virus				Western virus			
Animals immune to virus from	No.	N.J. 109	Va. 114	Va. 119	Va. 121	Utah 3	Utah 4	Nev. 1	S.D.
Eastern United States	Rabbit 114 Va.	P	P	P	P	P-	No P	No P	No P
	Rabbit 121 Va.	P	?	P	P	P-	No P	No P	No P
	Horse 129 Va.	P	P	P	P	—	No P	No P	No P
	Horse 134 Va.	P	?	P	P	—	—	—	No P
	Horse 136 Va.	P	P	P	P	—	P	No P	No P
	Horse Md.	P	P	P	P	No P	—	No P	No P
Western United States	Rabbit Utah 3	No P	—	No P	No P	P	P	P	P
	Rabbit Nev. 1	No P	—	—	No P	P	P	—	—
	Rabbit S. D.	No P	No P	No P	No P	P	P	P	P
	Horse Nev.	No P	—	No P	No P	P	P	P	P
	Commercial antiserum Horse	No P	—	No P	No P	P	P	?	P-

P = Protection.
No P = No Protection.
P- = One of 2 guinea pigs survived.
? = Life prolonged but guinea pigs died.
— = No test made.

It is apparent that the western strains are serologically identical and that the eastern strains differ from them but not from each other. The fact that the difference between them is not merely one of virulence is shown by the failure to neutralize in both directions. Since the Nevada and South Dakota strains do not differ from the 2 freshly obtained Utah strains there is no reason to believe that their serological character has been modified by adaptation to guinea pigs.

The sera from the 4 eastern horses in the table were obtained from animals that had recovered from the disease. It will be noted that these sera neutralize all strains of the eastern virus. These results differ from those of Meyer, Haring, and Howitt,[1] who did not find neutralizing antibodies in the sera of recovered animals.

No explanation is offered at this time for the serological difference between the strains of virus from the 2 parts of the country. The clinical disease appears to be similar in both regions except that in the east its course is more rapid. The importance at present of the difference between the 2 strains lies in its bearing upon the preparation of immunizing agents or therapeutic sera.

7067 P

Swelling of Gelatin in a Series of Human Blood Sera.

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During the past thirty-five years, there has been considerable speculation as to the rôle played in pathology by abnormal increases and decreases in the state of swelling or water holding power of tissues.[1]

The resultant swelling tendency exerted upon tissue by plasma, or the lymph derived therefrom, is necessarily a function of the concentrations of a number of the plasma constituents. The writers believed that it would be desirable to have some single test available for this resultant tendency, and that such a test might be afforded by observation of the effect of plasma or serum upon some standard swelling material such as gelatin.

Small squares of Eastman Kodak Company's "ash-free" gelatin, weighing about .05 gm., were placed in Ringer-Tyrode solution (glucose omitted) and allowed to swell for 40 hours at about 10° C. The solution contained sodium bicarbonate, and was kept in contact with alveolar air. The pH was maintained within the range pH 7.2-pH 7.6. The percentage swelling of the squares was determined from a comparison of their swollen and original dry weights. It was of the order of 11 times in all cases, and, in any one series, the maximum difference between values was about 2 parts per hundred.

Blocks of gelatin were thus provided in a standard state of swelling. It was hoped that this state would be such that the blocks would swell further in some sera and shrink in others. This proved to be the case.

[1] Ludlum, S. DeW., Taft, A. E., and Nugent, R. L., *Arch. Neurol. Psychiat.*, 1930, **23**, 1121.