In an attempt to ascertain whether this reaction was induced by virus, or the nerve tissue necessarily mixed with virus, the convalescent monkey, first group, was injected intrasplenically with a heavy suspension of normal monkey brain and cord tissue. There was no reaction at the end of 5 days so the animal was re-injected in the same fashion with virus and death was immediate. One additional monkey which had been injected with virus intrasplenically without showing detectable virucidal antibodies at any subsequent date was also injected intrasplenically with normal monkey brain and again without untoward effect.

From these experiments it would appear that this peculiar reaction is due to the interaction of the virus antigen and antibody. One other possibility exists, namely, a sensitization of the monkey to some particular protein degradation product produced in nerve tissue by virus action. Hindle[1] has described a comparable reaction in monkeys immunized to yellow fever virus and reinjected after 3 to 4 months.

If this reaction be due to virus it may provide a means of determining whether more than one strain exists in this country and abroad. When virus has been sufficiently purified certain of these reactions will be reexamined.

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Active Immunity to Endemic Typhus Fever as Produced by Formolized Infected Tissue.

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Formolized tissue *(Tunica vaginalis)* prepared according to Zinsser's method[1] and administered intraperitoneally in 4 weekly doses of 1 cc. each to non-infected guinea pigs brought about in test animals an immunity to at least 200 times enough virus to cause a scrotal reaction in 4 days. One cc. of a 1-10 saline emulsion of tissue taken at the height of reaction contained at least 200 times enough virus to cause a typical typhus reaction in the male guinea pig after 4 days.

[1] Hindle, E., *Med. Res. Council*, 1930, **7**, 460.

[1] Zinsser, H., and Batchelder, A. P., *J. Exp. Med.*, 1930, **51**, 847.

Animals similarly tested one week after 1, 2, or 3 1 cc. doses of "vaccine" all reacted positively to the test dose. Furthermore, protection was not found to be complete in animals that had received 1 or three 1 cc. doses of "vaccine" plus 4 weeks' rest when these animals were given the test dose. Only animals receiving 3 doses of vaccine followed by 4 weeks' rest were found to have any resistance at all to the test dose, and while these animals developed no definite scrotal reactions, all of them had temperature courses typical for endemic typhus fever in the guinea pig.

To determine the duration of their resistance, 6 animals previously immunized were tested at various intervals by inoculating them intraperitoneally with 1 cc. Two of these test animals were immune to the above dose 2 months after completion of the four 1 cc. dose "vaccination", and 2 others were immune to the test dose 3 months after the same "vaccination". When tested at 4 months one of the remaining 2 animals developed a slight scrotal swelling 4 days after receiving the test dose. This swelling persisted for 3 days and was accompanied by daily temperatures of 103.2°F. to 105.0°F. The sixth animal had no scrotal swelling, but on the fifth, sixth and seventh days following the test dose its temperature was 104.2°F., 105.2°F., and 104.2°F. In the course of these and other studies in endemic typhus it was found that 68 animals which had recovered from the infection produced by transfers of the virus remained immune to the test dose for periods varying from one month to one year.

In "vaccinating" the animals all had rather marked temperature reactions during the 2 days following inoculations. The reaction was never less than an increase of 1½°, and in many instances temperatures of 104.4°F. were noted. Zinsser[2] has reported similar reactions.

Formolized tissue kept for 4 weeks at 9°C. did not protect guinea pigs against the test dose described above when administered in either 1, 2, or 3 cc. doses given 4 times at intervals of one week. Nine animals so treated, (3 in each group) were tested 2 weeks after completion of "vaccination" as in the foregoing experiments. All of these animals developed scrotal swelling and typical temperature reactions following the intraperitoneal injection of 1 cc. of a 1-10 saline emulsion of infected tunica.

The virus after preservation in glycerin and storage for 7 days at 9°C., given in 4 cc. doses of equal parts of 1-10 saline emulsion of infected tunica and glycerin failed to produce a scrotal reaction.

[2] Zinsser, H., and Castenada, M. Ruiz, *J. Exp. Med.*, 1931, **53**, 493.

This amount of virus would be, roughly speaking, 400 times enough to cause a scrotal reaction in 4 days, or twice the test dose used in the above experiments.

Tests were made using both the glycerin and saline mixture and the tissue washed free of glycerin and taken up again in saline. In both instances test animals showed only a slight rise in temperature which occurred 4 days after inoculation and lasted only 2 days before returning to normal. In six animals so tested no temperatures higher than 103.6°F. were observed. Transfers of heart's blood, *Tunica vaginalis,* spleen and brain failed to re-establish the virus after 2 passages. Glycerolated virus preserved for 2 weeks produced no reaction at all when given under similar conditions.

It would appear that the immunity produced by inoculations of formolized tissue is not lasting, and that its production is accompanied by marked reaction to the relatively large quantities of "vaccine" substance employed. The "vaccine" retains its potency only for a short time.

The question of the nature of the "vaccine" (as to whether the virus is formol killed or formol attenuated) remains unsolved. It would seem, however, that the virus in formolized tissue would be dead since infected tissues preserved in glycerin and stored for 2 weeks at 9° C. produced no reaction at all.

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Serum Sickness in Offspring of Serum Injected Rabbits.

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In the rabbit, manifestations of serum sickness are apparent upon the ears 3 to 7 days after a primary injection of serum, and consist of a characteristic erythema with or without an edema. In some animals that have previously received serum there is noted upon a second injection of the serum, similar manifestation of serum disease occurring however, within a few hours to 3 days post-injection; these reactions are probably analogous to the immediate and accelerated types of serum sickness occurring in man incident to a second injection of serum.[1]

[1] Fleisher, M. S., and Jones, L., *J. Exp. Med.*, 1931, **54**, 597.