

Chart B shows a condition—occurring twice in one series—in which the intracranial pressure increased rapidly upon applying hyperpyrexia, and ended in an epileptic convulsion.

Conclusions. Hyperpyrexia produced by baths raises the intracranial pressure in epileptics, and perhaps in normal individuals. The hyperpyrexia frequently results in an epileptic seizure, occurring as the intracranial pressure rapidly rises. The seizure may be related to this rapidly increased intracranial pressure. Normal individuals never develop convulsions when subjected to such hyperpyrexia.

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Survival of Bacteriophage.

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The interval of time over which bacteriophage filtrates maintain their activity is of general biologic interest. Enzymes demonstrate their activities after many months. Immune substances retain their activities for at least more than 4 years. Ultramicroscopic viruses retain their activity under certain circumstances for several years. Ballantyne¹ has shown the survival of bacteria in water for at least 32 months. Anaerobic organisms have been recovered from old cultures after more than 14 years. The plague bacillus has remained viable for 10 years. Cultures of *Leptospira icteroides* and *L. icterohemorrhagiae* may show motility after 2 years and 4 months (Hadley, P.). Pure cultures of molds have yielded active spores after longer periods. The bacteriophage has been demonstrated to retain its activity for more than 5 years.

The present brief note is based on tests of a bacteriophage filtrate originally recovered by d'Herelle. It was sent to Dr. F. G. Novy in 1921, and was rejuvenated by Dr. Philip Hadley against the Shiga dysentery bacillus for which it was said to be specific. The properties were specifically studied² during the fall and winter of 1922-23, during which time several filtrates were sealed in tubes and stored in the dark at room temperature. The menstruum was a beef infusion broth, presumably pH 7.2 ± 0.2 , used for all of the work

¹ Ballantyne, E. N., *J. Bact.*, 1930, **19**, 303.

² Marshall, M. S., *J. Infect. Dis.*, 1925, **37**, 126.

performed. Tubes were sealed in a flame (glass seal), allowing about 4 cc. of air space for 10 cc. of filtrate. They have thus been held until the present time, now 8 years. The filtrate used was water clear, although very light granular precipitate appears in several of the ampoules not opened.

Recent tests indicate a weakened, but readily revived activity, which is apparently identical with the original filtrate. One loop of the original filtrate failed to inhibit 14 dysentery strains. A second test, using 2 drops, checked the growth of one Flexner strain. A filtrate of this tube partially inhibited 13 of the 14 strains at hand, using 1 drop. The failure was a Shiga type. A pooled filtrate from the above 13 tubes was decidedly active against a representative Flexner, Hiss-Russell Y, and a Shiga type. A series of dilutions for titration by inhibition showed complete lysis in a dilution of 1:100,000, and partial but marked lysis in a dilution of 1:10,000,000. Higher dilutions presented normal growth. Plates made by a technic identical with that used 8 years ago not only showed a count of lysed areas still consistent with the inhibition-titration method with this bacteriophage, but the areas were similar in type. All areas ranged in diameter between 0.2 and 0.1 mm. and were visible with a hand lens. The lysed areas of the original material at the time were only slightly larger, and comparison with a photograph indicated that it was virtually impossible to distinguish between this and present plates. Although the smallest areas were not easy to locate, they were distinct, and microscopic examination failed to reveal areas not visible with an ordinary 3.5x hand lens. With a less complete check of the maintenance of specific properties, direct lysis from sealed tubes of this bacteriophage was last previously demonstrated after nearly 7 years.

The bacteriophage may, then, survive for at least 8 years, without materially changing its chief characteristics. There is no direct estimate of degree of degeneration, but it would seem probable that the curve of degeneration is at present reasonably flat, and that survival for some years further may be expected. The meaning of such survival, relative to the nature and characteristics of the bacteriophage, enters a speculative field which is enticing, but which has no place here.