taken at appropriate intervals. Table I would appear to indicate that injected inorganic phosphate approximately measures glomerular filtration under these conditions.

Summary. Injected inorganic phosphate is not secreted by the aglomerular kidney but the urine of the aglomerular fish may contain large amounts of inorganic phosphate. This suggests that the inorganic phosphate in the urine of these fish is formed in the kidney from some precursor. From the above results it would appear that injected inorganic phosphate should be excreted only by glomerular filtration in the glomerular kidney. In support of this hypothesis it has been found that the clearances of inorganic phosphate and xylose agree fairly closely in frogs.

6987 P

Further Observations on Specific Inhibition of Bacteriophage Action.

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Recently we described[1] specific inhibition of bacteriophage by bacterial extracts *(B. dysenteriae Shiga* and *B. paratyphosus B)*. To test further the specificity of the inhibition, experiments were made with phages and extracts of organisms within the salmonella group, namely, *B. paratyphosus B* and *B. suipestifer*. Both phages were derived from chicken stool filtrates and were specific in their reactions on the 2 cultures.

The extracts were dissolved in saline with the aid of weak alkali and heat, neutralized, diluted with saline to make a 1-200 solution, and passed through Seitz filters. Suitable dilutions of the 2 phages in beef extract broth were prepared and mixed with equal quantities of the filtered bacillary extracts. Two tests were made with these mixtures; one after incubation overnight at 37°* and another following an additional interval of 12 hours at the same temperature. One-half cc. was removed from each one of the tubes, diluted with 4.5 cc. of beef extract broth and the homologous test organism was added.

[1] Levine, P., and Frisch, A. W., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 993.

* In other experiments it was demonstrated that the union of bacteriophage and bacterial extract progresses more rapidly at 37° than at icebox temperature.

The course of lysis in both tests showed that the action of anti-*B. suipestifer* phage was inhibited by its homologous extract, but only slightly by an extract of *B. paratyphosus B.;* on the other hand, the extract of *B. suipestifer* but weakly influenced the action of anti *B. paratyphosus B.* phage which was inhibited to a considerable degree by the *B. paratyphosus B.* extract. The effects were pronounced in both tests but the results were somewhat better in the mixtures incubated for the longer period.

Furthermore, the course of lysis of the anti-*B. suipestifer* phage was normal when placed in contact with extracts of *B. stanley, B. aertryck,* and *B. dysenteriae* (Shiga).

Other experiments were made to determine the relationship between phage titre and inhibition by extracts of various organisms acted on by a related phage. For this purpose, anti-*B. paratyphosus B.* phage was employed together with extracts of several smooth *phosus B., B. aertryck, B. stanley, B. tidy,* and also a smooth resistant strain of *B. paratyphosus B.* derived from the overgrowth following phage action on this culture. This organism, still resistant to phage 10 months after its isolation although transplanted numerous times, could not be differentiated serologically, morphologically, or biochemically from its parent culture.[3, 4] Crude saline extracts of these strains were prepared and tested for their capacity to inhibit the action of anti-*B. paratyphosus B.* phage. The tests demonstrated that all these extracts specifically retarded the action of the phage, but to a variable degree. The most intense inhibition was exhibited by an extract of *B. stanley* and the poorest by that of *B. aertryck.* Apparently the order of activity of the extracts does not run parallel to the titre of the phage on the living bacillus since the Stanley strain was acted on least (10^{-1}) but its extract gave the most intense inhibition. Further support for this contention was found in the behavior of the resistant strain, an extract of which gave an inhibition more distinct than that of *B. aertryck* although the latter organism was lysed to a titre of 10^{-5}.

The failure to establish a relationship between phage inhibition by extracts and the phage titre against the living bacillus, suggested other ideas, namely, the phage absorbing capacity of the whole bacillus, either living or dead, the precipitin titre of the bacillary

[2] White, P. B., Great Britain Med. Res. Council, Special Rep. Series, No. 103. 1926; *System of Bact.,* 1929, **4**, 115.

[3] Burnet, F. M., *J. Path. and Bact.,* 1929, **32**, 349.

[4] Bronfenbrenner, J., Muckenfuss, R. S., and Korb, C., *J. Exp. Med.,* 1926, **44**, 607.

extracts, or both. Investigations along these lines are in progress; it may be stated in a preliminary way, however, that, on the whole, there was a rough parallelism with the precipitin titre; secondly, in our hands, the heat-killed resistant *B. paratyphosus B.* organism specifically absorbed the anti-*B. paratyphosus B.* phage.[5, 6, 7]

To gather more information on the specificity of the reaction, the bacillary preparations employed in the experiment mentioned above and also that of *B. dysenteriae* (Shiga) were tested against anti-*B. dysenteriae* (Shiga) phage and inhibition was obtained only in the case of the homologous substance.

The specific behavior of extracts of *B. suipestifer* and the *B. paratyphosus B.* group of organisms toward their homologous phages indicates that the method may lend itself to a classification of the Salmonella group of organisms in terms of bacteriophage action perhaps in a manner similar to the serum reactions with the whole bacillus or extracts thereof.[8] Should other instances be found where extracts of resistant organisms specifically inhibit the phage derived against the parent strain, this technique and perhaps also absorption by dead bacilli would offer the advantage of revealing relationships to be expected from a serological point of view, but not demonstrable by direct phage action.

The demonstration of phage inhibition by solutions of bacillary extracts supplies a reaction for chemical studies on bacillary antigens in terms of bacteriophage.

6988 P

Attempts to Transmit Poliomyelitis to Mice, Rats, Guinea Pigs and Rabbits.*

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The successful transmission of poliomyelitis to the commoner and cheaper laboratory animals would be of inestimable assistance

[5] Applemans, R., *Comp. rend. soc. biol.*, 1922, **86**, 508.

[6] Gohs, W., and Jacobson, I., *Z. f. Immunitats.*, 1927, **49**, 412.

[7] Flu, P. C., *Centr. f. Bakt.*, I Orig., 1923, **90**, 374.

[8] Furth, J., and Landsteiner, K., *J. Exp. Med.*, 1929, **49**, 727.

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