thrombokinase, it was deemed desirable to perform some experiments regarding the effect of heparin on snake poisons. A very potent preparation of heparin made in these laboratories was employed; and the toxicity of snake venoms with and without heparin was tested both on seedlings of *Lupinus albus* and on mice. The experiments were made with venoms of *Crotalus atrox* and of *Naja*. Neither the phytopharmacological nor zoopharmacological experiments revealed any difference in the toxicity of the venoms produced by their combination with heparin.

Summary. 1. Ultraviolet radiations from a mercury vapor quartz lamp produce rapid deterioration of the potency of snake venoms, as indicated by both zoopharmacological and phytopharmacological tests. 2. Methylthionine chloride, or methylene blue, does not affect the toxicity of snake venoms for either living animals or plants. 3. Heparin injections produce no change in the toxicity of snake venom, as tested on living animals or plants.

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Specific Inhibition of Bacteriophage by Bacterial Extracts.

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There is as yet no final explanation for the specificity involved in bacteriophage action. Burnet[1] claims on the basis of experiments made with the Salmonella group of organisms that the action, in a general way, parallels the serologic definition of the heat stable factors. However, he recognized that several observations made by himself and others are not compatible with this point of view. One of these is the failure to demonstrate inhibition of phage action by means of extracts of bacteria containing specific carbohydrate material.*

In our experiments positive results were obtained using saline extracts prepared according to the method of Furth and Landsteiner,[3]

[1] Burnet, F. M., *J. Path. and Bact.*, 1930, **33**, 647.

* See also Prausnitz and Firle.[2]

[2] Prausnitz, C., and Firle, E., *Centr. f. Bact.*, 1924, **93**, 148.

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

except that no alkali was employed. The 2 phages employed, anti-dysenteriae Shiga and anti-B. paratyphosus B were derived from chicken stool filtrates. They were specific in their reactions when tested against these 2 organisms; the anti-B. paratyphosus B phage, however, acted also on *B. aertrycke*.

The tests were made by mixing serial dilutions of phage in a volume of 0.5 cc. with 0.5 cc. of a 1% solution of the extracts previously run through a Berkefeld filter and incubating the mixture overnight at 37° and 24 hours in the ice-chest. To each of the tubes were added 4 cc. of broth and a few drops of a young suspension of the homologous or test organism. Readings were made on the basis of the amount of growth. The signs ftr, tr, ±, +, +±, indicate increasing degrees of turbidity; the letters cl. indicate complete clearing.

TABLE I.

Tests with B. dysenteriae Shiga.

Dilutions of Anti-Shiga Phage	10^{-3}	10^{-5}	10^{-7}	10^{-9}	10^{-11}	10^{-13}	10^{-15}
Incubated with Shiga extract	+	+	+	+	+±	+±	+±
	tr	+	+±	+±	+±	+±	+±
	cl	cl	+±	+±	+±	+±	+±
	cl	cl	cl	+±	+±	+±	+±
Aertryeke extract	ftr	tr	±	+	+±	+±	+±
	cl	cl	tr	ftr	+	+±	+±
	cl	cl	cl	cl	+	+±	+±
	cl	cl	tr	cl	tr	tr	+
Saline	cl	tr	±	+	+	+	+
	cl	cl	cl	ftr	+	+±	+±
	cl	cl	cl	cl	cl	+±	+±
	cl	cl	cl	cl	cl	cl	+±

1st reading made after 5 hours at 37°.
2nd reading made after 2 additional hours at 37° and 5 hours at room temperature.
3rd reading made after standing overnight at room temperature.
4th reading made after an additional 24 hours at room temperature.

It is seen from Table I that the action of the phage against *B. dysenteriae* Shiga was inhibited by saline extracts of the homologous organism but only to a slight degree by a similar product derived from *B. aertrycke*. Thus in the tubes containing the greater concentration of Shiga phage its action in the homologous mixture is delayed while in the latter tubes of the series the fixation of the phage was complete. The specific inhibition in the case of the Shiga phage was evident even after the tests stood for 4 days at room temperature.

To demonstrate further the specificity of the reaction, tests were made with the phage against *B. paratyphosus B* and extracts of *B. aertrycke* which shares with the former organism the same heat stable factors. This combination was employed because a sufficiently potent anti-aertrycke phage was not available, and because the anti-*B. paratyphosus* B phage, as previously mentioned, was lytic for *B. aertrycke*. In these tests made with *B. paratyphosus* B (Table

TABLE II.
Test with B. paratyphosus B.

Dilution of Anti-*B. paratyphosus* Phage	10^{-5}	10^{-7}	10^{-9}	10^{-11}	10^{-13}	10^{-15}	10^{-17}	10^{-19}
Incubated with Shiga extract	cl	tr	+	+±	+±	+±	+±	+±
	cl	cl	cl	tr	±	+	+±	+±
	cl	cl	cl	cl	cl	±	+±	+±
	cl	cl	cl	cl	ftr	tr	+±	+±
Aertrycke extract	±	+	+±	+±	+±	+±	+±	+±
	±	+	+±	+±	+±	+±	+±	+±
	±	±	±	+	+±	+±	+±	+
	+	±	±	±	+	+±	+±	tr†
Saline	cl	cl	±	+	+±	+±	+±	+±
	cl	cl	cl	cl	tr	+±	+	+±
	cl	cl	cl	tr	tr	+±	tr	+±
	cl	tr	cl	cl	cl	tr	cl	+±

1st reading made after 4 hours at 37°
2nd reading made after 3 additional hours at room temperature.
3rd reading made after 1 additional hour at room temperature.
4th reading made after 4 additional hours at room temperature.

† This discrepancy may perhaps be due to some irregularity in the titration. In these experiments, however, care was taken to avoid inaccurate transfer of active agent in the titrations, by washing out the pipettes or changing them after a number of dilutions.

II) the action of the phage was inhibited by an extract of *B. aertrycke* but hardly at all by that of *B. dysenteriae* Shiga.

While the phage active against *B. paratyphosus* B had approximately the same titer as the anti-Shiga phage, rapid overgrowth occurred so that the specific effect was seen only during the 12 hours after the addition of the bacteria. Although in the readings made 24 hours later, the tubes showed equal degrees of turbidity, the specific inhibition could still be verified in some of the mixtures by the observation that in those tubes containing the heterologous extract or saline (for instance, Table II, dilution 10^{-13}) the turbidity was apparently due to organisms resistant to the phage; in the tube containing homologous extract, however, the bacteria, never having been lysed, remained sensitive to fresh addition of the lytic agent.

The inhibition of the *B. paratyphosus* phage by extracts of *B. aertrycke* was evident also when *B. aertrycke* was used as a test organism.

The effect described was observed in numerous tests but the degree of inhibition was somewhat variable. Experiments are under way to determine the optimal conditions required for the reaction. In any event it is essential to observe the course of the reaction over a number of hours. This is so especially in the case of the tests with the anti-*B. paratyphosus* B phage.

It remains to be established why Prausnitz and Burnet failed in their experiment to obtain inhibition of the phage by means of bacterial extracts. Two factors that may possibly serve as an explanation are their use of anti-formin extracts or too short a period of contact of phage and extract.

Particular significance is attached to the inhibition of the anti-*B. paratyphosus* B phage by extracts of *B. aertrycke* since the 2 organisms have the same heat stable components. Experiments along this line seem to offer a general method for the investigation of the specific behavior of the bacteriophage.

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Clinical Manifestations of Variations in Blood Magnesium—Hypomagnesaemia and Hypermagnesaemia.*

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Serles and one of us reported[1, 2] that, contrary to the usual conceptions, a large part of the magnesium ingested orally as magnesium sulphate is absorbed from the intestine and in normal animals and normal human beings about 40% of the ingested magnesium passes out in the urine in 24 hours, without causing any significant rise in plasma magnesium. The determinations of magnesium were facilitated by the introduction of a modification of Kolthoff's colorimetric method[3] for determining the magnesium in the oxalated Ca-free

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1 Hirschfelder, A. D., and Serles, E. R., *J. Clin. Invest.*, 1932, **11**, 841.

2 Hirschfelder, A. D., and Serles, E. R., *J. Pharmacol. and Exp. Therap.*, 1932, **45**, 264.

3 Kolthoff, I. M., *Biochem. Z.*, 1927, **185**, 344.