

examination of the exudate yielded only *Staphylococcus aureus*. The opening on the dorsal aspect had healed and the volar opening was in very satisfactory condition.

A man of 40 was admitted with osteomyelitis of left tibia of 36 years' duration. The sinus was widely excised and an Orr dressing applied. Pus taken at this time showed predominating hemolytic *Staphylococcus aureus* and a few diphtheroids. The pus also yielded a bacteriophage active against a stock strain of staphylococcus and, after exaltation, lytic for the wound strain. At subsequent dressings the diphtheroids predominated and only a few colonies of staphylococcus were obtained. The bacteriophage could no longer be detected. Satisfactory healing was obtained after approximately 4 months.

These preliminary observations have convinced us that neither the bacteriologist nor the surgeon should ignore the significance of bacteriophage in infected wounds, particularly those involving bone.

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### The Electric Charge of Mosaic Virus Particles.

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Recently a number of ultramicroscopic viruses of man and animals, and bacteriophage have been found, in general, to migrate to the anode under ordinary conditions of hydrogen ion concentration.

In the controlled experiments to be reported, a study was made of a typical virus of plants, namely that of mosaic disease in the tomato with the object of noting (a) the possible migration of a plant virus in an electrical field, (b) the direction of migration, and (c) any difference of behavior of unfiltered and filtered suspensions for a considerable amount of protein particles are removed from the latter.

The method of cataphoresis employed has already been described.<sup>1</sup> Tests were made at 4 m. a., 118-119 volts P.D., over a period of 3 hours. Suspensions of ground mosaic-infected leaves were prepared in G.P.A.,<sup>2</sup> or in phosphate buffer solutions at pH=5.3 to 8.5, with

<sup>1</sup> Olitsky, P. K., and Long, P. H., *J. Exp. Med.*, 1929, i, 263.

<sup>2</sup> Northrop, J. H., and de Kruif, P. H., *J. Gen. Physiol.*, 1922, iv, 639.

final dilutions of 1:300 to 500. Filtrates were obtained by single filtration through Berkefeld "N" candles. The anodic and cathodic materials were inoculated respectively into each of 5 to 10 normal tomato plants. The results are tabulated as follows:

TABLE I.

A. Unfiltered Material										
pH	5.3		7.5		8.2					
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Pole Mosaic (+) or Unaffected (-)	5+	0+	5+	0+	5+	0+	5+	0+	5+	0+
Average incubation period (days)	13.4		12.6		11.4					

  

B. Filtered Material										
pH	5.3		7.0		7.5		8.2		8.5	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Pole Mosaic (+) or Unaffected (-)	6+	0+	4+	0+	1+	0+	2+	0+	3+	0+
Average incubation period (days)	13.5		10.5		12		14.5		16	

It would appear, therefore, that mosaic virus or particles containing the virus migrate to the anode in an electrical field, at pH readings of 5.3 to 8.5. Thus this plant virus agrees in this respect with most viruses of mammalian origin and with bacteriophage. Filtration does not interfere with this property; the qualitative results are as clear cut as with unfiltered suspensions; the quantitative differences are probably due to the well-known factor of diminution of infective power after filtration of the mosaic virus. In a control test of filtrate inoculations, only 3 of 10 plants showed mosaic disease after about 11 days. It was also noted that a greenish clouding, resulting from protein and chlorophyll deposits, occurred only at the anode in both filtered and unfiltered suspensions, at hydrogen ion concentrations of from 7 to 8.5.