TECHNICAL PAPERS

The Amino Acid Content of Bacteriophage

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Methods of partition chromatography (*1*) require such small quantities of material that they provide a way to investigate the amino acid content of purified viruses which are available only in minute amounts. One of the most convenient virus systems to be studied in this way consists of bacteriophages and their host organisms.

TABLE 1

AMINO ACID CONTENTS OF *E. coli* AND T (4) BACTERIOPHAGE

Amino acid	Percentage*	
	In *E. coli*	In T(4)
Aspartic acid	9.57	11.97
Glutamic acid	9.59	11.97
Serine	4.88	4.77
Glycine	7.94	7.34
Threonine	5.31	7.00
Alanine	8.40	9.40
Valine	5.00	6.51
Methionine	2.92	< 1.3
Phenyl alanine	4.80	4.16
Isoleucine	4.63	3.90
Leucine	8.68	6.51
Tryptophane	1.29	....
Proline	3.02	5.00
Tyrosine	4.33	3.74
Arginine	8.21	6.51
Lysine	8.26	8.46
Histidine	3.26	< 2.6

* Expressed as percentage of total amino acids found on paper.

With this in mind, we have been analyzing *E. coli* and several of its bacteriophages. Results of chromatographic analysis of the organisms are being published elsewhere (*2*). Preliminary results of a corresponding analysis of the T(4) strain of its bacteriophage are reported here.

The quantitative methods of filter paper chromatography employed (*2, 3*) have been the same as those described in connection with the analysis of *E. coli*. The preparation of bacteriophage was one that had been purified by ultracentrifugation. It was hydrolyzed in the same way as the bacteria and otherwise handled in the same fashion; the amino acid content determined for it is listed in Table 1, along with the results on *E. coli* calculated in terms of the per cents of each amino acid referred to the total amount of amino acid found on the chromatogram. Evidently the same amino acids are present in both the bacterial and the bacteriophage suspensions. There are some differences in the relative amounts of these amino acids in the two preparations, but, for the reasons stated below, these differences cannot yet be considered as significant.

The greatest uncertainty in this work lies not in the results of the analytical procedures but rather in the difficulties in getting sufficiently pure bacteriophage suspensions. Electron micrographic observation indicated that the suspension of bacteriophage consisted predominately of the well-known sperm-like particles of this virus; but, though this demonstrates that the preparation had been largely purified by the ultracentrifugation to which it had been subjected, it is not an adequate proof of chemical purity. The final proof of purity must be consistency of analytical results with repeated purification. Considerable progress is still being made in the development of methods that can yield relatively large amounts of increasingly pure coli bacteriophages. Analytical work is being carried out on several phages purified by these methods. Its results will subsequently be described in detail.

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The Combined Effect of Potassium Iodide and Streptomycin on Established Tuberculosis in Guinea Pigs

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It is a well-known clinical observation that iodides cause tubercle bacilli previously absent to appear in the sputum of patients with pulmonary tuberculosis. Jobling and Petersen (*2*) reported in 1914 that iodine will combine with the unsaturated fatty acids obtained from tubercle bacilli and will neutralize their ferment-inhibiting properties. Subsequent to this neutralization, ferment action ensues within areas of caseation with liberation of the bacilli and their appearance in the sputum. They also stated that iodine might serve another purpose by facilitating solution and absorption of the caseous matter, thus exposing the bacilli, which otherwise might be inaccessible to the influence of an effective therapeutic agent. In the light of this very significant work and in view of the