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Phenylalanine Content of Hen's Egg Albumin.

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The convincing evidence offered by Womack and Rose[1] that phenylalanine is essential in nutrition makes it desirable to know the phenylalanine content of the common food proteins. Moreover, a knowledge of the amino acid composition of purified proteins (or even of one purified protein) would be of immense value in formulating an adequate theory of protein structure. The last reported analysis of egg albumin for phenylalanine that the present authors have found was that of Osborne, Jones, and Leavenworth.[2] These authors, using the Fischer esterification method,[3] obtained 5.07 g of phenylalanine from 100 g of egg albumin. Previous workers had reported 2.5% (Fischer[4]), 4.4% (Abderhalden and Pregl[5]), and 5.2% (Hongounenq and Morel[6]).

Egg albumin was isolated by the method of Cole.[7] After 2 recrystallizations it was dialyzed in the apparatus described elsewhere.[8] The protein was air-dried and kept in a desiccator over phosphorus pentoxide. Its nitrogen content was 15.13% (see Calvery[9] and Arnow[10]); a solution of it in distilled water had a pH of 4.75; and 98% of it in solution could be coagulated by heat.

Phenylalanine was determined by a modification of the Kapeller-Adler[11] procedure. The results are summarized in Table I.

If egg albumin is assumed to have a molecular weight of 40,500 (Svedberg[12]), the data obtained suggest that one molecule of egg

1 Womack, M., and Rose, W. C., *J. Biol. Chem.*, 1934, **107**, 449.

2 Osborne, T. B., Jones, P. B., and Leavenworth, C. S., *Am. J. Physiol.*, 1909, **24**, 252.

3 Fischer, E., *Z. physiol. Chem.*, 1901, **33**, 151.

4 Fischer, E., *Z. physiol. Chem.*, 1901, **33**, 412.

5 Abderhalden, E., and Pregl, F., *Z. physiol. Chem.*, 1905, **46**, 24.

6 Quoted by Osborne, Jones and Leavenworth.

7 Cole, A. G., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 1162.

8 Bernhart, F. W., Arnow, L. E., and Bratton, A. C., *Ind. Eng. Chem. Anal. Ed.*, 1937, **9**, 387.

9 Calvery, H. O., *J. Biol. Chem.*, 1932, **94**, 613.

10 Arnow, L. E., *J. Biol. Chem.*, 1935, **110**, 43.

11 Kapeller-Adler, R., *Biochem. Z.*, 1932, **252**, 185.

12 Svedberg, T., *Ind. Eng. Chem. Anal. Ed.*, 1938, **10**, 113.

TABLE I.
Experimental Values for the Phenylalanine Content of Egg Albumin.

Quantity of egg albumin analyzed, mg	G of phenylalanine from 100 g of egg albumin, g	G of phenylalanine residue per 100 g of unhydrolyzed egg albumin, g
87.3	5.20	4.63
87.3	5.33	4.75
87.3	5.33	4.75
84.3	5.29	4.71
72.5	5.53	4.93
72.0	5.35	4.77
64.6	5.31	4.73
54.0	5.33	4.75
52.7	5.16	4.60
48.4	5.31	4.73
36.0	5.33	4.75
	Avg 5.32	4.73

albumin contains 13 phenylalanine residues. On the other hand, adoption of the theory of Bergmann[13] would make it appear probable that one molecule of protein contains 12 phenylalanine residues; and the calculated molecular weight of egg albumin would be 37,300.

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Osmotic Relationships Between Blood Plasma and Intestinal Fluid During Absorption.

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It has been noted by Katzenellenbogen,[1] Goldschmidt, and Dayton[2] and others[3, 4, 5] that univalent ion salts may be absorbed from the intestine against concentration gradients. This paper is concerned with a study of the changes in vapor pressure or osmotic activity accompanying such absorption from the intestine of the dog.

Methods. Vapor pressure determinations were made with the

13 Bergmann, M., *Chem. Rev.*, 1938, **22**, 423.

1 Katzenellenbogen, M., *Pflüger's Arch.*, 1906, **114**, 522.

2 Goldschmidt, S., and Dayton, A. B., *Am. J. Physiol.*, 1919, **48**, 459.

3 Burns, H. S., and Visscher, M. B., *Ibid.*, 1934, **110**, 490.

4 Ingraham, R. C., and Visscher, M. B., *Ibid.*, 1936, **114**, 676.

5 Ingraham, R. C., and Visscher, M. B., *Ibid.*, 1936, **114**, 681.