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Analysis of Type II Pneumococcus Specific Precipitate.

HERBERT O. CALVERY. (Introduced by H. B. Lewis.)

From the Department of Physiological Chemistry, Medical School, University of Michigan, Ann Arbor.

The antibodies of an immune animal are associated with the globulin fraction of the serum proteins. Since they are difficult to separate from the serum proteins in a relatively pure form, very few chemical investigations of them have been made. The most recent is that of Hewitt[1] in which are reported the amide-N, monoamino-N, diamino-N, cystine, tyrosine, and tryptophane of diphtheria toxin-antitoxin floccules. These are compared with the crystalline albumin fraction and the globulin fraction from which the chemical methods used do not permit differentiation.

Careful chemical analysis of the precipitate formed when specific haptens are added to antisera should furnish valuable information since this precipitate contains antibody in the purest form in which it is available. The present investigation is of Type II pneumococcus specific precipitate furnished by Dr. M. Heidelberger and Dr. F. E. Kendall of Columbia University, to whom I wish to express my appreciation. The precipitate contains about 5% of the specific carbohydrate, and the analytical values have not been corrected for this. Analyses of other specific precipitates are in progress.

The specific precipitates were obtained, purified and dried in the usual manner of preparation of protein precipitates by filtration, washing with water, alcohol, and ether and subsequently placing in a vacuum desiccator over some drying agent. Two samples of the white powder thus obtained were analyzed by the general chemical methods of protein analysis in use in this laboratory.[2] The analytical values obtained are summarized in Table I. All values reported are averages of duplicate analyses for the 2 samples except the isolation values obtained for arginine, histidine, lysine, glutamic acid and aspartic acid.

The values found agree in a general way with those reported for serum globulin but before specific comparisons can be made more careful analyses must be carried out on highly purified fractions of the serum globulins, if possible from the same animals from which the specific precipitates have been obtained. The cystine

[1] Hewitt, L. F., *Biochem. J.*, 1934, **28**, 2080.

[2] Calvery, H. O., and Freyberg, R. H. To appear in *J. Biol. Chem.*, 1935, **109**.

TABLE I.
Analytical Values for Type II Pneumococcus Specific Precipitate.
All values are corrected for ash and moisture. The nitrogen fractions are expressed as percentages of the total nitrogen.

	I %	II %
Ash	0.16	0.18
Moisture	6.0	6.1
Total N	15.9	16.0
Amide N	3.7	3.6
Humin N	0.58	0.66
Amino N (after hydrolysis)	76.8	73.4
Phosphorus	none	none
Sulfur	1.3	1.2
Tyrosine	5.5	5.5
Tryptophane	2.0	2.0
Cystine	3.1	3.1
Arginine	5.7	5.4
Histidine	1.0	1.1
Lysine	4.9	4.7
Aspartic Acid	4.3	4.5
Glutamic Acid	6.1	6.4

values in Table I are much higher, the tryptophane values slightly higher and the tyrosine values somewhat lower than those reported by Hewitt[1] for diphtheria toxin-antitoxin floccules, for which amino acids the mean values are 2.05%, 1.80% and 5.85% respectively. The amide N value found by Hewitt is very high, being 9.1% as compared to 3.65% in the table. From these comparative values it seems very probable that more complete chemical analyses of highly purified products will afford valuable information concerning the chemical composition of antibodies, their probable method of formation and the nature of the reactions between antigens and antibodies.

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Specific Rotation of Cystine Excreted in Cystinuria.

BARKER H. BROWN AND HOWARD B. LEWIS.

From the Department of Physiological Chemistry, Medical School, University of Michigan, Ann Arbor.

The identity of stone cystine and protein cystine has been generally accepted in recent years. Gortner and Hoffman[1] in an examination of cystine isolated from kidney calculi observed a specific ro-

[1] Gortner, R. A., and Hoffman, W. F., PROC. SOC. EXP. BIOL. AND MED., 1926, **23**, 691.