President, J. N. Martin, Iowa State College; *Vice-president,* R. B. McClenon, Grinnell College; *Secretary-treasurer,* J. C. Gilman, Iowa State College; *Editor,* Mrs. F. W. Nichols, Ames; *Botany and Bacteriology,* G. F. Goodman, Iowa State College; *Chemistry, general and physical,* J. A. Coss, Morningside College; *Chemistry, organic and biological,* R. M. Hixon, Iowa State College; *Geology,* A. C. Trowbridge, State University of Iowa; *Mathematics,* E. E. Moots, Cornell College; *Physics,* R. W. Morrow, Iowa Wesleyan; *Psychology,* L. K. Henry, Iowa State College; *Science Teaching,* H. S. Conard, Grinnell; *Zoology,* Paul L. Risley, State University of Iowa.

JOSEPH C. GILMAN,
Secretary-Treasurer

THE PENNSYLVANIA ACADEMY OF SCIENCE

THE fourteenth annual meeting of the Pennsylvania Academy of Science was held at Bucknell University, Lewisburg, Pennsylvania, on Friday and Saturday, April 15 and 16. Much of the success of the meeting may be accredited to the hospitality of the university and the untiring efforts of its scientific staff, particularly Professor N. H. Stewart. About one hundred members attended. The program opened on Friday morning, at which time twelve papers on diverse topics were read. On Friday afternoon, the meetings split into two simultaneous groups for biology and geology. At the former, sixteen papers and at the latter also sixteen papers were listed. The meetings continued on Saturday morning. A zoological session included eleven titles, and at the same time a symposium on the teaching of science was held at which ten papers were listed. While the academy was in session, the junior academy assembled under the direction of Professor K. F. Oerlein. About one hundred and twenty-five members attended these meetings.

The annual dinner took place on Friday evening in the university dining hall. Both senior and junior academy members participated. After dinner, the entire group adjourned to Vaughan Literature Auditorium for the presidential address by Dr. George H. Ashley. Dr. Ashley spoke on "How Old is Man?" After tracing man's early history as revealed by fossil remains, Dr. Ashley commented upon man's relation to the last glacial retreat from Europe and North America and propounded reasons to show that the retreat was not necessarily simultaneous on both sides of the Atlantic Ocean.

At the regular business meeting the following officers were elected for the current year:

President: Dr. L. K. Darbaker, University of Pittsburgh.

Vice-Presidents: Jaques Cattell, Science Press; Professor E. A. Vuilleumier, Dickinson College.

Secretary: Dr. V. Earl Light, Lebanon Valley College.

Assistant Secretary: Charles E. Mohr, Reading Public Museum.

Treasurer: Professor H. W. Thurston, Pennsylvania State College.

Editor: R. W. Stone, Pennsylvania Topographic and Geologic Survey.

Press Secretary: Dr. Bradford Willard, Pennsylvania Topographic and Geologic Survey.

Junior Academy: Professor K. F. Oerlein, Indiana State Teachers College.

It has been decided to hold the 1939 meeting at Pennsylvania State College, and the 1940 meeting at Washington and Jefferson College. The summer meeting for 1938, the date to be announced, is to take place at West Chester to visit the serpentine barrens, famous equally for their peculiar botany, zoology and geology.

BRADFORD WILLARD,
Press Secretary

SPECIAL ARTICLES

ELECTROPHORESIS OF IMMUNE SERUM

ELECTROPHORETIC analysis of serum has indicated the existence of four definite protein components of different mobilities (albumin and globulin α, β and γ).[1] In rabbit antisera to crystalline egg albumin the antibody was found in the slowest migrating (γ) component.[1] Since antibodies formed in the horse and in the rabbit differ greatly in molecular weight,[2] a correlation of ultracentrifugal and electrophoretic studies seemed advisable.

Potent horse and rabbit Type I antipneumococcus sera, in which 20.7 and 18.6 per cent., respectively, of the total nitrogen was specifically precipitable, were dialyzed against buffer containing 0.02M phosphate and 0.15M NaCl and studied in the Tiselius electrophoresis apparatus.[3] The scale and Toepler "schlieren" methods were used for optical observation. The experiments were repeated under identical conditions with samples of the same sera from which the antibody had been removed by addition of the homologous type specific polysaccharide or by a heavy suspension of Type I pneumococci.[4]

The results were strikingly different in the sera of

[1] A. Tiselius, *Biochem. Jour.,* 31: 1464, 1937.

[2] M. Heidelberger and K. O. Pedersen, *Jour. Exp. Med.,* 65: 393, 1937; E. A. Kabat and K. O. Pedersen, SCIENCE, 87: 372, 1938.

[3] A. Tiselius, *Trans. Faraday Soc.,* 33: 524, 1937.

[4] M. Heidelberger and E. A. Kabat, *Jour. Exp. Med.,* 63: 737, 1936.

the two animals. The rabbit antiserum showed no evidence of a new protein component, but there was an increase in the amount of γ-globulin to 56 per cent. of the total protein, as compared with 17 per cent. in normal serum (determinations by the scale method). Comparison with the electrophoretic diagrams obtained from the absorbed serum showed that specific precipitation removed 35 per cent. of the γ-globulin, whereas the other components were not markedly affected. 19.6 per cent. of the total protein concentration was thus accounted for as antibody, in excellent agreement with 18.6 per cent., the value obtained by direct analysis for antibody nitrogen.

The horse antiserum, however, showed a very strong new component, migrating between the β- and γ-globulins, and this was no longer present in the sample from which antibody had been removed (Fig. 1). The

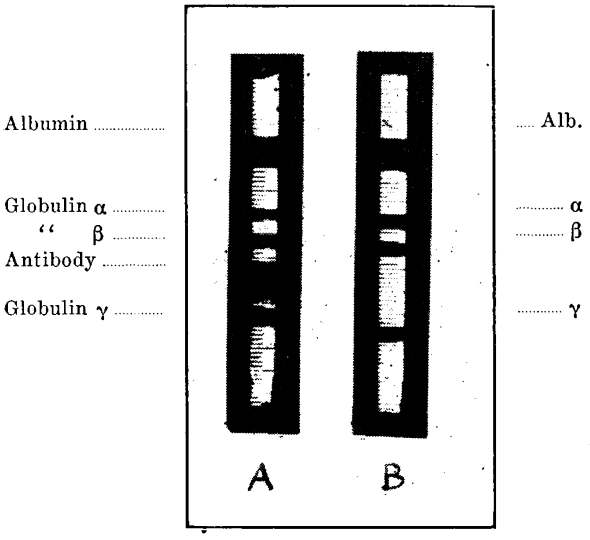

FIG. 1. Electrophoretic diagrams of unabsorbed (A) and absorbed (B) antipneumococcus horse serum.

mobilities of the other components in the absorbed and unabsorbed sera were the same within experimental error as were the mobilities of normal sera in the same salt medium.

TABLE 1

MOBILITIES IN $cm^2\ sec^{-1}\ volt^{-1} \times 10^5$ OF MAIN PROTEIN COMPONENTS OF IMMUNE HORSE AND RABBIT ANTISERA. TEMP. 0° C. BUFFER 0.15M NaCl, 0.05M TOTAL PHOSPHATE

	Albumin	Glob. α	Glob. β	Antibody	Glob. γ
Horse serum pH 7.71 ..	5.5	3.7	3.0	2.1	0.9
Rabbit serum pH 7.50 ..	5.9	4.3	3.3	..	1.2

The data in Table 1 are consistent with the observations of Heidelberger and Pedersen[2] and indicate that pneumococcus anticarbohydrate produced by the horse exists as a new component, while the same antibody as produced by the rabbit is an addition to the normal γ-globulin component of serum.

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Rockefeller Foundation Fellow, 1937–38
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UNIVERSITY OF UPSALA, SWEDEN

AGGLUTININS FOR HUMAN ERYTHROCYTES IN TYPE XIV ANTI-PNEUMOCOCCIC HORSE SERUMS[1]

IN the course of clinical trials with therapeutic antipneumococcic horse and rabbit serums, unusual reactions sometimes leading to death were encountered in occasional patients receiving anti-pneumococcus type XIV horse serums. In one patient who recovered, hemoglobinuria occurred soon after an intravenous injection of type XIV horse serum. Bullowa[2] also has encountered fatal reactions with therapeutic type XIV serums. Experiments carried out in an attempt to elucidate the mechanism of these reactions revealed that the serums of horses immunized against type XIV pneumococci have agglutinins in high titers for human erythrocytes of all four groups. Agglutinins in low titers for human erythrocytes of each of the blood groups have been observed in normal horse serums,[3] and agglutinins for group AB and A cells have been noted in rabbit serums.[4] The latter have been shown to be in the nature of Forssman's antibodies.

The results of some of the observations made thus far are summarized briefly.

(1) Every one of nineteen different specimens of type XIV anti-pneumococcic horse serum agglutinated human red blood cells of all four blood groups in dilutions of 1:80 to 1:2560 of the serums. These serums were obtained from three different laboratories and were produced by immunization with at least three different strains of type XIV pneumococci. They included monovalent and bivalent (some with type VI and others with type XIX), concentrated and unconcentrated serums. In the concentrated serums the titers of agglutinins for the blood cells of each group were higher than the corresponding titers in the unconcentrated serums from which they were prepared. Erythrocytes from different individuals of the same blood group were agglutinated to the same titer in the same type XIV horse serum. Hemolysins

[1] From the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine, Harvard Medical School, Boston, Mass.

[2] J. G. M. Bullowa, "The Management of the Pneumonias." New York, Oxford University Press, 1937, p. 316.

[3] V. A. Herman, *Jour. Immun.*, 31: 347, 1936.

[4] G. H. Bailey and N. S. Shorb, *Am. Jour. Hyg.*, 13: 831, 1931; 17: 329 and 358, 1933; C. A. Stuart, *et al.*, Jour. Immunol., 31: 25, 1936; O. Thomsen, *Ztschr. Immunitatsforsch.*, 87: 335, 1936; M. Eisler, *ibid.*, 88: 240, 1936.