

speed attained was by *Aeschna mixta*, also a dragonfly, which made 7 meters per second. The third fastest was *Vespa crabro*, a wasp, which made 6 meters per second. Of the 5 species of flies used, the highest speed, 4 meters per second, was attained by *Tabanus bovinus*, a tabanid. Of the 5 species of beetles used, the highest speed, 2.5 meters per second, was recorded for *Melolontha vulgaris*, a chafer.

Magnan considered that these experiments did not give the full maximum velocity of the insects as they fly in nature. He held that the experiments indicated that certain insects would approach the speed of 10 meters per second.

Demoll³ determined the speed of many species of insects belonging to 7 orders by timing them as they flew from the dark side of a room to a window on the opposite side. Of those insects used, hawk moths attained the greatest speed, that of 15 meters per second, or about 33.5 miles per hour. Next in speed came a tabanid, *Tabanus bovinus*, and a dragonfly, *Agrion*. Each of these attained a maximum speed of 14 meters per second. The greatest speed for a worker honeybee was 3.7 meters per second.

It is noted that there is a great difference in the determination of the maximum speed attained by insects of the same groups by these two experimenters. This difference also holds where the same species of insect was used by the two workers.

Tillyard⁴ timed a dragonfly of the genus *Austrophlebia* over a measured stretch of between 80 and 90 yards, finding that it covered the distance in 3 seconds.

This dragonfly, therefore, flew at a speed of nearly 60 miles per hour.

The results obtained by these three men indicate clearly that much more work is to be done before a final answer can be given to the question, "How fast can insects fly?"

H. E. EWING

U. S. NATIONAL MUSEUM

PASTEUR'S PATENTS

REGARDING the article which appeared in SCIENCE for October 8 under the signature of P. J. Federico, I would ask you, in my capacity of editor of the works of my grandfather—Louis Pasteur, kindly to refer your readers to foot-note 3, page 13 of volume III, "Etudes sur le vinaigre et sur le vin,"¹ in which note Pasteur explains why he took out patents.¹ See also note 1, page 410 of the same volume, where a reference to the patent taken by Pasteur for his process of manufacturing wine will be found. At the end of this note the words spoken by Balard (one of Pasteur's former teachers) before the Academy of Sciences, on February 27, 1872, regarding such patents may be quoted in translation: "This patent was taken by M. Pasteur when he had matured his process for preserving wine, in order to be guarded against undelicate people. He voluntarily allowed it to become public property, so those who speak lightly of this means of ensuring the property of an industrial discovery are therefore at liberty to freely make use of it." See also vol. V, "Etudes sur la bière," page 346 to 352.

PASTEUR VALLERY-RADOT

SOCIETIES AND MEETINGS

THE IOWA ACADEMY OF SCIENCE

THE fifty-second annual meeting of the Iowa Academy of Science was held at Morningside College at Sioux City, Iowa, on April 15 and 16 with 175 members and visitors in registered attendance. Members of the South Dakota Academy of Science were guests.

The presidential address, "Water Problems," was presented by Dr. A. C. Trowbridge, state geologist and professor of geology at the State University of Iowa. Other papers on the general program were "On the 'Curve of Deaths' and the Associated 'Curve of Lives.'" by Dr. H. L. Rietz, of the Department of Mathematics of the State University of Iowa, and "The Fir Forests of Iowa," by Dr. H. S. Conard, of the Department of Botany of Grinnell College. The annual address, "Science and Society," was presented by Dr. C. E. Friley, president of Iowa State College.

³ R. Demoll, "Der Flug der Insekten und der Vögel," Jena: Gustav Fischer: 6, 1918.

⁴ R. J. Tillyard, "The Biology of Dragonflies," Cambridge University Press: 322, 1917.

In addition to the general program, the academy met in nine sections for the presentation of 110 papers of special interest. A section on science teaching was initiated under the chairmanship of Dr. J. B. Culbertson, of Cornell College, Mt. Vernon, Iowa. The Junior Academy of Science of Iowa met with the academy with an attendance of delegates from eleven clubs. Dr. H. S. Conard, of Grinnell College, and Dr. George Hendrickson, of Iowa State College, presented talks on their program.

The following officers and section chairmen were elected for the next meeting, which will be held at Iowa State College at Ames, Iowa:

¹ In translation it reads: "As it frequently happens that scientific principles, when published by their authors, become in the hands of a third party, after being slightly modified or by the addition of a certain apparatus, the object of a patent, I (following the advice of duly qualified persons) applied for a patent, prior to publishing my paper in February, so that the same should be prior in date to any which my paper would give rise to; I may add that it is my intention not to make use of it."

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

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.

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

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

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