to find perfect specimens we do not look at the most advanced classes, but to the reverse. Those who live to extreme old age are generally in the lowly ranks. But why has physical development ceased at all? Why are there not some superior beings by this time? But alas, there are no marks or indications of wings or halos on either the great saints or scientists of the day.

Alas, there are not!

CARL H. EIGENMANN.

SOCIETIES AND ACADEMIES.

THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS.

THE thirty-fifth annual meeting of the Wisconsin Academy of Sciences, Arts and Letters was held at Madison, February 8 and 9, 1906, the president of the academy, Dr. John J. Davis, presiding. On the evening of February 8 a dinner, complimentary to visiting members, was given, followed by an address by the president on 'The Academy—Its Past and Its Future.' During the four regular sessions the following program was presented:

RICHARD G. NORTON: 'An Investigation into the Cause of the Breaking of Watch Springs in Greater Numbers during the Warm Months of the Year.'

C. S. SLICHTER: 'The Limitations of a General Method of Approximation in Hydrodynamics.'

C. S. SLICHTER: 'A Fundamental Existence Theorem for Linear Homogenous Differential Equations.'

JAMES L. BARTLETT: 'The Climate of Madison.'

A. R. WHITSON: 'The Influence of Soil Temperature on the Occurrence of Frost.'

G. C. COMSTOCK: 'The Luminosity of the Brightest Stars.'

EDWARD T. OWEN: 'Hybrid Parts of Speech.'

NINA M. SHELDON: 'The Supernatural Elements in the English and Scottish Ballads.'

ARTHUR BEATTY: 'English Dramatic Origins—A Protological Study.'

F. C. SHARP: 'A Study of Moral Standards.'

REUBEN G. THWAITES: Memorial Address—'James Davie Butler.'

CHARLES E. BROWN: 'Wisconsin's Quartzite Implements.'

ARTHUR C. BOGGESS: 'The Period of Anarchy in Illinois, 1782–90.'

SOLON J. BUCK: 'The Occupation of Government Land in Oklahoma Territory.'

J. F. DILWORTH: 'Life in the Beguinages before the Reformation.'

E. K. J. H. VOSS: 'A Nuremberg City Ordinance of the Year 1562, Issued during the Time of the Black Death.'

D. L. PATTERSON: 'Alexander and the Council of Worms.'

D. C. MUNRO: 'The Children's Crusade.'

G. C. SELLERY: 'Suspension of *habeas corpus* in the Civil War.'

ULRICH B. PHILLIPS: 'Problems of Colonization as Illustrated in the Province of Georgia.'

C. R. FISH: 'Tables Illustrating the Progress of Rotation in Office.'

WM. V. POOLEY: 'Causes Affecting the Westward Movement of Settlement Prior to 1850.'

W. F. KOELKER: 'Note on the Nature of the Hydrocarbons Occurring in Wisconsin Oil Rock.'

LOUIS KAHLENBERG and ALONZO S. MCDANIEL: 'On the Differences of Potential between Manganese and Lead Peroxides and Various Aqueous and Non-aqueous Solutions.'

L. A. YOUTZ: 'Nitrogen from the Atmosphere and Its Use in the Annealing of Brass Wire.'

V. LENHER: 'Nitroselenic Acid.'

W. D. FROST, R. WHITMAN and R. E. MILTENBERGER: 'Effect of Desiccation on *Bacillus dysenteriæ* Shiga.'

GEORGE WAGNER: 'A Note on the Chemotaxis of Oxytricha aeruginosa.'

GEORGE WAGNER: 'Some Points in the Natural History of the Spoon-bill Catfish.'

G. A. TALBERT: 'Variations of the Brachial and Sciatic Plexus of the Frog.'

G. A. TALBERT: 'Cerebral Localization from a Clinical Study.'

C. B. HARDENBERG: 'Comparative Studies on the Trophi of *Scarabæidæ*.'

E. A. BIRGE and V. LENHER: 'The Gases of Wisconsin Lakes.'

E. C. CASE: 'Wave-rolled Snowballs.'

W. S. MILLER: 'The Mesothelium of the Pleural Cavity.'

S. WEIDMAN: 'An Additional Driftless Area in Wisconsin.'

J. J. DAVIS: 'Notes on a Few Parasitic Fungi of the Pacific Northwest.'

R. H. DENNISTON: '*Gasteromycetes* of Wisconsin.'

C. E. ALLEN: 'The Life History of *Coleochæte*.'

GEORGE M. REED: 'Infection Experiments with the Mildew on the Cucurbits.'

R. A. HARPER: 'The Nature of the Variation of the Spore Number in the Ascus.'

W. Marquette: 'Polar Organization in the Cells of *Isoetes*.'

E. W. Olive: 'Cell and Nuclear Division in *Basidiobulus*.'

J. B. Overton: 'On the Permanence of the Chromosomes in the Calla Lily and the Elm.'

A. H. Christman: 'Spore Formation in the Primary Uredo.'

B. M. Allen: 'The Origin of the Sex Cells of *Chrysemys*.'

Hon. John W. Hoyt and C. Dwight Marsh, both of Washington, D. C., were elected delegates to attend the celebration of the two-hundredth anniversary of the birth of Benjamin Franklin at the University of Pennsylvania, April 17–20, 1906, and Dr. Ernest R. Buckley, of Rolla, Mo., was chosen to represent the academy at the dinner commemorating the fiftieth anniversary of the founding of the St. Louis Academy of Science at St. Louis, March 10, 1906.

The following officers were elected by the academy for the ensuing three years:

President—Louis Kahlenberg, Madison.

Vice Presidents—Charles H. Chandler, Ripon; Henry E. Legler, Madison; E. C. Case, Milwaukee.

Secretary—Charles E. Allen, Madison.

Treasurer—Rollin H. Denniston, Madison.

Librarian—Walter M. Smith, Madison.

Curator—Charles E. Brown, Milwaukee.

Publication Committee—The president and the secretary *ex officio*, E. B. Skinner.

Library Committee—The librarian *ex officio*, Herbert J. Farley, George W. Peckham, Hiram D. Densmore, George Wagner.

Committee on Membership—The secretary *ex officio*, R. H. Halsey, Miss Harriet B. Merrill, D. C. Munro, L. A. Youtz.

Charles E. Allen,
Secretary.

The Philosophical Society of Washington.

The 614th meeting was held February 24, 1906.

Professor J. H. Gore gave a new demonstration that o/o is indeterminate, using the formula for the straight line through two points and making the points coincident.

The problem presented at the last meeting by President Abbe regarding the sound from a meteor was called up by Mr. Buckingham, who pointed out that the wavefront is approximately conical and the sound appears to reach the observer from a direction normal to this front. Mr. Nutting showed that with the assumed velocities by Döppler's principle, the intensity of the sound before and after passing the observer would be about 700 to 1.

Mr. E. R. Frisby then spoke on 'The Progress of the Coast Survey Work in the Philippines.' This is carried on at the joint expense of the United States and Insular governments. The problem is unique since there are 3,146 islands in the 115,000 square miles; a third of them have areas of less than one tenth of a square mile. Owing to commercial needs, the astronomical position of a number of points was first determined and then harbor surveys were made, coast survey and triangulation being postponed. Plumb-line deflections are found to follow the topographical indications. The work was done by four or five parties in five ships. The early and smaller charts were printed in Manila.

Mr. F. H. Bigelow then discussed 'The Formation of Cyclones and Anticyclones,' in the light of the information furnished by the European and American kite and balloon ascensions made during the past ten years. A historical summary of early efforts to solve this problem showed that Ferrel's cyclone, as well as the type of vortex employed by Guldberg and Mohn, or Oberbeck, depended upon a symmetrical distribution of the temperature around a central axis. On the other hand, the modern observations show that the temperature distribution is asymmetric, one half of the respective areas being warm and the other half cold. Diagrams of the pressure, temperature and velocity in the several levels from the surface to 10,000 meters give the changes in passing from one level to another, the systems being the same in each hemisphere. Especially the temperature-gradients, or temperature-falls per 1,000 meters, were worked out for the anticyclone and cyclone as a whole, also, in each quadrant of these separately, the result being that there is a wide departure from the adiabatic law, and that there is a remarkable variation in each quadrant.

These must be accounted for in any theoretical solution, and an exhibit was made of certain formulæ which are being tried to account for the observed velocity, pressure, temperature and heat contents in the several levels.

THE 615th meeting was held March 10, 1906.

Mr. H. C. Dickinson discussed 'Thermal After-effects on Thermometer Glass,' describing experiments made at the Bureau of Standards on new unseasoned tubes of Jena glass. At about 400° C. glass is plastic to internal strains while still rigid to external strains. So by prolonged heating at high temperatures the strains are relieved which have been set up on manufacturing the instrument and which cause a rise in the zero-point. The Jena normal thermometer glass, which is easy to work, is used up to 450° C.; the Jena borosilicon glass, which is very difficult to work, is used up to 550° with an internal pressure of twenty atmospheres. The resuits were shown by lantern slides of curves that indicated the change of zero as a function of the temperature of annealing and the duration of exposure at this temperature. The exposures were made in an electric furnace in which the temperature was kept quite constant for many days.

Mr. R. A. Harris presented a paper entitled 'On Function-Theory Analogues Relating Chiefly to Mathematical Physics.' The chief object of the communication was to show how complex variables other than $x+iy$ can be utilized in spatial and physical problems.

Since x_1, y_1 in the equation

$$x_1+iy_1=e^{-i\theta}(x+iy)$$

are coordinates of the point x, y referred to axes θ degrees in advance of the original axes, it follows that x_3, y_3, z_3, given below, are coordinates of a point in space referred to a new system defined by the Eulerian angles ϕ, θ and ψ. In the equations

$$x_1+iy_1+jz_1=e^{-i\phi}(x+iy)+jz,$$
$$y_2+iz_2+jx_2=e^{-i\theta}(y_1+iz_1)+jx_1,$$
$$x_3+iy_3+jz_3=e^{-i\psi}(x_2+iy_2)+jz_2,$$

j, like i and 1, is a separating symbol; also $i^2=j^2=-1$. By eliminating all quantities whose subscripts are 1 or 2, x_3, y_3, z_3 become expressed in terms of x, y, z and the angles ϕ, θ and ψ.

The equation

$$(a-ib)(x_1+iy_1)=(a+ib)(x+iy)$$

signifies that the point x_1, y_1 is the point x, y displaced by a rotation through an angle θ where

$$\cos\tfrac{1}{2}\theta=\frac{a}{\sqrt{a^2+b^2}}=a \text{ if } a^2+b^2=1,$$

$$\sin\tfrac{1}{2}\theta=\frac{b}{\sqrt{a^2+b^2}}=b \text{ if } a^2+b^2=1.$$

Similarly the equation

$$(a-ib-jc)(x_1+iy_1+jz_1)=(a+b+jc)(x+iy+jz),$$

if the ij-term be omitted from the products as having no spatial interpretation, and if $a^2+b^2+c^2=1$, signifies that the point x_1, y_1, z_1 is the point x, y, z rotated about a line in the yz-plane passing through the origin.

Again, the equation

$$(a-ib-jc\mp ijd)(x_1+iy_1+jz_1)=(a+ib+jc\pm ijd)(x+iy+jz),$$

if the ij-terms be omitted from the products, and if $a^2+b^2+c^2+d^2=1$, is the general expression for a displacement by rotation about a line passing through the origin. The quantities a, b, c and d are essentially Rodrigues' parameters and have the values

$$a=\cos\tfrac{1}{2}\omega,\quad b=\cos\gamma\sin\tfrac{1}{2}\omega,$$
$$c=-\cos\beta\sin\tfrac{1}{2}\omega,\quad d=\cos\alpha\sin\tfrac{1}{2}\omega,$$

α, β and γ denoting the direction-angles of the axis of rotation and ω the angle of displacement.

The use of a complex quantity was pointed out in connection with expressions for the acceleration when a moving particle is referred to polar coordinates—the complex used being a sort of extension of the ordinary symbol for angular velocity.

A semi-mechanical method of transforming from one plane to another by means of hyperbolic complexes of two dimensions was outlined. An example of such transformation having a physical application is implied in the equation

$$x + ijw = \cos^{-1}(X + ijW)$$

where X, W take uniform increments.

A three-dimensional analogue to conformal transformation was briefly noticed.

By means of functions of complex quantities an infinite number of solutions of Laplace's equation can be obtained, as well as of other analogous partial differential equations. Moreover, each solution obtained by Taylor's theorem yields several other solutions, the number depending upon the nature of the complex used.

Mr. L. A. Bauer spoke informally of disturbances just recognized on the record sheets at Cheltenham (Md.) magnetic observatory, that so far can be explained only as due to electric railroad currents, although the nearest point of such a road is thirteen miles away. He also described the precautions taken to protect the German observatory at Potsdam from trolley currents.

Charles K. Wead,
Secretary.

THE OREGON STATE ACADEMY OF SCIENCES.

The following papers have been presented before the Oregon State Academy of Sciences:

December 16, 'The Development of the Mushrooms and other Fungi' (illustrated), Professor A. R. Sweetser, State University.

January 20, 'General Motions of the Atmosphere' (illustrated), Mr. Edw. A. Beals, U. S. Weather Bureau, Portland; 'Animals in Mt. Rainier National Park,' Alden Sampson, Washington, D. C.

The first annual meeting of the academy occurred on February 17. President Sheldon, in his annual address, spoke on 'The Past and Future Work of the Academy.' Following the reports of the retiring officers, officers were elected for the ensuing year as follows:

President—Edmund P. Sheldon.
First Vice-president—A. L. Knisley.
Second Vice-president—C. Lombardi.
Third Vice-president—E. A. Beals.
Recording Secretary—Ernest Barton.
Corresponding Secretary—G. E. Coghill.
Treasurer—M. W. Gorman.
Librarian and Curator—L. L. Hawkins.
Trustee (for three years)—President Campbell, State University.

G. E. Coghill,
Corresponding Secretary.

UNIVERSITY OF COLORADO SCIENTIFIC SOCIETY.

During January and February, 1906, the society held eight meetings. The papers presented were as follows:

Professor Joseph H. Bair: 'Recapitulation, and its Bearing on the Problems of Life.'

Professor John B. Ekeley: 'Important Compounds of Carbon.'

Dr. George H. Cattermole: 'Diseases of the Heart and Blood Vessels.'

Professor Frederic L. Paxson: 'The Influence of the West in American History.'

Mr. G. S. Dodds: 'Microscopic Plant and Animal Life of Ponds and Ditches.'

Dr. Martin E. Miles: 'Preventive Medicine.'

Dr. Saul Epsteen: 'The Cost of Life Insurance as viewed from a Mathematical Standpoint.'

Mr. George M. Chadwick: 'The Development of Musical Form.'

The meetings have been well attended, chiefly by members of the faculty and by citizens of Boulder. The attendance has been from fifty to one hundred.

Francis Ramaley,
Secretary.

Boulder, Colo.,

DISCUSSION AND CORRESPONDENCE.

METEORITE SHOWER AT MODOC, KANSAS.

Investigation has been made by the writer of the meteorite fall which took place at Modoc, Scott County, Kansas, about 9:30 P.M., September 2, 1905. Mention of the fall was made in the local paper at the time, and in Science of March 9. The phenomena of the fall were observed by a large number of the inhabitants of Scott and the adjoining counties. The course of the meteorite, as learned by the writer through inquiries in several counties, was nearly due east. The phenomena were a sudden lighting up of the sky by a swiftly moving fireball, 'as big as a washtub,' which quickly exploded with three successive and widening discharges. The ex-