the larger and most important part of the United States, that is, between latitudes 30½° and 47½°, the maximum scale error is only one half of one per cent. Only in southernmost Florida and Texas does this projection attain its maximum scale error of 2¾ per cent. This implies, however, an error in the areas at these extreme parts equal to the square of the linear distortion, or an error of 5½ per cent.

While this error in area may be accounted for by methods already described, the Zenithal projection on the other hand is free from this inconvenience.

The choice then between the Lambert zenithal and the Lambert conformal for a base map of the United States, disregarding scale and direction errors which are conveniently small in both projections, rests largely upon the choice of *equal area* as represented by the Zenithal and *conformality* as represented by the Conformal Conic projection—the former property appealing directly to the practical use of the map, the latter property being one of mathematical refinement and symmetry with definite scale factors available, the projection having two parallels of latitude of true scale, the advantages of straight meridians as an element of prime importance, and the possibilities of indefinite east and west extension without increase of scale error.

SPECIAL ARTICLES

SUBSTITUTES FOR PHENOLPHTHALEIN AND METHYL ORANGE IN THE TITRATION OF FIXED AND HALF-BOUND CO_2[1]

During the past year the writer has had occasion to make a great many determinations of sodium carbonate in the presence of the hydrate by the double titration method with phenolphthalein and methyl orange as indicators. The end point with methyl orange was not satisfactory. A number of new indicators were tried with the result that two were found which may be used as substitutes for phenolphthalein and methyl orange.

[1] Published by permission of the Secretary of Agriculture.

An added advantage of these two indicators[2] is that both have the same color changes. Six drops of one indicator in 75 c.c. of solution gives a fairly deep blue in the presence of sodium hydrate and carbonate and on titration with hydrochloric acid retains this color until the hydrate is all neutralized and the carbonate converted into bicarbonate when it changes at the neutral point to a muddy green and then with a slight excess of acid to a lemon yellow. The addition of three drops of the second indicator will now change the solution to a deep blue, which continues until the bicarbonate has all been destroyed, when the solution shows the same intermediate change as before and becomes a lemon yellow again when a slight excess of acid is present.

These indicators are among the nine recommended by Clark & Lubs[3] for the colorimetric determination of hydrogen ion concentration. The first indicator, thymol blue (thymol sulfon phthalein) is prepared by introducing 1 decigram of the substance into a Florence flask and then adding 4.3 c.c. of $n/20$ sodium hydroxid. The solution is best heated by introducing the flask into hot water and agitating until the indicator is all dissolved. When solution is complete, the volume is made up to 250 c.c. with distilled water.

The substitute for methyl orange is brom phenol blue (tetra bromo phenol sulfon phthalein). This indicator is made up in the same way except that 1 decigram requires only 3.0 c.c. of $n/20$ sodium hydroxide.

F. M. Scales
U. S. Department of Agriculture

[2] These indicators may be obtained from Hynson, Westcott & Dunning, of Baltimore, Maryland.

[3] Clark, Wm. Mansfield, and Lubs, Herbert A., *Jour. of Bacteriology*, Vol. II., Nos. 1, 2 and 3.

THE AMERICAN SOCIETY OF ZOOLOGISTS

The American Society of Zoologists held its seventeenth annual meeting in conjunction with Section F of the American Association for the Advancement of Science and the Ecological Society of America, December 29, 30 and 31, in the Soldan High School building, St. Louis, Missouri. President C. M. Child presided throughout the

meetings. The other officers for the year were: *Vice-president,* H. H. Wilder; *Secretary-Treasurer,* W. C. Allee; *Executive Committee,* L. J. Cole, R. P. Bigelow, H V. Wilson, M. M. Metcalf, George Lefevre; *Member Council A. A. A. S., C. P.* Sigerfoos; *Local Representative,* Caswell Grave.

ELECTION OF MEMBERS

At the business meeting the Executive Committee recommended the following persons for election to membership in the society: George Delwin Allen, Albert W. Bellamy, William Charles Boeck, Calvin O. Esterly, Frank Blair Hanson, Charles Eugene Johnson, Ernest Everett Just, James Ernest Kindred, Mrs. Ruth Stocking Lynch, Thomas Byrd Magath, James Watt Mayor, Dwight Elmer Minnich, Carl R. Moore, Thurlow Chase Nelson, Nadine Nowlin, Charles H. O. Donoghue, Albert Duncan Robertson, Francis Metcalf Root, Elizabeth Anita Smith, Dayton Stoner, Gertrude Marean White, Sadao Yoshida. All were duly elected.

The treasurer's report showed a balance of $809.59, an increase for the year of $63.21.

ADVISORY BOARD

At the request of Frank R. Lillie, chairman of the committee on cooperation and coordination of the Division of Biology and Agriculture of the National Research Council, the executive committee approved, and the society passed the following resolution:

Resolved: That there be established a permanent committee to be called the advisory board of the American Society of Zoologists, consisting of eight members appointed by the executive committee, two each for periods of one, two, three and four years; and thereafter two each year for a four-year term. The chairman of the board shall be elected annually by the board.

The duties of the board shall be:

1. To represent the American Society of Zoologists before the National Research Council.

2. To correlate the various research agencies of the country in zoology; including various government bodies, both national and state, museums, research establishments and universities.

3. To promote international relations in zoology.

4. To take up other problems for the promotion of research in zoology, subject to the approval of The Executive Committee.

President Child announced the appointment by the executive committee of the following advisory board: F. R. Lillie, Wm. E. Castle, C. C. Nutting, G. N. Calkins, J. T. Patterson, M. M. Metcalf, V. E. Shelford, Robert Chambers, Jr.

THE JOURNAL OF MORPHOLOGY

Owing to the request of Professor J. S. Kingsley to be relieved of the editorial management of the *Journal of Morphology* at a date in 1920 not yet definitely fixed, The Wistar Institute through M. J. Greenman, its director, approached the American Society of Zoologists, proposing that the society assume responsibility for the scientific policy and the election of the editorial board of the *Journal of Morphology,* subject to the approval of the advisory board of The Wistar Institute and full financial responsibility for the *Journal* to be kept by The Wistar Institute.

Mr. Greenman further proposed that the society appoint a small special committee on publication which should meet with the advisory board of The Wistar Institute in Philadelphia at certain of its regular meetings held in April to discuss journal affairs in general, and those of the *Journal of Morphology* in particular.

Whenever the committee was called to attend a meeting in Philadelphia all expenses of travel and entertainment incident thereto are to be paid by The Wistar Institute.

After discussion it was voted to approve the general proposition of assuming responsibility for the scientific policy, and the appointment of the editorial board of the *Journal of Morphology;* and the Executive Committee was instructed to appoint a committee on publication whose duties would be:

1. To initiate a scientific policy concerning the *Journal of Morphology.*

2. To nominate an editorial board.

3. To consult with the advisory board of The Wistar Institute concerning both the proposed policy and the editorial nominations.

4. To refer the recommendations for final decision to the executive committee in 1920, and thereafter through the executive committee to the society at its annual meeting.

M. M. Metcalf, Caswell Grave and W. E. Castle have been duly appointed members of the Committee on Publication.

NEW BY-LAW

The following new By-law was adopted:

By-Laws (Add) No. 4

The National Research Council allows the society three representatives on the Division of Biology and Agriculture. Of these three representatives, one shall be elected each year to serve three years. The method of election shall be the same as that used in the election of the officers of the society.

PROPOSED CHANGE IN CONSTITUTION

Although final action could not be taken at this meeting, the following proposed amendment to the Constitution was read:

Article II. (Add) Section 4

Honorary fellows, regardless of membership in the society, may be elected upon unanimous recommendation of the executive committee, by a majority vote of the members present at any meeting of the society. The number of honorary fellows shall be limited to ten and not more than one shall be elected on any one meeting of the society. Honorary fellowships does not involve the payment of dues nor does it confer the right to vote.

After discussion, it was voted that any amendment to the constitution shall not contemplate the elevation of members of the society, and that honorary membership shall be limited to members of foreign societies.

RESOLUTIONS

The resolution committee, consisting of Caswell Grave, Bennet M. Allen and Chancey Juday, reported the following resolutions, which were adopted by standing vote, and ordered spread on the records:

William Erskine Kellicott
1878–1919

Mindful of the great loss sustained by the American Society of Zoologists and zoological science in the death of William Erskine Kellicott, the members of the society find comfort and satisfaction in recalling the mature and substantial character of his scientific contributions, the unusual abilities he displayed as a teacher of zoology, and above all the pleasing personality of their coworker and friend.

The society, therefore, desires to record this minute in recognition of his services to zoological science and to mankind.

George L. Kite
1882–1919

During the brief period of his labors, George L. Kite showed special aptitude, and an adequate preparation for the investigation of the difficult problems which lie in the field where zoology, chemistry and physics meet. His loss is only partially repaired by the inspiration which the methods he developed and the results he attained are affording to the workers who have taken up the problems he relinquished.

The American Society of Zoologists places this minute on record, thereby expressing its regret at the early loss of this promising member.

ELECTION OF OFFICERS

The nominating committee composed of S. O. Mast, V. E. Shelford and B. M. Allen, reported the following nominations:

President, Gilman A. Drew.

Vice-president, Caswell Grave.

Member Executive Committee to serve five years, C. M. Child.

Member of Division of Biology and Agriculture, National Research Council, to serve three years, F. R. Lillie.

Nominations from the floor were called for but none was suggested, and the officers as presented by the Nominating Committee were duly elected.

On nomination of the executive committee, C. C. Nutting was elected member of the council of the American Association for the Advancement of Science in place of C. P. Sigerfoos, resigned.

SESSIONS FOR THE PRESENTATION AND DISCUSSION OF PAPERS

At the meetings of the society for the presentation and discussion of papers a total of 42 papers were presented in full, and 28 were read by title. Seventeen of the papers were followed by discussion.

List of Titles

The titles have been arranged by the secretary of the zoologists according to the rules of the society, in the order of their arrival.

Papers marked with an asterisk were read by title.

Embryology

**The individuality of the germ-nuclei during the cleavage of the egg of Cryptobranchus alleghaniensis:* Bertram G. Smith, Michigan State Normal College.

**A sex intergrade pig which resembles a free-martin:* Will Scott, Indiana University.

Retention of dead fetuses in utero and its bearing on the problems of superfetation and superfecundation: Albert Kuntz, St. Louis University, School of Medicine.

**An explanation of the early development of the peripheral nervous system in the vertebrate embryo:* H. H. Lane, University of Oklahoma.

The thyroid and parathyroid glands of Bufo tadpoles deprived of the pituitary glands: Bennet M. Allen, University of Kansas.

The influence of thyroid extirpation upon the various organs of Bufo larvæ: Bennet M. Allen, University of Kansas.

Stages in the development of the thymus, parathyroid and ultimobranchial bodies in turtles: Charles Eugene Johnson, department of zoology, University of Kansas.

The results of the extirpation of the thyroid and of the pituitary anlagen on the suprarenal tissue in Rana pipiens: ALICE L. BROWN, Kansas State Agricultural College. (Introduced by B. M. Allen.)

Cytology

**The effect of hypotonic and hypertonic solutions on fibroblasts of the embryonic chick heart in vitro:* M. J. HOGUE, school of hygiene and public health, Johns Hopkins University.

**Coelenterates and the evolution of germ cells:* GEORGE T. HARGITT, Syracuse University.

Cytological criteria for the determination of Amœbic cysts in man: S. I. KORNHAUSER, Denison University.

The spermatogenesis of Anolis carolinensis: THEOPHILUS S. PAINTER, University of Texas.

The presence of a longitudinal split in chromosomes prior to their union in parasynapsis: W. R. B. ROBERTSON, University of Kansas.

Chromosome studies in Tettigidæ. II. Chromosomes of BB, CC and the hybrid BC in the genus Paratettix: MARY T. HARMAN, zoology department, Kansas State Agricultural College.

Parasitology

Notes on the life-cycle of two species of Acanthocephala from fresh-water fishes: H. J. VAN CLEAVE, University of Illinois.

On the life-history of the gape-worm (Synagamus trachealis): B. H. RANSOM, U. S. Bureau of Animal Industry, Washington, D. C.

A new bladder fluke from the frog: JOHN E. GUBERLET, Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Studies on the development of Ascarida perspicillum, parasitic in fowls: JAMES E. ACKERT, Kansas State Agricultural College.

**New data bearing on the life-history of Sarcocystis tenella:* JOHN W. SCOTT, University of Wyoming.

Contributions to the life-history of Gordius robustus Leidy: H. G. MAY, Mississippi College.

Leucochloridium problematicum n. sp.: THOMAS BYRD MAGATH, Mayo Clinic. (Lantern.)

Two new genera of Acanthocephala from Venezuelan fishes: H. J. VAN CLEAVE, University of Illinois.

**Note on the behavior of embryos of the fringed tapeworm:* JOHN W. SCOTT, University of Wyoming.

Contributions to the life-history of Paragordius varius (Leidy): H. G. MAY, Mississippi College.

Genetics

Selection for increased and decreased bristle number in the mutant strain "reduced": F. PAYNE, Indiana University.

The mutational series, full to bar to ultra bar, in Drosophila: CHARLES ZELENY, University of Illinois.

Variation in the percentage of crossovers and selection: J. A. DETLEFSEN and E. ROBERTS, College of Agriculture, University of Illinois.

Inheritance of color in the domestic turkey: W. R. B. ROBERTSON, University of Kansas.

Heredity of orange eye color: F. PAYNE and MARGARET DENNY, Indiana University.

The tabulation of factorial values for eye-facet number in the bar races of Drosophila: CHARLES ZELENY, University of Illinois.

Linkage of genetic factors in mice: J. A. DETLEFSEN and E. ROBERTS, College of Agriculture, University of Illinois.

Forty-two generations of selection for high and low facet number in the white bar-eyed race of Drosophila: CHARLES ZELENY, University of Illinois.

On the inheritance of congenital cataract in dairy cattle: J. A. DETLEFSEN and W. W. YAPP, College of Agriculture University of Illinois.

Ecology and General Physiology

Observations on the habits of larval colonies of Pectinatella: STEPHEN R. WILLIAMS, Miami University.

Animal aggregations: W. C. ALLEE, Lake Forest College.

Behavior of the larvæ of Corethra punctipennis Say: CHAUNCEY JUDAY, Wisconsin Natural History Survey.

**Studies on chitons:* W. J. CROZIER, Hull Zoological Laboratory, University of Chicago.

**On the natural history of Onchidium:* LESLIE B. AREY and W. J. CROZIER, Northwestern University, University of Chicago.

**The olfactory sense of Orthoptera:* N. E. MCINDOO, Bureau of Entomology, Washington, D. C.

On a new principle underlying movement in organisms: A. A. SCHAEFFER, University of Tennessee.

The relation of the concentration of oxygen to the rate of respiratory metabolism in Planaria: E. J. LUND, Laboratory of General Physiology, University of Minnesota.

**Experimental studies on the cerebral cortex and*

corpus striatum of the pigeon: F. T. Rogers, Marquette School of Medicine.

**Photic orientation in the drone-fly, Eristalis tenax:* S. O. Mast, Johns Hopkins University.

**Behavior of a tunicate larva:* W. J. Crozier, The University of Chicago.

**Vision in the seventeen-year locust, Cicada septendecim:* S. O. Mast, Johns Hopkins University.

**Periodicity in the photic responses of the euglenoid, Septocinclis texta, and its bearing on reversion in the sense of orientation:* S. O. Mast, Johns Hopkins University.

**Adaptation to light in Euglena variabilis (?) and its bearing on reversion in orientation:* S. O. Mast, Johns Hopkins University.

**The maze-behavior of white rats in the second generation after alcoholic treatment:* E. C. MacDowell and E. M. Vicari, Carnegie Institution of Washington.

**The relation of modifiability of behavior and metabolism in land isopods:* C. H. Abbott, Massachusetts Agricultural College. (From the Osborn Zoological Laboratory, Yale University; introduced by Henry Laurens.)

The rate of carbon dioxide production by pieces of Planaria, in relation to the theory of axial gradients: George Delwin Allen, University of Minnesota. (Introduced by E. J. Lund.)

Evolution

**Irreversible differentiation and orthogenesis:* C. Judson Herrick, The University of Chicago.

**An analysis of the sexual modifications of an appendage in sex-intergrade Daphnia longispina:* A. M. Banta and Mary Gover, Station for Experimental Evolution.

Comparative Anatomy

**The Urodele vomer:* Inez Whipple Wilder, Smith College.

**The origin, function and fate of the test-vesicles of Amaroucium constellatum:* Caswell Grave, Washington University. (Lantern.)

Respiratory organs of Ucides caudatus, a West Indian land crab: C. C. Nutting, University of Iowa. (Lantern.)

**The homologies and development of the papal organ of male spiders:* W. M. Barrows, Ohio State University.

**Morphology of the enteron of the periodical cicada, Tibicen septendecim Linn:* Charles W. Hargitt and L. M. Hickernell, Syracuse University.

**Sexual dimorphism in Nemertians:* W. R. Coe, Yale University.

The columella auris of the Reptilia: Edward L. Rice, Ohio Wesleyan University.

**The spiracular organ of elasmobranch, ganoid and dipnoan fishes:* H. W. Norris and Sally P. Hughes, Grinnell College.

Invitation Program

Faunal areas on the Pacific slope of South America: C. H. Eigenmann, University of Indiana.

Discussion led by C. C. Nutting, University of Iowa.

Polyembryony and sex: J. T. Patterson, Texas University.

Discussion led by S. I. Kornhauser, Denison University.

Physiological life histories of terrestrial animals: V. E. Shelford, Illinois Natural History Survey and the University of Illinois.

Discussion led by Thomas Headlee, New Jersey Agricultural Experiment Station.

The work of the National Research Council in relation to zoology: C. E. McClung, chairman, Division of Biology and Agriculture, National Research Council.

Papers Contributed by The Ecological Society of America

Hydrogen ion concentration in the different stages of pond succession: V. E. Shelford, Illinois Natural History Survey.

Distribution of life on a river bottom: A. D. Howard, U. S. Bureau of Fisheries.

Changes observed in river fauna above Keokuk Dam: A. D. Howard, U. S. Bureau of Fisheries.

Ecological succession of insects in stored food products: Royal N. Chapman, University of Minnesota.

Papers following the Zoology Dinner

The message of the biologist, vice-presidential address for Section F: William Patten, Dartmouth College.

Motion pictures of the Barbadoes-Antigua Expedition: C. C. Nutting, University of Iowa.

Exhibits

Slides of stained cysts of the intestinal amœbas and flagellates of man: S. I. Kornhauser, Denison University.

Wire models of paths of oyster larvæ, dero, etc.: A. A. Schaeffer, University of Tennessee.

The embryonic columella auria of the lizard, *Eumeces:* EDWARD L. RICE, Ohio Wesleyan University.

Phenotypes in coat colors in mice: J. A. DETLEFSEN and ELMER ROBERTS, Laboratory of Genetics, College of Agriculture, University of Illinois.

Demonstration of synapsis stages in the chromosomes of grouse locusts and other grasshoppers: W. R. B. ROBERTSON, University of Kansas.

Feathers illustrating the inheritance of color in varieties of the domestic turkey: W. R. B. ROBERTSON, University of Kansas.

The development of the asexual larvæ in *Paracopidosomopsis:* J. T. PATTERSON, University of Texas.

Full proceedings of the meeting together with abstracts of papers and a list of members and their addresses will be found in the *Anatomical Record* for January, 1920.

W. C. ALLEE,
Secretary

THE MINERALOGICAL SOCIETY OF AMERICA

AT a meeting held in the quarters of the Department of Mineralogy at Harvard University on December 30 a group of 28 mineralogists from all sections of the United States, including representatives from Canada, organized a new society to be known as the Mineralogical Society of America. This action was the outcome of a movement started at the Albany meeting of the Geological Society of America in 1916 for the bringing together into a permanent organization of workers in science whose interest lay largely or wholly in mineralogy, crystallography or those allied sciences which include physical crystallography and mineral synthesis.

A provisional Constitution and By-Laws were adopted which defined the object of the society as the advancement of mineralogy, crystallography and the allied sciences and provided for several forms of membership, as follows:

1. *Fellows,* who are to be nominated by the council, must qualify for eligibility by having produced some published results of research in mineralogy, crystallography or the allied sciences. Fellows are eligible for office in the society and may vote upon amendments to the Constitution.

2. *Members,* who comprise persons who are engaged in or interested in mineralogy, crystallography or the allied sciences, but who are not qualified for fellowship. Membership carries with it the right to vote upon all matters except the amendment of the Constitution, but members are not eligible for office.

The Constitution also provides for *Patrons,* who shall have conferred material favors upon the society and *Correspondents,* or residents outside of North America who are sufficiently distinguished in the subjects for which the society stands to warrant their receiving this recognition.

Because it was recognized that the comparatively small attendance at the meeting did not adequately represent the probable initial membership of the society, the lists of charter fellows and members have been kept open until a later meeting of the society.

It is expected that the general membership of the society at the close of 1920 will number some 350 to 400 fellows and members.

It was decided to publish a journal devoted to mineralogy, crystallography and the allied sciences, which shall be the official organ of the society, and which the general membership of the society shall be entitled to receive. The present plan is to enlarge the *American Mineralogist* to include research papers and abstracts, but at the same time to retain the valuable features of this publication which has become recognized as of permanent interest to such collectors and amateurs who are eligible to membership but not fellowship. The council of the society has under consideration the question of affiliation with the Geological Society of America.

The provisional officers of the new society which were elected at the December meeting are: President, E. H. Kraus, of the University of Michigan; Vice-president, T. L. Walker, of the University of Toronto; Secretary, H. P. Whitlock, of the American Museum of Natural History; Treasurer, A. B. Peck, of the Bureau of Standards, Washington;