erly represented. The *Journal of Comparative Medicine and Veterinary Archives* is mentioned but once in the catalogue, although there were eighteen leading articles in which bacteria were described as the cause of the disease mentioned, and in some cases extensive studies were given of the diagnostic and cultural characters of the organisms. In the *American Veterinary Review,* not noticed in the catalogue, there appeared sixteen original articles similar to the above. In the *Medical Dial,* also not noticed, were nine leading articles treating of bacteriological studies, diagnoses and bacterial investigations of water supplies, milk, etc. The *Medical Record,* to which there appear five references for the whole year, contained in the issues from June to December, twenty-two articles that one would have expected to have found mentioned.

Since this publication, having an American representative, shows such an inadequate representation of American literature, it can hardly be wondered that so many European investigators not having access to the original publications are unacquainted with what is done on this side. Omissions from the present volume are to be included in the next, according to a note in the catalogue, and it is to be sincerely hoped that a greater effort will be made to fairly represent our American scientific literature.

WALTER H. EVANS.

WASHINGTON, D. C.

BOURNE'S COMPARATIVE ANATOMY OF ANIMALS.*

THE first volume of the two comprising this work has already been noticed in this journal (SCIENCE, Vol. XII., p. 311, 1900). The present volume consists of a series of somewhat detailed descriptions of the structure and ontogeny of selected types of animals, the whole being intended to fit students for the preliminary and intermediate examinations in the British universities. The animals selected are the liverfluke (how this is cœlomate does not appear), earthworm, fresh-water mussel, snail, *Apus, Astacus,* cockroach, *Amphioxus,* dogfish, frog, with a chapter on other annelids and a final one on the mammals.

As a whole, the descriptions are clear and accurate, and the seventy-seven illustrations illustrative of the text. Particularly instructive is the cut (fig. 44) of the pharyngeal region of *Amphioxus.* However, it is not well adapted for use in American schools, for it tells the student just those points which we insist that he shall ascertain for himself, so far as possible, from the specimen. As a 'cram manual' it would have a value. Lastly, the title is misleading. The whole work is descriptive, not comparative; in fact comparisons and broader features are rare in this second part, which in many respects falls short of the first volume.

J. S. KINGSLEY.

* 'An Introduction to the Study of the Comparative Anatomy of Animals,' by Gilbert C. Bourne. Vol. II., 'The Cœlomate Metazoa.' London, George Bell and Sons, 1902, pp. xv + 321. 4*s.* 6*d.*

SCIENTIFIC JOURNALS AND ARTICLES.

THE March number (Volume 9, No. 6) of the *Bulletin* of the American Mathematical Society contains: Report of the ninth annual meeting of the American Mathematical Society, by Professor F. N. Cole; Report of the December meeting of the San Francisco Section, by Professor G. A. Miller; 'The abstract group G simply isomorphic with the alternating group on six letters,' by Professor L. E. Dickson; 'Note on a property of the conic sections,' by Professor H. F. Blichfeldt; 'The analytic theory of displacements,' by Mr. R. W. H. T. Hudson; Notes; New publications. The April number of the *Bulletin* contains: Report of the January meeting of the Chicago section, by Professor T. F. Holgate; 'Some groups in logic,' by Professor E. W. Davis; 'Cesàro's Intrinsic Geometry,' by Dr. Virgil Snyder; 'Gauss's Collected Works,' by Professor James Pierpont; 'Analytic projective geometry,' by Dr. E. B. Wilson; Shorter notices; Notes; New publications.

SOCIETIES AND ACADEMIES.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 562d meeting was held January 31, 1903.

Professor A. N. Skinner, of the Naval Observatory, spoke by invitation on the 'Prog-

ress of the Zone Observations of the Astronomische Gesellschaft.'

All determinations of the positions of the fixed stars through the time of Hevelius (1650) were made without the use of the telescope. The time of Flamsteed (1725) marks the first use of the telescope for this purpose. Bradley's star-place determinations (1750) are considered to be the beginning of the astronomy of precision. Among the astronomers who led in the determination of star places were: Lalande at Paris, 50,000 star places (1800); Piazzo at Palermo, 6,700 star places (1800); Rümker at Hamburg, 70,000 star places (1835); Lamont at Munich, 33,000 star places (1845).

At the suggestion of Bessel the Berlin Academy of Sciences (1825) undertook the publication of star charts to contain all stars visible with a 3-inch telescope to be executed by different observers and to cover the belt $-15°$ to $+15°$ of declination. To furnish a groundwork for these charts Bessel swept over this area $-15°$ to $+15°$ decl. in zones with a meridian instrument, and determined the places of a large number of stars for 1825. Later he extended his zones from $+15°$ to $+45°$ decl., embracing a total of 70,000 star places between $-15°$ and $+45°$ decl. Argelander, a pupil of Bessel, extended Bessel's zone determinations from $+45°$ to $+80°$ decl. at Bonn (1842) with 22,000 star places, and southward from $-15°$ to $-31°$ decl., also at Bonn (1850), with 17,000 star places.

Bessel expected that only a few years' time would be required to complete the Berlin Academy charts, but their execution dragged along until 1860, when at last they were finished.

Because the Berlin Academy charts, then incomplete, proved inadequate to satisfy the increasing needs of astronomy, Argelander, with his assistants at Bonn, in 1852 commenced the 'Great Bonner Sternverzeichniss' to give the approximate places of all stars visible with a 3-inch telescope from $-2°$ to $+90°$ declination, accompanied by an atlas of all the stars. This great work, comprising 324,198 stars in three quarto volumes with the atlas, was finished in 1860. In 1886 Argelander's successor at Bonn, Schönfeld, extended this great catalogue from $-2°$ to $-23°$ declination in a quarto volume containing 133,659 stars.

The Astronomische Gesellschaft, founded in 1865, planned the first division of their great zone catalogue to comprise accurate determinations of the places of all the stars to the 9.0 magnitude, inclusive, contained in the 'Bonner Sternverzeichniss' from $-2°$ to $+80°$ declination, the work to be distributed among different observatories in zones of about five degrees broad. The following observatories participated in this work: Kasan, Dorpat, Christiania, Helsingfors, Cambridge (U. S.), Bonn, Lund, Leiden, Cambridge (England), Berlin, Leipzig, Albany (U. S.), Nikolajew. This series of catalogues in fifteen volumes has been published except the Dorpat zone. These fifteen catalogues will contain about 137,000 star places for the epoch 1875.0.

Immediately on the appearance of the southern extension of the Bonner Sternverzeichniss' by Schönfeld in 1886, the Astronomische Gesellschaft arranged for the determination of all the stars to the 9.0 magnitude, inclusive, in Schönfeld from $-2°$ to $-23°$ declination. The following observatories agreed to participate in this work: Strassburg, $-2°$ to $-6°$ declination; Wein-Ottakring, $-6°$ to $-10°$; Cambridge (U. S.), $-10°$ to $-14°$; the Naval Observatory, Washington, D. C., $-14°$ to $-18°$; Algiers, $-18°$ to $-23°$.

Wein-Ottakring has published the journal of its zone observations $-6°$ to $-10°$; the Naval Observatory has published the journal for the zone $-14°$ to $-18°$ as Volume II. of its publications, second series, 525 pages quarto. The discussion of the results and the preparation of the catalogue from the Washington observations are in progress.

Mr. R. A. Harris then pointed out 'The Uses of a Drawing Board and Scales in Trigonometry and Navigation.' The object is to solve graphically spherical triangles. The apparatus consists of a board about 40 x 20 inches, with angular graduations on three sides radiating from the center of one long side, and of edge scales graduated to give

various functions of an angle or of half the angle, together with the usual T-square and straight edge. By these instruments a plane triangle is constructed having sides and angles proportional to the proper trigonometrical functions of three known parts of the spherical triangle to be solved; then the remaining parts may be scaled off.

The next paper was a report by Mr. F. G. Radelfinger 'On the Analytic Representation of Function.'

The general problem of obtaining an analytic development coextensive with the domain of existence of a function was stated by way of introduction; then the author reviewed the most important recent researches bearing on this general problem. He confined himself in the main to a synopsis of the results obtained by Mittag-Leffler in his four 'notes,' which have appeared at intervals during the last three years in his journal, the *Acta Mathematica.*

The analytic developments constructed by Mittag-Leffler are in the form of series n times infinite, which can be transformed into singly infinite series of rational polynomials; these developments converge within an extended region, which for $n = \infty$ coincides with a star introduced by him; the star embraces the whole plane excepting radial crosscuts extending from each singular point to infinity. Several methods of constructing these expressions have been made use of and expounded in the several notes. Borel's work was also reviewed, and the extension thereof by Mittag-Leffler.

The next paper was 'On the Foundations of Geometry and on Possible Systems of Geometry,' by Dr. Henry Freeman Stecker, of Cornell University. In the absence of Dr. Stecker his paper was presented by Mr. Radelfinger.

After an introduction on the assumptions which must be made in constructing a geometry, Dr. Stecker reviewed the criticisms of Moore and Schur of Hilbert's classic paper of 1899, recently translated, and announced the concluson that in spite of all criticisms and attempted improvements, Hilbert's system has 'withstood all attacks, and remains not only apparently sound in logic, but the simplest of such systems as have thus far been constructed.'

An account was next given of Hilbert's second, and recent, great memoir, *Mathematische Annalen,* Bd. 56, which has for its object to establish Lie's well-known and indispensable results, without the assumption, made by Lie, that the functions defining the displacements are differentiable. In solving the problem Hilbert makes use of Cantor's theory of point-assemblages and Jordan's theory of a closed curve free from double points. Hilbert's results, so far as they go, establish the independence of Lie's results of the assumption stated above, but they have yet to be extended to elliptic geometry and also to space.

In conclusion a thesis by Hamel, a pupil of Hilbert's was discussed, which leads to the conclusion that 'from the standpoint of the calculus of variations the Euclidean geometry is the simplest possible.'

CHARLES K. WEAD,
Secretary.

NEW YORK ACADEMY OF SCIENCES.

SECTION OF ANTHROPOLOGY AND PSYCHOLOGY.

THE regular meeting of the section was held February 23, in conjunction with the New York branch of the American Psychological Association, Professor Thorndike presiding. Afternoon and evening sessions were held, the members dining together at the close of the afternoon session. The following papers were presented:

'Phonetic Surveys,' Professor E. W. Scripture. After brief mention of the phonetic surveys being carried on by Grierson in India and Guilleron in France, a description was given of the chief talking machine methods that may be used for this purpose. It was pointed out that the advances in the construction of phonographs, graphophones and gramophones during the last couple of years have been so great as to revolutionize these methods. It was also explained that making a speech record was like taking a photograph; everybody can take a picture, but a good picture requires skill. By use of the grapho-

phone the records made on wax cylinders can be used for making metal molds; from these indestructible molds copies in hard wax can be made. The gramophone method likewise furnishes metal molds from which hard discs are produced; but the talking machine requires an expert. This gramophone method was lately used on three expeditions sent out by the Vienna Academy of Sciences. The new methods furnish records that are perfect in recording every detail of the voice. There is not the slightest loss even of the most difficult consonants. Criticisms stating the contrary are derived from acquaintance with methods that are now out of date. From the gramophone records the curve of speech can be traced off with great accuracy; whereby every detail of the voice can be measured. A similar method can be applied to phonograph records. It was urged that the fast disappearing dialects and languages should be recorded and preserved in one of these ways. It was pointed out that such records could be made and delivered at smaller cost per word than in the case of Guilleron's 'Atlas.' It was stated that the various talking machine companies have shown self-sacrificing interest in such work, and that the Victor Talking Machine Company would be willing to loan its record-taking car when it is finished. Exhibits of various material and speech curves were made.

'Correlations of Measurements of Growth,' Dr. Clark Wissler. (Read by title.)

'Correlations in School Children,' Dr. J. H. Bair. The measurements were taken on Worcester school children. A high coefficient of correlation was shown between stature and height-sitting, stature and weight, and height-sitting and weight. Between stature, height-sitting, weight, with length of head and width of head the amount of correlation was much less and much more irregular than between the measurements first named. This irregularity was partly due to the small number of cases examined.

'Apparent Motion in Stereoscopic Vision,' Professor J. E. Lough. Stereoscopic pictures may be united without the aid of a stereoscope, *i. e.*, by direct fixation, whenever the distances between similar objects in the two pictures is not greater than the interocular distance. When pictures are so united—giving a direct perception of the third dimension—any movement of the picture from side to side gives the impression that objects in the background are moving through a greater distance than are the objects in the foreground. This 'slipping' of the background is perceived with still greater vividness when the picture remains stationary and the head is rotated or moved from side to side. In bringing a stereoscopic picture nearer the eyes the background seems to approach more rapidly than the foreground, and in moving the picture away from the eyes the background seems to move away more rapidly. The apparent motion in stereoscopic pictures seen under the above conditions is probably due to the fact that the angle of parallax remains constant, while the line of direction varies, with every movement of the head or of the picture.

'An Experiment in Facial Vision,' Professor Robert MacDougall. The paper supplements and in three respects aims to correct the reports of previous experiments on facial vision. In the perception of objects in proximity to the face independently of the sense of sight, the nature of the sensory impression upon which perception depends is not commonly discriminated. In the present investigation the percentage of correct perceptions was found to lie between 50 and 75, that is, within the subliminal region. This result is contrary to previous work in which the percentage lay clearly above the threshold of 75. If a true perceptual process be involved, the percentage of correct responses should be a function of the absolute differences between the objects discriminated. This was found to be the case in the present set of experiments, but not in preceding investigations. In work published heretofore the perception was reported to be mediated solely by sensations of sound, but in the present investigation the shutting off of auditory stimulation made practically no reduction in the percentage of correct responses.

'Notes on the Washington Meeting,' Professor E. H. Sneath. The Washington meeting, if compared with a possible meeting of psychologists twenty-five years ago, shows the lines along which progress has been made. Such a comparison demonstrates clearly (1) the special training required of the psychologists of to-day; (2) the position of psychology among the sciences; (3) the growth of productive scholarship; (4) the differentiation of the work into experimental, genetic, comparative, abnormal, educational, etc.; (5) the development of new methods of approach.

'Grades for Mental Traits,' Professor J. McKeen Cattell. This paper treated the accuracy with which grades can be assigned for college studies, and the methods to be employed in assigning grades. Those who do well in one study or have one trait in excess are likely to do well in other studies and to have other traits in excess, and they are more likely to succeed in after life. It was shown, however, that the grades assigned to students have not very great validity. It was recommended that grades be assigned in a scale of ten and that a probable error be attached to the grade. The grades should represent groups of equal size rather than equal differences in merit. The paper also discussed the grade assigned to large groups for mental, moral and physical traits, and gave some of the results that the writer had obtained.

'A Preliminary Report on Tests of One Hundred Men of Science,' W. H. Davis. (Read by title.)

JAMES E. LOUGH,
Secretary.

THE TEXAS ACADEMY OF SCIENCE.

AT the regular meeting of the Texas Academy of Science held in the chemical lecture room of the University of Texas on Friday evening, November 28, 1902, the following papers were presented by title:

'Contribution to a Knowledge of the Coleopterous Fauna of the Lower Rio Grande Valley in Texas and Tamaulipas, with Biological Notes and Special Reference to Geographical Distribution,' by C. H. T. Townsend, El Paso.

'Poisonous Snakes of Texas,' by J. D. Mitchell, Victoria.

Mr. E. C. H. Bantel, instructor in engineering, University of Texas, gave an illustrated lecture on 'Iron Smelting.'

At the formal meeting held in the university auditorium on Monday evening, December 29, 1902, Dr. William L. Bray, professor of botany, delivered an illustrated lecture on 'The Evolution of the Flower and its Relations to Insects and other Pollenizing Agents.'

The following papers appeared by title on the program of this meeting:

'The Effect of Weeds and Moss upon the Coefficients of Discharge in Small Irrigating Canals,' by J. C. Nagle, professor of civil engineering in the Agricultural and Mechanical College of Texas, College Station.

'The Decomposition of Potassium Chlorate at Fixed Temperatures,' by Eugene P. Schoch, Ph.D., and J. S. Brown, B.S.

'The Kinetics of Oxidation Reactions. Example I. The Equilibrium between Potassium Ferrocyanide, Potassium Ferricyanide, Iodine and Potassium Iodide,' by Eugene P. Schoch, Ph.D., instructor in chemistry, University of Texas.

'Contribution to the Chemistry of Fatigue,' by Dr. Henry Winston Harper, professor of chemistry in the University of Texas, and Margaret Holliday, M.S.

At the regular meeting held in the zoological lecture room of the university, on Saturday evening, March 14, 1903, the following papers were presented, both of which were illustrated with stereopticon views:

'Some Wholesome Educational Statistics,' by W. S. Sutton, M.A., professor of the science and art of education in the university.

'Steel Making,' by E. C. H. Bantel, C.E., instructor in engineering.

FREDERIC W. SIMONDS,
Secretary.

CLEMSON COLLEGE SCIENCE CLUB.

AT the regular monthly meeting of the club on Friday evening, February 27, Professor J. V. Lewis presented an illustrated paper on 'The Occurrence and Origin of Corundum in the Eastern United States.'

Corundum occurs in the crystalline rocks of the Appalachian region in granite, gneiss, mica-schist, crystalline limestone, etc., but thus far the only deposits that have been profitably exploited occur in basic magnesian rocks, chiefly peridotites, with smaller bodies of pyroxenites and amphibolites. The sapphire or gem variety, common corundum, and emery have all been found in this region. The second occurs most commonly with the peridotites, and, except in one or two localities, is much the most important. It occurs at intervals from Alabama to Massachusetts, and has been mined in Pennsylvania, North Carolina and Georgia, occurring chiefly in vein-like zones about the borders of the peridotites and sometimes penetrating the mass of these rocks.

North of North Carolina the peridotites are extensively altered into serpentine, steatite, etc. In North Carolina and southward they are chiefly unaltered. The studies of Lewis and Pratt have demonstrated (1) that the peridotites are igneous intrusives, and (2) that the corundum has most probably been formed by segregation from a state of solution in the molten magma. These results have been briefly presented in a report shortly to be published by the North Carolina Geological Survey.

In the discussion of this paper, Dr. P. H. Mell stated that he had had occasion to investigate these peridotites and corundum deposits in the seventies, when they were first beginning to attract attention. He collected material from which, to the best of his knowledge, the first corundum wheel ever made had been manufactured. He traversed the whole region, from Alabama to Massachusetts, and arrived at the conclusion that both the corundum and the peridotites are of igneous origin, which view was almost unanimously rejected by geologists at the time. Therefore, he was very much gratified to find that the results of the latest investigations of these rocks confirmed his own conclusion.

CHAS. E. CHAMBLISS,
Secretary.

A. AND M. COLLEGE OF SOUTH CAROLINA,
CLEMSON COLLEGE, S. C.

VERMONT BOTANICAL CLUB.

THE eighth annual winter meeting of the Vermont Botanical Club was held at the University of Vermont on January 16 and 17. The officers were reelected for the ensuing year as follows:

President—Ezra Brainerd, Middlebury College.
Vice-President—C. G. Pringle, University of Vermont.
Secretary—L. R. Jones, University of Vermont.

It was the sentiment that the summer field meeting, about July 1, be held on Stratton Mountain.

The following program was presented:

CLIFTON D. HOWE: Annual Address—'Some Results of Deforestation in Vermont.'

PRESIDENT EZRA BRAINERD: 'Vermont Violets.'

WILLIAM H. BLANCHARD: 'More Finds in My Section.'

MISS ALICE E. BACON: 'An Experiment with the Fruit of the Red Baneberry.'

MRS. FREDERICK A. RICHARDSON: 'Reversion in a Columbine.'

MISS ELIZABETH BILLINGS: 'A Many Branched Spleenwort.'

WILLIAM STUART: 'Nitrogen Gatherers.'

MRS. H. E. STRAW: 'Ferns of Smugglers and Nebraska Notches.'

H. M. SEELEY: 'My Aster.'

MRS. E. B. DAVENPORT: 'Recollections of Mr. C. C. Frost.'

L. R. JONES: 'The Frost Herbarium.'

JOHN HENLEY BARNHARDT: 'A List of Vermont Local Floras.'

E. A. BURT: 'The Thelephoræ of Vermont.'

MRS. NELLIE F. FLYNN: 'Additions to the Flora of Burlington and Vicinity during 1902.'

G. T. MOORE: 'The Pollution of Water Supplies by Algæ.'

MISS RUTH B. FISHER: 'An Appeal for More Study of the Lower Plants in our Schools.'

PRESIDENT EZRA BRAINERD: 'The Chandler Herbarium.'

W. W. EGGLESTON: 'A Canoe Trip in Northern Maine.'

CARLTON D. HOWE: 'Plant Progression.'

F. A. ROSS: 'Vagaries of *Hepatica*.'

MISS M. EVA BAKER: 'The Message of the Trees.'

L. R. JONES,
Secretary.

NEBRASKA ORNITHOLOGISTS' UNION.

THE fourth annual meeting of the Nebraska Ornithologists' Union was held in Lincoln, Neb., January 24, 1903, on which occasion the following papers were read:

REV. J. M. BATES: President's address—'Birds and Man.'

MRS. C. S. LOBINGIER: 'Educational Value of Bird Study.'

MISS ANNA CALDWELL: 'Devices for Interesting Children in Bird Study.'

REV. J. M. BATES: 'Observations on the Number of Birds to the Square Mile in Custer County.'

MR. WILSON TOUT: 'The Crow in Nebraska.'

MR. MYRON SWENK: 'The Birds of the Niobrara Valley.'

DR. R. H. WOLCOTT: 'Birds of Cherry County, Neb.

DR. R. H. WOLCOTT: 'Remarks on a Record of Nebraska Ornithology.'

Newly elected members raised the total membership of the society to nearly two hundred.

The following officers were elected:

President—F. H. Shoemaker, Omaha.

Vice-President—Miss Anna Caldwell, Lincoln.

Corresponding Secretary—J. C. Crawford, Jr., West Point.

Recording Secretary and Editor (permanent)—Dr. R. H. Wolcott, University of Nebraska.

Treasurer—Mr. August Eiche, Lincoln.

Executive Committee—Dr. G. E. Condra, University of Nebraska; Dr. H. B. Lowry, Lincoln; J. A. Dickinson, Gresham.

The office of Custodian was created as a permanent office and Myron Swenk, of Lincoln, appointed to fill it.

The presentation of a considerable amount of material, including many skins on which records are based, was reported, and it was resolved to secure, if possible, for the collection, all the material in the state upon which the past records of the occurrence of rare birds in Nebraska had been based.

A committee was appointed to complete the formal organization of the Audubon Auxiliary and to put in definite shape terms of affiliation between it and the union.

ROBERT H. WOLCOTT,
Secretary.

DISCUSSION AND CORRESPONDENCE.

BIOMETRY AND BIOMETRIKA.

TO THE EDITOR OF SCIENCE: May I as one of the editors of the above journal make a personal appeal to the American scientific world through your columns? My reasons for doing so are twofold. In America the novel, be it in science, politics or industry, is not *a priori* condemned as the undesirable or the fatuous, which is its customary fate in Europe. Secondly, the list of American subscribers to our journal shows us that American biologists and mathematicians are willing to consider on its own merits what biometry has to say for itself; they are not from the beginning hostile to the new movement. In Europe the older teachers will have nothing to do with the subject. The list of subscribers shows that we depend chiefly upon the younger workers here; and every difficulty is put in the way of their doing biometric work. This is extremely serious, for it means that appointments and fellowships will not follow on research work in biometry, and thus young scientists are and will be discouraged from taking it up. Quite recently a young American biometrician working here was surprised to find the scorn with which the officials at a great national institution treated his measuring work. 'Well, tell us what biometry has proved?' was the question put to him by officials, whose library contained no copy of the journal, and who apparently had never studied its pages. Another young worker proceeding to take up a colonial appointment was warned by one of the doyens of zoology on all grounds to give up this foolish biometric work. A third, going to work in one of the greatest continental zoological laboratories, finds its world-renowned head disgusted because he attempts to solve a problem by statistics which in fact can and can only be solved in that way.

None of our responsible biometricians claim that there is *one* way only of solving *all* biological problems, but solely that there is only one way, the statistico-mathematical method, in which *certain* problems can be answered. We do not, therefore, aim at depriving biologists, pure and simple, of their field of ac-