previously published and discussed in such a connected form, and are alone well worth the price of the book. Not less interesting and valuable are the portions devoted to antifouling paints, carriage and house painting and furniture varnishing.

Being a treatise on the industrial and artistic technology one scarcely expects to find much chemical information; there are, however, excellent chapters on the oils, particularly one on linseed oil by Dr. McIlhiney. It would have materially aided the chemist to have found an equally good and complete description of the gums used in varnish manufacture.

Throughout the entire work, one can not help being impressed with the wide practical experience of the author in the technology of paints and varnishes, and particularly with their applications.

The work should be in the hands of the architect, whether engaged in the erection of sky-scrapers or summer houses, of the civil engineer, having to do either with bridge or water works construction, of the naval constructor, and in fact of any one concerned with the preservation of wood or metal.

A. H. GILL.

GAUPP'S ANATOMY OF THE FROG.*

In preceding numbers of SCIENCE (Vol. VII., p. 463; X., p. 451; XV., p. 100) the earlier parts of this monumental work on the structure of the frog have received notice. The present part completes the whole, making a total of 1,738 pages, aside from preface, etc., entirely devoted to this one form. No other vertebrate, man excepted, has ever had such exhaustive treatment.

This concluding portion, 521 pages in all, is devoted solely to integument and sense organs, all treated in the same careful manner as the other systems, but, as would be expected, microscopic detail is emphasized here as in no other parts. Not only do we have a general

* A. Ecker's und R. Wiedersheim's 'Anatomie des Frosches auf Grund eigener Untersuchungen durchaus' neu bearbeitet von Dr. Ernst Gaupp. IIIte Abtheilung, IIte Hälfte, pp. 441–961 + xi. Braunschweig, 1904.

account of the structure of the skin and its glands like that given in the first edition of the work (familiar in most laboratories in Hassal's translation), but we are given a good summary of the known facts, structural and physiological, of the color changes and details of the breeding-season changes in specific regions of the skin.

In treating of the sense organs each section is followed by a résumé of the development of each and an account of its functions. Thus in connection with the nose we have an account of the course of the air in the different parts of the nasal cavity, and the evidence to show that the frog is an 'air smeller' even when submerged. It is especially in the section pertaining to the ear that the largest proportion of new facts are given, since Dr. Gaupp has made certain parts of the otic region peculiarly its own.

In conclusion, we may say that the work is one which must be in every laboratory, and while we can hardly expect the whole to be translated we wish that at least certain portions, like that on the central nervous system, were more accessible to our students. Congratulations must be extended to the author on the completion of such a vast amount of work.

J. S. KINGSLEY.

SCIENTIFIC JOURNALS AND ARTICLES.

THE opening (October) number of Volume 11, of the *Bulletin of the American Mathematical Society* contains the following articles: 'On Developable and Tubular Surfaces having Spherical Lines of Curvature,' by Professor Virgil Snyder; 'Addition to a Theorem due to Frobenius,' by Professor G. A. Miller; 'On Self-Dual Scrolls,' by Professor E. J. Wilczynski; 'The Opportunities for Mathematical Study in Italy,' by Dr. J. L. Coolidge; 'Vector Analysis' (Review of Henrici and Turner's Vectors and Rotors, of Kelland and Tait's (Knott) Introduction to Quaternions and of Fischer's Vectordifferentiation und Vectorintegration), by Dr. E. B. Wilson; 'The Mathematics of Insurance' (Review of Loewy's Versicherungsmathematik), by Dr. Saul Epsteen; Shorter Notices (Seliwanoff's 'Lehrbuch der Differenzenrech-

nung'), by Dr. Saul Epsteen; Notes; New Publications.

The November number of the *Bulletin* contains the following articles: 'Report of the Eleventh Summer Meeting of the American Mathematical Society,' by Professors M. W. Haskell and H. S. White; 'Report of the October Meeting of the San Francisco Section,' by Professor G. A. Miller; 'The Foundations of Mathematics' (Review of B. Russell's Principles of Mathematics and Foundations of Geometry), by Dr. E. B. Wilson; Notes; New Publications.

The General Index of the first thirteen volumes of the *Bulletin,* 1891–1904, compiled by Dr. Emilie N. Martin, has just been issued as a separate publication. The 80 pages comprise indexes according to authors, works reviewed, and subject matter, the last classified according to the Répertoire bibliographique des Sciences mathématiques. There is also an index of all papers read before the Society since 1891.

THE October number (Volume 5, No. 4) of *The Transactions of the American Mathematical Society* contains the following papers:

F. S. MACAULAY: 'On a Method of dealing with the Intersections of Plane Curves.'

J. M. PEIRCE: 'On Certain Complete Systems of Quaternion Expressions, and on the Removal of Metric Limitations from the Calculus of Quaternions.'

L. P. EISENHART: 'Three Particular Systems of Lines on a Surface.'

E. J. WILCZYNSKI: 'On Ruled Surfaces whose Flecnode Curve intersects every Generator in two coincident Points.'

J. I. HUTCHINSON: 'On the Automorphic Functions of the Group (0, 3; 2, 6, 6).'

H. F. BLICHFELDT: 'A Theorem concerning the Invariants of Linear Homogeneous Groups, with some Applications to Substitution Groups.'

F. MORLEY: 'On the Geometry whose Element is the 3-Point of a Plane.'

G. A. BLISS: 'Sufficient Conditions for a Minimum with respect to One-Sided Variations.'

H. L. RIETZ: 'On Groups in which certain Commutative Operations are Conjugate.'

M. FRÉCHET: 'Sur les Opérations Linéaires.'

H. TABER: 'On Hypercomplex Number Systems (first paper).'

This number also contains: Notes and Errata, Volumes 1, 3, 4, 5; Table of Contents, Volume 5; Indices by subject matter, authors and numbers, Volumes 1–5.

The Popular Science Monthly for November opens with an account of 'The International Congress of Arts and Science,' by Wm. Harper Davis, illustrated by many portraits of those who participated therein. The rest of the number is devoted to addresses delivered at the congress and includes 'Present Problems of Inorganic Chemistry,' by Sir William Ramsay; 'The Light of the Stars,' by E. C. Pickering; 'Fundamental Concepts of Physical Science,' by Edward L. Nichols; 'The Methods of the Earth Sciences,' T. C. Chamberlin; 'Utilitarian Science,' by David Starr Jordan, and 'The Evolution of the Scientific Investigator,' by Simon Newcomb. In the 'Progress of Science' the editor briefly reviews the work of the congress and incidentally queries whether or not the amount accomplished justified the expenditure. The papers read and meetings held were, after all, but a small part of the good accomplished. As in almost every gathering of scientific men, the real good was the bringing together and meeting of those who participated, and particularly the privilege enjoyed by the younger men of meeting the acknowledged masters in science. Papers may be read at any time, but the men who present them are often names only and devoid of the personality that results from actual acquaintance.

The Museums Journal, of Great Britain, for October, contains for its leading article an account of the 'Norwich Castle Museum,' by Thomas Southwell. The interest of the number, however, centers around a letter by E. Ray Lankester, on 'Museums and Nature Study,' in which he points out most admirably some of the purposes for which museums and their scientific staff exist. In this connection it may surprise some to learn that the British Museum has no lecture hall.

Another most important article is a communication from Luca Beltrami, included under the title 'A Mediæval Vestment,' in

which he draws attention to the ethics in the case of the cope of Nicholas IV., which was abstracted from the cathedral at Ascoli and has been purchased by J. Pierpont Morgan.

SOCIETIES AND ACADEMIES.

AMERICAN MATHEMATICAL SOCIETY.

DURING September and October the American Mathematical Society held three several meetings. Of these the first in interest and importance was the eleventh summer meeting, held at St. Louis on September 16–17, thus immediately preceding the congress of arts and science of the Louisiana Purchase Exposition. Nearly forty members of the society attended this meeting, and there were present also by invitation Professors Gino Fano, of Turin, who brought greetings from Italian colleagues, and Henri Poincaré, of Paris, who read a paper on ' Closed geodesics on a closed convex surface,' a subject which had attracted his attention on account of its importance in connection with the discussion of trajectories in celestial mechanics. A detailed account of the meeting will be found in the November number of the *Bulletin* of the society, which also contains a report of the meeting of the San Francisco section at the University of California, October 1. At the latter meeting the program included a conference on recent investigations on the teaching of elementary geometry.

The one hundred and twentieth regular meeting of the society was held at Columbia University on Saturday, October 29, with an attendance of twenty-four members. President Thomas S. Fiske occupied the chair. Nominations of officers and members of the council to be elected at the annual meeting in December were adopted and ordered placed on the official ballot. The committee on the financial support of the *Transactions* reported a favorable outlook, several universities already having promised assistance in the form of a subvention. The expense of publishing the *Transactions* has been $2,000 per annum, of which amount ten universities have thus far contributed one half, the balance being met by the society and by returns from sub-

scriptions and sales. Committees were appointed to consider measures for providing for the increasing burden of administration and to audit the treasurer's accounts.

The following papers were read at the October meeting:

DR. EDWARD KASNER: ' Contact transformations and related systems of curves.'

DR. MAX MASON: ' The doubly periodic solutions of $\Delta u + \lambda A (x, y) u = f (x, y)$.'

PROFESSOR E. B. VAN VLECK: ' A proof of some theorems on pointwise discontinuous functions.'

PROFESSOR HENRY TABER: ' Hypercomplex number systems.'

MR. J. C. MOREHEAD: ' Note on a theorem of Lucas on Fermat's numbers.'

PROFESSOR E. W. BROWN: ' On the completion of the new lunar theory.'

PROFESSOR VIRGIL SNYDER: ' Quintic scrolls having a tacnodal or an oscnodal conic.'

PROFESSOR G. A. MILLER: ' Groups of subtraction and division.'

The following new members have recently been admitted to the society: Mr. R. P. Baker, Union Academy, Anna, Ill.; Dr. W. H. Bussey, Evanston, Ill.; Dr. H. A. Converse, Baltimore Polytechnic Institute; Mr. A. M. Curtiss, State Normal School, Oneonta, N. Y.; Professor G. R. Dean, University of Missouri; Dr. E. L. Dodd, University of Iowa; Dr. Saul Epsteen, University of Chicago; Professor R. R. Fleet, William Jewell College, Mo.; Professor E. D. Grant, Michigan College of Mines; Mr. J. E. Higden, Shortridge High School, Indianapolis, Ind.; Dr. L. E. Karpinski, University of Michigan; Dr. O. C. Lester, Yale University; Professor Tullio Levi-Civita, University of Padua; Professor J. C. Lymer, Lawrence University, Appleton, Wis.; Professor W. F. Moncreiff, Winthrop College, S. C.; Mr. Arthur Ranum, University of Wisconsin; Mr. C. S. Sisam, U. S. Naval Academy; Miss Adelaide Smith, Huguenot College, Wellington, S. A.; Dr. Clara E. Smith, Yale University; Professor C. M. Snelling, University of Georgia; Professor Eduard Study, University of Bonn; Professor D. T. Wilson, Case School of Applied Sciences. The total membership of the society is now 480.

F. N. COLE,
Secretary.