the cross-section of the pupa of a bee (p. 199) and the expert will certainly not regard an illustration of this kind as a triumph of the art of photomicrography. Nevertheless many of the figures, particularly those in the chapter on birds, are of an unusually high order. Although the book cannot be described as a well-balanced zoology, and is open to serious objections as a laboratory guide, its clear and truthful presentation of many elementary facts will certainly gain for it a wide circulation.

G. H. PARKER.

HARVARD UNIVERSITY.

SCIENTIFIC JOURNALS AND ARTICLES.

WE note a little tardily *The Plant World* for March which contains articles on 'American Botanical Gardens,' by John W. Harshberger, a sketch of Lewis David von Schweinitz, by C. L. Shear and John Stuart Mill and 'Botanical Study,' by E. J. Hill. In the supplement Charles L. Pollard continues the description of the families of the Order Ericales.

The Osprey for April has a paper on 'The Feeding Habits of the Coot and Other Water Birds,' by Barton W. Evermann, and one on the 'Birds of the Marianne Islands and their Vernacular Names,' by W. E. Safford. The supplement, devoted to the General History of Birds, discusses the question of molt.

The Museums Journal of Great Britain for April has a flattering article on 'The Museums of Chicago,' by F. A. Bather, being a review of Dr. Meyer's memoir. But it is to be feared that we are not so well up in the matter of museum methods and general appreciation of museums as Mr. Bather thinks: it is one of the numerous cases of distance, etc. William E. Hoyle notes 'Some Useful Applications of Card Catalogues' and we have the usual number of interesting notes which do credit to Mr. Howarth's industry as an editor.

THE publication of the *Biological Bulletin* will be resumed in June, when the first and second parts of Volume III. will be issued. It will be published as heretofore, under the auspices of the Marine Biological Laboratory, and its scope will include zoology, general biology, and physiology. The editorial staff consists of Professors E. G. Conklin, Jacques Loeb, T. H. Morgan, W. M. Wheeler C. O. Whitman, E. B. Wilson and Frank R. Lillie, managing editor. In regard to the *Bulletin* Professor Lillie says: "There is in America no journal that takes the place of the *Biologisches Centralblatt* or the *Anatomischer Anzeiger* in Germany, although there is abundance of material to support such a publication. It is hoped that the *Bulletin* may occupy this field, and meet the need for rapid publication of results; the editors, therefore, undertake to issue one number each month, making two volumes a year, if the material offered is sufficient. The subscription price of the *Bulletin* has been fixed at three dollars for a volume of 300 pages; the low price makes it necessary to limit the length of the articles, and to exclude all lithographic plates. In no case will articles of more than twenty-five pages be included in any single number; but, in some cases, longer articles may be accepted, and published in installments. The cost of illustrations above $10 for any single article will be charged to the author, as will also be the cost of unusual alterations in the proof. The *Bulletin* will undoubtedly meet a real need; but the responsibility for its success rests with American biologists, and the editors therefore confidently appeal to them for their support. This can be most practically given in the two forms of subscriptions and contributions to its pages." All communications, subscriptions, and manuscripts should be sent to the managing editor, the University of Chicago, September 15 to June 15, or Wood's Holl, Mass., June 15 to September 15.

The Journal of Mycology, of which seven volumes were published from 1885 to 1894, is now resumed by Dr. W. A. Kellerman, Ohio State University, Columbus, Ohio, at the former price, namely, one dollar per year. It will be issued quarterly, the May number being the first for 1902 (Vol. 8); but the second number will appear early in June.

SOCIETIES AND ACADEMIES.

AMERICAN PHYSICAL SOCIETY.

THE April meeting of the Physical Society was held at Columbia University on April 21,

this date being chosen instead of the usual one on account of the reception tendered on that day to the Society's only honorary member, Lord Kelvin. The meeting was the most largely attended in the history of the Society. The program, which was so extended as to make it hardly practicable to give an abstract of the individual papers, was as follows:

'Note on the Specific Heat of Mercury': H. T. BARNES.

'On the Theory of Concentration Cells': H. S. CARHART.

'An Apparatus for the Quantitative Study of Sound': A. G. WEBSTER.

'The Magnetic Deviation of Rays from Radio-Active Substances': E. RUTHERFORD and A. G. GRIER.

'The Condensation of Nuclei': CARL BARUS.

'A New Gravity Electrical Time Key': CHAS. FORBES.

'An Electrical Method for Calibrating Chronographs': H. C. PARKER.

'Absorption Curves for Condensers for Very Short Time Intervals': H. C. PARKER.

'Residual Magnetism in Iron and Steel for Very Short Intervals of Time': C. C. TROWBRIDGE.

'An Experiment Relating to the Application of Lagrange's Equations to Electric Currents': W. S. DAY.

'The Physical Meaning of Mathematical Operations in Heat Conduction': A. S. MACKENZIE.

'A New Method of Integrating one of the Differential Equations of Heat': R. S. WOODWARD.

'An Instrument for Drawing a Sine Curve': A. S. MACKENZIE.

'Three Lecture Experiments': W. S. FRANKLIN.

ERNEST MERRITT,
Secretary.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 552d regular meeting was held April 26, 1902. Mr. W. J. Spillman, of the Department of Agriculture, described 'A Machine for producing Normal Equations from Observational Equations.'

The work to be done in this case consists in multiplying each equation through by the coefficient of a given term of the equation, and in collecting the new coefficients of homologous terms into sums which are the coefficients in the normal equation. The method here described is applicable to cases where the number of terms in the normal equation is not greater than four. The machine contains a number of levers, pivoted at center, and graduated each way from the center to 10. The length of the graduations is arbitrary. Each lever is provided with four indicator slides, two on each side. The slides are set so as to point out on the lever scale the coefficients of the terms of an observational equation. The lever is then said to be set for that equation. From the slides cords pass upward to four systems of pulleys, in such manner that moving the levers vertically causes each cord to actuate an index finger attached to the uppermost pulley in each system. A convenient scale is arranged near one end of the lever, and is graduated into ten equal divisions, numbered from 0 to 10. The lever being raised from the zero to any point on this scale causes the index fingers to move on four similarly graduated arcs, and to point out on these scales the products of the coefficients by the number to which the indicator on the end of the lever points.

Other levers are set for other observation equations, as above. When any lever is raised so as to point to the number by which its equation is to be multiplied, the new coefficients of that equation are added to those already produced. When all the levers that are set are properly adjusted, the index fingers point out the coefficients of the normal equation.

A similar machine had proved very useful in problems requiring multiplication and summation of corresponding products.

The next paper was by Mr. L. J. Briggs, also of the Department of Agriculture, 'On the Absorption of Gases and Dissolved Salts by Quartz and Glass.'

In one series of experiments very finely powdered quartz was used and the weights of water vapor or carbon dioxide absorbed thereby were determined; these were found to be closely proportioned to the pressure of the vapor or gas. Similarly experiments were made with very dilute solutions of chlorides, carbonates and hydroxides of sodium, potassium and ammonium. The quantity absorbed increases much less rapidly than the concentration and appears with these salts to be dependent on the acid radical rather than upon the basic ele-

ment. The importance of such investigations in their relations to soil-physics and scientific agriculture was pointed out.

Erratum.—In the report of the 551st meeting (SCIENCE, May 2, 1902, page 710) the statement regarding the consumption of liquid air should read fifty gallons per week.

CHARLES K. WEAD,
Secretary.

THE SECTION OF GEOLOGY AND MINERALOGY OF THE NEW YORK ACADEMY OF SCIENCES.

THE Section met on the 24th of April, and listened to the reading of two papers, abstracts of which follow:

Lea McI. Luquer, 'On the Determination of the Relative Refractive Indices of Minerals in Rock Sections by the Becke Method.'

In most schemes for the optical determination of minerals in rock sections, the birefrigence and resulting interference colors are made the basis of the scheme of classification. It is also desirable, however, to bring into consideration an approximate knowledge of the indices of refraction, and where the relative differences in the indices of two adjoining minerals are required, the method devised by Becke is found to be very convenient. This method depends upon the principle of the total reflection of light, and with proper adjustment of the microscope, which is to be focused sharply on the dividing plane between the two minerals, it is possible by slightly raising the objective, to observe a 'bright line' on the side of the mineral having the higher index of refraction.

The main precautions to be observed are that the cone of incident light be small, the sections very thin, the cementing material not much lower in refractive index than either of the minerals to be determined, and the plane of contact clear and nearly vertical. When the contact plane is much inclined, the method cannot be applied.

By this method very slight differences in refraction can be distinguished; as for example, between quartz sections cut parallel and at right angles to the optic axis with the difference

$$\varepsilon - \omega = 0.009, \quad \varepsilon = 1.553, \quad \omega = 1.544$$

Dr. Luquer's paper has been published in the *School of Mines Quarterly* for January, 1902, pages 127–133.

Austin F. Rogers, 'The Minerals of the Joplin, Mo., Lead and Zinc District.'

The minerals of the Joplin district include sulphur, galena, sphalerite, covellite, greenockite, wurtzite, chalcopyrite, pyrite, marcasite, quartz, cuprite, pyrolusite, limonite, calcite, dolomite, smithsonite, cerussite, aurichalcite, hydrozincite, malachite, azurite, calamine, muscovite, chrysocolla, allophane, pyromorphite, barite, anglesite, leadhillite, caledonite, linarite, gypsum, goslarite, chalcanthite, melanterite, copiapite and bitumen, all of which have been found by the writer.

Lamellar twinning has been observed in galena, the twinning planes being vicinal tetragonal trisoctahedra. Covellite is found replacing sphalerite. Wurtzite occurs in distinct hemimorphic crystals, the first instance of the kind to be reported. Twin crystals of marcasite are common, among them cyclic fivelings. Quartz crystals are rare and small. Calcite presents an interesting field for crystallographic study, about twenty-four types with a total of twenty-nine crystal forms having been noted. Twinning according to all of the four laws for calcite has been observed. Some distinct crystals of aurichalcite confirm D'Archiardi's observations that the mineral is monoclinic and that the axial angle β is not 90°. Calamine occurs in doubly terminated crystals which show their hemimorphic character plainly. Seamon's theory as to the formation of calamine from 'tallow-clay' is not in all cases applicable. The rare copper-lead basic sulphates, caledonite and linarite, occur at one mine at Galena, Kansas. This mine also furnishes covellite, cuprite and aurichalcite.

The observed paragenesis generally follows this order: dolomite, galena, sphalerite, chalcopyrite, marcasite, pyrite, barite, calcite. The total absence of certain silicates and the rarity and small size of the quartz crystals strongly preclude the theory that the lead and zinc ores have been brought up from great depths by hot waters.

Attention was called to the coincidence in

the location of the ore deposits of this and neighboring districts and the border areas of the Ozark uplift, as pointed out by Haworth.*

A fuller discussion of the minerals noted in this paper and their occurrence will be found in the forthcoming 'Lead and Zinc Report of the University Geological Survey of Kansas.'

Edmund O. Hovey,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the meeting of May 19, 1902, fifteen persons were present. Professor C. M. Woodward presented some notes on the 'Stresses in a Rotating Disk,' from which it appeared that the stresses in such a disk, as, for instance, in an emery-wheel or grindstone, when mathematically analyzed, are entirely tangential, notwithstanding the fact that the disk increases in diameter when rotated at a high rate of speed, so that the tendency to fracture is along radial lines. Professor Woodward also discussed the stresses in the disk when bound by a thin cylinder of greater strength and a high modulus of elasticity.

One person was elected to active membership.

William Trelease,
Recording Secretary.

THE PACIFIC COAST ASSOCIATION OF CHEMISTRY TEACHERS.

The Association organized last summer, held its first regular meeting as Berkeley, April 26, The Association was started during the session of the summer school of the University of California by a few teachers who were in attendance, and who realized the importance of a better understanding among themselves as to the proper methods of teaching chemistry. During the first six months of its existence a number of 'Circulars of Information' were issued, and the membership steadily increased until it now numbers about fifty. In April the Association had become strong enough to begin to hold meetings for the discussion of subjects of interest to the members. The first meeting was held in the chemistry building of the University of California and was attended by representatives from the principal schools in that part of the state within easy reach of Berkeley. Two subjects had been assigned for discussion, both dealing with the proportion of work that should be done by the teacher and the student respectively. But the discussion took a wider range and covered the entire subject before the meeting adjourned. While there was considerable difference of opinion as to methods, it was the unanimous opinion of those present that it is necessary to emphasize the practical, everyday side of chemistry to make it interesting and attractive to the beginner.

The Association is planning to hold its annual meeting in July during the summer school at the University, when teachers from all parts of California and the other Pacific states gather at Berkeley in large numbers.

Edward Booth,
Secretary.

University of California.

* *Bull. Geol. Soc. Amer.*, 11: 221, 1900.

DISCUSSION AND CORRESPONDENCE.

THE COMING MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Unfortunately the list of officers of the coming meeting of the American Association in Pittsburgh was dropped by the printer from the paged proofs of the Preliminary Circular, and the omission was not detected until the entire edition had been printed and mailed. That there may be no misunderstanding the list of officers for this meeting is herewith given:

OFFICERS OF THE PITTSBURGH MEETING.

President.

Asaph Hall, U. S. N., South Norfolk, Conn.

Vice-Presidents.

A—Mathematics and Astronomy, G. W. Hough, Northwestern University.

B—Physics, W. S. Franklin, Lehigh University.

C—Chemistry, H. A. Weber, Ohio State University.

D—Mechanical Science and Engineering, J. J. Flather, University of Minnesota.

E—Geology and Geography, O. A. Derby, Sao Paulo, Brazil.