conquest of the country by Europeans. Most of these are the work of tribes speaking either the Nahuatl (Aztec) or the Maya languages; but others are from the Zapotec or Mixtec regions, these representing different linguistic stocks.

The accurate reproduction, by modern methods, of these remarkable monuments of a perished civilization is one of the most valuable services which can be rendered to the study of American archæology; and in presenting in all respects a fac-simile of one of the most perfect, the Codex Vaticanus No. 3773, the Duke de Loubat has added another and a most important item to his many claims on the gratitude of those interested in the ancient history of America. His edition leaves nothing to be desired in point of faithfulness to the original; and that it is in fact a gift to science, being chiefly distributed to public libraries, excites just admiration for the liberality as well as the appreciative scholarship of the donor.

The Codex in this edition is accompanied by two articles from the pen of the well-known archæologist, Father Francisco del Paso y Troncoso, one on the proper sequence of the pages of the manuscript, the other on its probable age and origin. The former is indispensable to its comprehension.

This Codex was included by Lord Kingsborough in his great work published in 1831; but not only was the copy prepared by his artist defective in various particulars, but its pages were erroneously arranged, so that the study of it became hopelessly confusing.

From what is know of the classes of native writings, this Codex is recognized as of Nahuatl origin and is concerned with the ritual year of 260 days, doubtless either in its divinatory applications, or as regulating the fasts, festivals and other religious ceremonies of the temples. The opening pages give the *tonalamatl*, or list of days, and on the last is the picture of a masked figure indicating the astrological relationship of the various parts of the body.

As we have in the 'Borgian Codex' a document from the same locality, and also ritual in its character, there are facilities for the explanation of this Vatican Codex not to be found in other instances.

So far as its history is concerned it rests in obscurity. It was certainly in the Vatican library as early as 1596, and may have reached there about 1550. But, of course, no question can be raised concerning its authenticity, and its composition previous to any European influence in Mexico. We thus have, by the generous action of M. de Loubat, placed within the reach of students probably the best conserved example of that once rich native literature in which were stored the history, religion and science of aboriginal American civilization.

D. G. Brinton.

SCIENTIFIC JOURNALS.

AMERICAN CHEMICAL JOURNAL, FEBRUARY.

A Contribution to the Study of Water Solutions of Some of the Alums: By H. C. Jones and E. Mackay. Various methods have been used in investigations of the conditions existing in a solution from which double salts will crystallize out. The question to be decided was whether the double salt was present as such in solution, or was formed at the moment of crystallization. The methods used may be grouped under the following heads, as they have to do with (*a*) the diffusion, (*b*) the thermal changes, (*c*) the volume changes, (*d*) the solubility, (*e*) the electrical properties, or (*f*) the cryoscopic behavior of solutions of the compounds under investigation. After reviewing these methods the authors state that the aim of the present work was to obtain, from a study of the conductivity of solutions of alums, data which would justify more definite conclusions than had yet been drawn. They have compared the electrical conductivity and cryoscopic behavior of the double salts with that of their constituent salts to see if they corresponded to mixtures. The methods of work, analyses and preparation of various alums are given. The results obtained by the conductivity method show that in dilute solutions the complex alum molecules are broken down completely into the molecules of the simpler sulphates, which dissociate as if alone, while in more concentrated solutions the alums are either partially undecomposed or the dissociation is not complete. Potassium chrome alum apparently exists as such in moderately concentrated

solutions. These results in general are confirmed by the freezing point measurements.

Silicides of Copper and Iron: By G. DECHALMOT. In a former number of this journal the author described a silicide of copper of the composition Cu_2Si_3. Upon repeating the work with different specimens he found that the substance obtained was a mixture of silicon, copper silicide and copper. The mixture forms apparently homogeneous pure crystals, which fact led him to think they were of the composition given above. He has also obtained a silicide of iron to which he gives the composition $FeSi_2$.

Formation of Diacetylenyl (Butadiine) from Copper Acetylene: By A. A. NOYES and C. W. LUCKER. Several investigators have described a crystalline product obtained by the action of acetylene (from copper acetylene) on boiling bromine. The composition ascribed to it was $C_4H_2Br_6$, and the present investigation was undertaken to verify this and to determine the origin of the compound. Pure acetylene (from calcium carbide) would not produce it, and it was finally discovered that the action would take place more readily if cupric chloride was added to the copper acetylene before its decomposition, as the formation was due to the oxidizing action of the cupric chloride formed by the action of the air on the copper acetylene and hydrochloric acid. The study of the compound led to the conclusion that it is formed by the direct union of the hydrocarbon C_4H_2 with bromine.

On the Action of Acid Chlorides on the Imido Esters and Isoanilides, and on the Structure of the Silver Salts of the Anilides: By H. L. WHEELER and P. T. WALDEN. The authors thought that light might be thrown on the constitution of the silver salts by the study of the action of acid chlorides on compounds that are definitely constituted as the silver salts are supposed to be. From the action of acid chlorides on isoanilides and imido esters results were obtained which admit of only one interpretation according to which the reactions are explained, not by tautomerism, but by addition. This proves also that the metal in the silver salts of the anilides is directly joined to oxygen. The reactions of acid chlorides with imido esters also showed that diacid amides have both acid groups attached to the nitrogen. These results were further confirmed by the action of the halogens on the imido esters.

On the Effect of Light on the Displacement of Bromine and Iodine from Organic Bromides and Iodides: By J. H. KASTLE and W. H. BEATTY. In studying the decompositions of the halogen derivatives of the sulphonamides it was found that the halogen was set free, to a considerable extent, by the action of sunlight. If a substance containing both chlorine and bromine is exposed to the sunlight in a sealed tube with water the chlorine is first set free, and after some time, from the action of this chlorine, the bromine is set free. Chlorine set free in this way could displace bromine and iodine from their most stable compounds. Parallel experiments carried on in the sunlight and in the dark showed that up to 50° no change took place in the dark, while the action in the light was marked.

The Specific Gravities of Water Solutions of Formic Acid: By G. M. RICHARDSON and P. ALLAIRE. The authors have determined the specific gravity of solutions of formic acid, making seventy-one determinations between the pure acid and a solution containing only 0.618 per cent., and have tabulated the data obtained.

The Constitution of Benzanilide: By N. KNIGHT. There are two possible formulæ for benzanilide, and a method which was suggested to establish the correct one was to study the reactions of benzene sulphanilide with benzoylchloride and of benzanilide with benzenesulphonchloride. The results, however, were different from those expected, dibenzoylanilide being the chief product, and no important conclusions as to the structure could be drawn.

A number of recent publications are also reviewed in this number of the *Journal*, viz.: *Traité de chemie organique d'après les theories modernes*, A. BÈHAL; *Analytical Chemistry*, N. MENSCHUTKIN; *Recherches sur la congelation des solutions aqueuses étendues*, M. A. PONSOT; *Kurzes Lehrbuch der organischen Chemie*, A. BERNTHSEN; *Studies in Chemical Dynamics*, J. H. VAN'T HOFF; *The Chemical Analysis of Iron*, A. A. BLAIR (3d edition); and *Gas and Fuel Analysis for Engineers*, A. H. GILL.

J. ELLIOTT GILPIN.

THE JOURNAL OF COMPARATIVE NEUROLOGY, DECEMBER, 1896. DOUBLE NUMBER.

The Brain of the Bee—A Preliminary Contribution to the Morphology of the Nervous System of the Arthropoda: By F. C. Kenyon, Ph.D., Clark University. This memoir contains the first really successful and comprehensive application of modern methods to the central nervous system of the insects. Dr. Kenyon was very successful with the newer silver and hæmatoxylin methods, though the difficulties in this research were very great. This communication contains a detailed description of the structure, especially the fiber connections, of the brain of the honey bee, with the exception of the optic lobes, which are reserved for separate treatment. Thirty-two cell groups are enumerated and their connections given so far as known. The text comprises 78 pages and there are nine plates, three of photographs, two of silver preparations and four charts in colors showing the courses of the fibers in detail. Among the results perhaps the most interesting relates to the structure of the so-called mushroom bodies. Additional evidence is adduced to show that the function of these peculiar bodies is that of enabling the insect to intelligently adapt itself to its surroundings. They are shown to be connected at their calices with two pairs of sensory tracts of fibers from the optic lobes, with three from the antennal lobes and with one that is probably also sensory from the ventral nervous system. Their roots are shown by fragmentary evidence, sufficient to warrant the conclusion, to be very probably connected with the inner terminals of motor, or possibly of other efferent fibers.

The Origin and Growth of Brain Cells in the Adult Body: By Howard Ayers. The recent discovery of the centrosome in both vertebrate and invertebrate nerve cells has brought into prominence anew the question as to whether the current doctrine that adult nerve cells do not divide is true. It will be remembered that Herrick and others have long claimed that it is not, and now Dr. Ayers brings forward fresh evidence. In the brain of the adult Torpedo he finds cells dividing in a very characteristic manner and these are especially abundant in the electric lobes. The centrosome was found, but the division is apparently amitotic. In the electric lobes there is also another remarkable feature. The overgrown ganglion cells have applied themselves to the walls of the arterial capillaries and there spread themselves out, thus affording the best possible facilities for nutrition.

The Innervation of the Auditory Epithelium in Mustelus canis DeKay: By A. D. Morrill. This paper gives a summary of the results of some very successful methylen blue preparations of the ear of the smooth dog-fish. No continuation of the nerve into the cell was observed, although the cells were semi-transparent. Satisfactory evidence of anastomosis of nerve fibers was not obtained. There are two kinds of nerve endings in the auditory epithelium, the one being free near the surface, and the other ending in knob-like structures in contact with the base of the hair cells.

Neural Terms, International and National: By Burt G. Wilder, M. D., Cornell University. In this extensive paper of 136 pages Dr. Wilder has brought together the main points in his voluminous writings on nomenclature, together with much new matter, and has arranged the whole in the form of a systematic presentation of the principles of nomenclature and their application to the nervous system, which should be a standard of reference for many years to come. The immediate occasion of the paper is the report of the Committee on Anatomical Nomenclature of the Anatomische Gesellschaft, Basel, 1895. As this German committee is to report again after three years, it is very desirable that in the meantime all questions of nomenclature should receive careful attention. The paper contains a valuable list of definitions of terms employed in the discussion, a review of the author's work on nomenclature, full discussions on the reports of the American and German committees and extensive comparative tables of terms of brain anatomy, together with a bibliography.

AMERICAN GEOLOGIST, FEBRUARY.

A tribute to Professor Ch. Fred. Hartt, By Frederic W. Simonds.

Dr. F. W. Sardeson continues his correlation studies on the Galena and Maquoketa

series. In this paper he discusses the species commonly known as *Orthis testudinaria*, and concludes that several separate forms are generally comprised in it and that the original species has no typical American representative.

Professor Jules Marcou finishes his review of 'Rules and Misrules in Stratigraphic Classification.' Especial application is made to various members of the Orodovician, Mesozoic, Tertiary and Quaternary. In a postscriptum the three official geological maps of the State of New York are compared in some detail.

The extreme rapidity of weathering and stream erosion in the artic latitudes is described by Professor R. S. Tarr. The abundant lichen flora, the air and water and the great variations of temperature are the active agents.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES, FEBRUARY 1, 1897.

SECTION OF ASTRONOMY AND PHYSICS.

THE first paper was one postponed from last month by H. Jacoby, 'On two Trailplates of Circumpolar Stars, made by Anders Donner at the Helsingfors Observatory.'

It was explained that these photographic negatives of circumpolar stars were taken with the telescope stationary, and hence that each star left a trail upon the plate, which, after necessary corrections, would be an arc of a circle around the true north pole of the heavens. The exposure, which was for a few moments at intervals of a half hour, extending over 14 hours, thus gave a series of short arcs extending over a little more than a semicircle. This method, if no unforeseen difficulties appear, should give the position of the pole to within a few hundredths of a second of arc and a system of right ascensions differing from the truth by a uniform correction.

The paper was discussed by R. S. Woodward and others.

Mr. P. H. Dudley then presented a paper under the following title: 'Investigations of Undulations in railway tracks by his track indicator, and the reduction of two-thirds of the amount in the last fifteen years, by the use of his stiff-rail sections.'

Mr. Dudley pointed out the causes and character of the inequalities in railroad rails, and described his very perfect car for obtaining a complete record of the condition of the track while travelling at 20 to 25 miles per hour. Among other records given is the summation of the inequalities of the rail per mile. A dozen years ago this total unevenness amounted to six or seven feet even on the better roads; now as a result of the records of the car, and of new designs and methods of manufacture of rails, the total has been reduced to 18 to 20 inches. It was shown that this remnant was due to dents in the rails and could not be helped by work on the road bed, but must be reduced by further improvements in the manufacture of the rails.

Sections of rails and indicator records were exhibited, and lantern slides shown to illustrate the above improvements on the New York Central and Boston and Albany system. A great proportion of the gain is due to the improvement in Mr. Dudley's improved rail sections, which give a maximum of rigidity and wear, with a minimum of weight.

R. S. Woodward pointed out the extreme importance of many of the problems upon which Mr. Dudley is working, and hoped that the author's idea of a rail-rolling machine, which would turn out a 60-ft. rail *straight* and *cold*, would soon be put into operation. W. Hallock remarked upon the advantages to science which were sure to come from the author's investigation of many physical questions which cannot be studied in a laboratory and need a railroad to experiment with.

J. J. Stevenson called attention to what the community at large owes to Mr. Dudley's improvements. It means heavier engines, heavier cars, longer trains, greater speed, reduced freight and passenger rates, all of which greatly contribute to the general welfare and the advance of civilization.

H. S. Curtis presented a paper on 'The advantages of long-focus Lenses in Landscape Photography.' After referring to the unsatisfactory results of photographing landscapes with ordinary lenses, owing to false perspective and lack of detail, he showed how this was remedied by lenses of longer focus. A telescopic