are few and the book furnishes an excellent idea of the structure of the cat, free from a superfluity of detail which too often serves merely to conceal from the young student the fundamental principles which they may be intended to elucidate. Profusion of detail does not always make for accuracy in the student and it is principles rather than facts that he should acquire from his laboratory training.

Throughout the book are frequent remarks of a comparative nature and at the close of each chapter is a list of questions or suggestions, for the most part of a general nature, which will serve as excellent topics for comment by the teacher or for collateral investigation under his direction by the student. An introductory chapter is devoted to an account of useful methods by which the dissection of a mammal may be facilitated, and the text is illustrated by numerous figures and diagrams for the most part admirably executed.

J. P. McM.

SOCIETIES AND ACADEMIES.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 573d meeting was held November 7. Dr. A. L. Day spoke on 'The Black Body and the Measurement of Extreme Temperatures.' He outlined the history of the theoretical study of the problem, and showed how such a body had been constructed artificially; he then discussed at length the results of experiments made with it, pointing out the relation between the temperature and the total radiation, and between the temperature and the wave-length of radiation of maximum intensity, and expressing these relations by equations; from these equations temperatures outside the range of measurement can be calculated by extrapolation.

Mr. C. E. Van Orstrand followed with 'Notes on the Emission Function,' discussing mathematically the second of the equations presented by the preceding speaker.

AT the 574th meeting, held November 21, the subject of 'Synchronous Actions in the Atmospheres of the Sun and the Earth' was discussed by Professor F. H. Bigelow, of the Weather Bureau. The curves first published in 1894, showing simultaneous variations in the sunspot areas, the magnetic field, the pressures and temperatures of the northwestern states, the movements in latitude and longitudes of the storm centers, were compared with the prominence secular variations and found to agree. The meteorological data have been extended to all parts of the earth and they give similar variations, supplemented by inversion of the type. Thus the direct type of temperature prevails throughout the tropics, and the inverse type in the temperate zones; the direct type of pressures holds around the Indian Ocean and the inverse type in North and South America. The distribution of the prominences in latitude and their movements in the eleven-year cycle were explained, also their distribution in longitude. From the latter were derived the periods of rotation of the sun in different zones, and the variations of the several periods in the eleven-year cycle, which gave the same curve as holds for the prominence frequency. This important phenomenon was referred back to the internal circulation of the sun, and it confirms the second case of von Helmholtz's equations, as applied to a rotating mass heated at the center. The fundamental period of the sun's rotation is that of the equator, 26.68 days, and as this is the shortest possible period in the sun it follows that numerous determinations of the solar rotation from terrestrial phenomena, such as aurora, thunderstorms, must be excluded as misleading. The observed synchronism at the earth has its basis in the sun's circulation, and this is of a kind to produce vertical polarization, and an internal magnetic field. Hence all stars should be magnetized while the process of cooling under their own gravitation is going on.

Mr. L. A. Bauer then presented several brief 'Contributions to the Theory of the Earth's Permanent Magnetism.' He showed that the energy of the earth's magnetization had diminished by one thirty-sixth part in forty-six years. He stated as a result of his analysis that the principal cause of secular variation resides outside the earth's crust. He also attempted a calculation of the magnetic en-

ergy per unit of area at the surface of the earth.

The 575th meeting on December 5 was set apart for the annual address of the retiring president, Professor James Howard Gore. His subject was 'The Geoidal Figure of the Earth.' He pointed out that four views had been held successively regarding the form of the earth—that it was a plane, a sphere, a spheroid, and a geoid; he traced the history of the measurements that had led to the successive views, and discussed at length the present conclusions of geodesists.

Charles K. Wead,
Secretary.

GEOLOGICAL SOCIETY OF WASHINGTON.

At the 146th meeting held on November 25, 1903, the following papers were presented:

Ninth Session of the International Congress of Geologists, at Vienna: S. F. Emmons.

The Alaska-Treadwell Mine: A. C. Spencer.

The Stratigraphic Position of the Judith River Beds: T. W. Stanton and J. B. Hatchel.

The above papers have been or shortly will be published in full.

The 147th meeting of the society was held on December 9. Under the title 'Notes on the Deposition of the Appalachian Pottsville,' Mr. David White presented certain conclusions respecting the physical geography of the Aplachian trough during early Pennsylvanian time, with correlations based largely on the study of the fossil plants. These show the existence in lower Pottsville time of an axial trough near the eastern margin of the present coal region. The loading and subsidence of this relatively narrow trough led to the submergence of the western land, and in late Pottsville time the transgression of the sea across the bituminous regions of Pennsylvania, Ohio, western Maryland and northern West Virginia. The thickness of the Pottsville sediments, about 1,200 feet in the type section, was shown to be about 4,000 feet near the eastern border, in southwest Virginia near the Tennessee line.

Dr. George H. Girty made a comparison of sections of upper Paleozoic rocks in Ohio and northwestern Pennsylvania. He showed that not the Shenango sandstone, as had usually been supposed, but a much lower bed in the Crawford County section, was equivalent to the sub-Olean conglomerate. This was determined by tracing eastward from its typical locality the Corry sandstone, which near Warren was found to occupy a position just above the sub-Olean. The latter, therefore, would appear to occur at about the horizon of the Berea grit of Ohio, which is the same as the Cussewago sandstone, which lies not far below the Corry sandstone in Professor I. C. White's section of Crawford and Erie counties.

The Waverly group of Ohio was explicitly included by Meek and Worthen, along with the Chouteau group of Missouri and the Goniatite limestone of Rockford, Indiana, in their definition of the Kinderhook group or epoch. The only Waverly fauna well known at that time was the fauna of the Cuyahoga shale, and these authors seem to have had in mind as the Kinderhook fauna chiefly that of the Chouteau limestone. If any precise correlation is possible between the Waverly group and the early Mississippian of the Mississippi valley, it lies between the middle member of the Cuyahoga formation and the Chouteau limestone. It follows, therefore, that the series of rocks and faunas in southwestern New York which overlie the true Chemung, inclusive of the sub-Olean conglomerate, recently assigned by Professor J. M. Clarke to the Carboniferous, really lie below the base of the Carboniferous system as at present recognized in this country, just as they lie above the Chemung beds, the recognized top of the Devonian. This series, having an approximate thickness of 500 feet, represents an interval not provided for in the geological time-scale, and for it the term Bradfordian is proposed. This term, which will rank with Senecan, Chautauquan, etc., includes the Cattaraugus, Oswayo and Knapp beds of the New York section, which may provisionally be accepted as its subdivisions. The position of this series as an unrecognized interval in the time-scale is quite apart from the determination of its age as Devonian or Carboniferous,

a question which is reserved for further study and discussion. The Bradfordian faunas are equally distinct from those of the Chemung group, on one hand, and from those of the Waverly group, on the other. They contain to some extent an intermingling of Carboniferous and Devonian species, and are in fact transitional between those of the two eras corresponding to the position of the rocks in which they are found.

A recent bulletin of the U. S. Geological Survey, by Professor H. S. Williams, which deals with the migrations of faunas, so far as it involves the rocks and faunas under consideration, is based upon a misconception of their stratigraphic relations.

This was followed by a paper entitled 'Fluorspar Deposits of Southern Illinois,' by Dr. H. Foster Bain.

These deposits occur within an elliptical area about forty miles in diameter covering positions of southern Illinois and the adjacent part of Kentucky, and forming a truncated dome probably reduced to a peneplain in Tertiary time. The region is one of the normal faulting and the individual blocks of strata are very irregularly disposed. The ore occurs in fissure veins along these fault planes. In the region are a number of dikes of mica-peridotite, biotite-pyroxenite and diabase. The type of deposits, unusual in the Mississippi valley, associated with the igneous rocks suggests a genetic relation and the analogy with the fluorspar deposits of the northern England is very close.

THE 148th regular and 11th annual meeting of the society took place on December 10. The first part of the meeting was occupied by the presidential address of Dr. C. Willard Hayes, entitled 'Should There be a Federal Department of Mines.' Later the reports of the secretaries and treasurers were presented followed by the election of officers for the ensuing year.

President—C. Willard Hayes.

Vice-Presidents—George P. Merrill and Waldemar Lindgren.

Secretaries—Walter C. Mendenhall and Alfred H. Brooks.

Treasurer—George W. Store.

Members of Council at Large—David White, T. W. Stanton, T. Wayland Vaughan, M. R. Campbell and Leslie F. Ransom.

ALFRED H. BROOKS,
Secretary.

CHEMICAL SOCIETY OF WASHINGTON.

THE 144th regular meeting of the Washington Chemical Society was held on October 8, at 8 P.M., in the assembly hall of the Cosmos Club. In the absence of the president, the meeting was called to order by the vice-president, Dr. E. T. Allen.

The program for the evening consisted of two papers. The first paper, entitled 'Second Report on Cement Analysis,' was presented by Dr. W. F. Hillebrand and dealt with the results of the analyses of two samples of cement material, which were made by nineteen chemists working independently. The results obtained by these chemists were compared with a standard analysis made by Dr. Hillebrand and many of the determinations differed very markedly from the standard results. A discussion of these variations was entered into by the author, and it was pointed out that, although many differences existed among the determinations made by the various analysts, it was not necessary to assume that the source of the errors lay with the method, but was due to other factors which must be taken into consideration.

The second paper on the program was presented by Dr. Atherton Seidell, and was entitled 'Precipitation of Zinc by Manganese Peroxide, with especial reference to the Volhard Method of Determining Manganese.' The problem involved and the method used for the analysis of the precipitate formed in the Volhard method for the determination of manganese were briefly described. The results of the investigation lead to the conclusion that zinc is always carried down by the precipitated peroxide of manganese. The amount found in the precipitate depends upon the quantity which is present in the solution at the time the precipitation is made.

The ratio between the zinc oxide and the manganese peroxide found in the precipitates indicates the formation of mixtures having definite molecular ratios.

The precipitate having the composition $4MnO_2.ZnO$ contained the highest relative amount of zinc which could be carried down in combination with manganese peroxide. The water of hydration in the precipitates was found to be variable, and its amount at any of the temperatures selected for drying did not correspond to a whole number of molecules.

THE 145th regular meeting of the Washington Chemical Society was held November 12 in the assembly room of the Cosmos Club. Dr. H. N. Stokes and Mr. S. S. Voorhees were elected councillors of the American Chemical Society. Dr. Atherton Seidell was elected secretary of the Washington Chemical Society. The first paper on the program, entitled 'European Notes,' was delivered by Professor F. W. Clarke. The speaker described his recent visit to Manchester, England, in attendance upon the meeting held in honor of the one hundredth anniversary of Dalton's discovery. He also told of his visits to Cambridge and the laboratories of Thorpe and Ramsay in London, to a meeting of the Royal Society and the Royal Society Social Club. A short account of the meeting of the Congress of Applied Chemistry held at Berlin was given, after which he described his subsequent visits to Dresden, then to Munich, where he was shown Beyer's laboratory built by Liebig and also made acquainted with the great work in mineralogy which is now being done by Groth. Dr. Clarke also spoke of his visits to Zurich and to Heidelberg. The second paper, entitled 'The Solubility of Calcium Sulphate in Aqueous Solutions of Sulphuric Acid,' by F. K. Cameron and J. F. Breazeale, was presented by Dr. Cameron. The authors showed that in the presence of any concentration of sulphuric acid the solubility curve for gypsum or calcium sulphate did not show a maximum point, as this substance does in pure water, but increases steadily with increase in temperature. At temperatures from 25° C. to 85° C. the solubility of calcium sulphate increases with increasing concentration of sulphuric acid until a maximum is reached and then decreases again. The position of the maximum point on the curve, the concentration with respect to calcium sulphate and sulphuric acid respectively being taken as ordinates, depends upon the temperature. The data obtained seems to negative the assumption that both electrolytes yield a common ion. These hypotheses suggest themselves:

1. That at higher dilutions sulphuric acid yields mainly an HSO_4 ion and with increasing concentration mainly an SO_4 ion. But this assumption is opposed to the results of previous work of others on the conductivity, etc., of solutions of sulphuric acid.

2. That double or bisulphates are formed. An examination of the solid phase in contact with the solution failed to throw light upon this point.

3. That other solubility effects than that occasioned by the ions masked the action of the latter.

No satisfactory criteria exist by which these assumptions may be adequately tested. The authors do not regard the facts as necessarily opposed to the dissociation hypothesis. But the hypothesis in its present form is unsatisfactory and inadequate to furnish assistance in the study of such phenomena.

It was pointed out that in these solutions there was evidence of a condensation of the solvent, water, which might have an important bearing on the apparently abnormal results. Finally, the solubility of calcium sulphate in pure water was discussed in comparison with the results obtained by other investigators.

A. SEIDELL,
Secretary.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 377th meeting was held Saturday evening, November 28.

H. F. Moore spoke on 'The Artificial Fattening of Oysters,' stating that experiments made by the U. S. Fish Commission showed that when placed in artificial ponds, kept at the right degree of temperature and salinity to foster the growth of diatoms, and with the water kept in motion to imitate the movement of the tide, poor oysters rapidly became fat.

F. H. Hillman described 'The Comparative Effects of the Seed Midge and of *Bruchophagus funebris* on the Structure of Clover Flowers and Fruits.' The speaker stated that

the seed midge, *Cecidomyia leguminicola* Lintner, arrested the growth of the clover corolla, usually causing it to project but slightly from the throat of the calyx, while its base became crustaceous, forming a hardened case about the growing larva. At the same time the pistil became aborted, its growth being arrested before fertilization, while, together with the stamens, it was pushed aside by the growing larva. The attacks of *Bruchophagus funebris* (Howard) does not prevent the complete or nearly complete development of the corolla, which, in this case, does not become crustaceous. The ovary becomes nearly mature, its hardened portion being fully formed. The seed attains nearly full size, but instead of being normally violet or yellow, plump and shining, it is brown, dull and somewhat shrunken. The kernel of the seed is practically exhausted, leaving the seed coat as a frail shell.

These essential differences in the life histories of the insects shown in their effects on the clover flowers and fruits appear to afford conclusive evidence of the correctness of Professor Hopkins's opinion that *Bruchophagus funebris* feeds on the clover seed and is not parasitic on the seed midge, as has been believed.

An examination by the author of 32 red clover heads showed 53 per cent. of the seed farmed to be uninjured, while 47 per cent. was destroyed by the *Bruchophagus*.

Enlarged figures showing the structures discussed were displayed.

Charles Hallock spoke on the subject of 'Sea Trout where no Rivers Are,' the object of the communication being to establish the point that the sea trout is not a fresh-water species with marine habits, but primarily a resident of salt water. It was stated that the sea trout of the Shetland Islands and the Labrador coast, which attain a weight of twenty pounds, do not enter rivers to spawn, nor do more than a moiety of the Canadian sea trout, the bulk of these spawning in estuaries in tide water. While these trout were structurally identical with the fresh-water species, they differed widely from the latter in habits, range, food and appearance, and the speaker considered that these facts should be allowed due weight in differentiating between species. In the course of his remarks Mr. Hallock intimated that the salmon of the Atlantic coast passed the salt-water portion of their life in the subarctic belt, being attracted thither by the abundance of coastwise food.

The fourth paper of the evening, entitled 'The Vegetative Vigor of Hybrids and Mutations,' was read by Mr. O. F. Cook. Hybrids and mutations were interpreted as representing opposite side-paths of the evolutionary thoroughfare, the free interbreeding of numerous moderately diverse individuals being the best condition for evolutionary progress. A declining reproductive power characterizes both of these extreme types of variation, but is often accompanied by unusual vegetative vigor. Physiological and selective explanations of this paradox appear to be inadequate, but from the standpoint of a kinetic theory of evolution it was suggested that the vigor is the same as that of normal variations and crosses, while the relative or complete sterility may be due in both cases to the absence of normal interbreeding, which also induces abrupt variations or aberrations of heredity. Vegetative vigor does not, therefore, conflict with the view that hybrids and mutations are degenerative variations. F. A. LUCAS.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 349th meeting was held on November 3, 1903.

Professor W J McGee gave an account of the work performed by the American Anthropological Association at the recent meeting held in New York and also gave a résumé of the work of the Department of Anthropology of the World's Fair at St. Louis.

Mr. Goddard, of the University of California, was present and was invited to address the society. He told of the investigations being carried on in the language, folk-lore and ceremonials of the Indians of California by the Ethnological and Archeological Survey of the state. He spoke of the extinction of stocks and the decay of customs and urged the aid of students before it is too late.

Dr. John R. Swanton gave a communication

on the Haida and other tribes he has been studying. In his winter field work he hopes to ascertain the relationships, if any, between the Tlinkit and the Haida.

On account of the illness of Dr. Lamb his paper went over, and the society resolved itself into a committee of the whole to discuss the subject of cave exploration.

Professor Holmes stated the problems to be solved and mentioned the explorations of Fowke, McGuire, Putnam and Moorehead. He pointed out that caves show undisturbed sites and hence give a good record, and announced that Professor Putnam has found early man with fossils in caves of California. As yet he said the evidence of early man in the caves exploration in the east is negative.

Dr. Fewkes said that caves were gathering places of men for religious purposes as the Cave of the Sun at Porto Plata, where it is believed by the natives that the sun and moon rose. He stated his belief that the lowest form of man is found in South America and in caves in the region of the Tapuyan stock. Dr. Hrdlicka remarked on the caves of northern Mexico where there are (1) shelters showing evidences of fire, chips and bones, and little art; (2) having human burial; (3) the deep variety containing ceremonial objects, and (4) the dwelling caves, and showed all occur in a region inhabited by a single people.

Mr. McGuire gave an interesting account of his recent cave hunting in Maryland and Pennsylvania. He examined a number of caves, and while the finds were numerous no evidence was found as to the antiquity of man.

Professor McGee said that cave studies should be made not so much for man as for paleontology, and should be a geological problem.

The president told interestingly her observations on cave exploration and said that some Indian words indicate going under the ground to enter the house, and perhaps refer to a period when caves were used as habitations.

The 350th meeting was held November 17, 1903.

Dr. J. Walter Fewkes read a paper on the stone collars and tripointed images, or zemes, of Porto Rico. Doctor Fewkes illustrated his paper with large drawings of the types of these specimens. The collars, which are found almost wholly in Porto Rico, are fine examples of stone working, having gone through the process of carving and polishing after the rough work of pecking with a stone hammer. Each collar has an oval, flat, roughened area on one side.

The tripointed images are of five types: (1) Smooth, without decoration; (2) with conoid projection modified into a head; (3) with face on one side; (4) with head on the right and two legs on the left; (5) with four legs. Most of the images have human faces, though some are in the shape of animals and birds. In reference to the relation between the collars and the tripointed images, Dr. Fewkes called attention to the theory of J. J. Acosta that images generally have the same proportion and were placed on the flat surface of the collar and secured by cords. A specimen showing the feasibility of such junction was displayed. Dr. Fewkes said that there is no proof that these objects are not idols and that they show the representation of anthropomorphic gods in Porto Rico. Most of the collars seem to be serpent forms. In absence of data, however, there are still enigmas that require for their solution more field work and research, to which end Dr. Fewkes will devote this winter's labors in the West Indies.

In answer to an inquiry from the president, Miss Fletcher, Dr. Fewkes said that the triform images are geographical and resemble Yunque Mountain. In answer to a question from Mr. McGuire, Dr. Fewkes said there seem to be more triform images than collars, and he further remarked that the locality where the collars have been found has not been recorded.

The secretary mentioned that Professor Mason had remarked on the similarity between the cedar bark collars of the northwest coast Indians and the stone collars of Porto Rico.

Dr. John R. Swanton said that the resemblance is probably accidental and further said that if the Porto Rican collars were evidence of a serpent cult the art modifications might

be due to the transfer of the cult to a locality where serpents do not exist.

In reference to the human remains collected by Dr. Fewkes, Dr. Hrdlicka said that a comparison of the Porto Rican skull with South American skulls shows it to be like specimens from Brazil. In answer to an inquiry from Dr. Lamb, Dr. Fewkes said the bones were found in a mound near Utuado.

Under the head of voluntary communications, Dr. Hrdlicka suggested that archeological and anthropological work be carried on at Panama in connection with work on the canal.

The secretary presented data on the destruction of ruins in the southwestern United States, and suggested that the movement for their preservation inaugurated some years ago be revived. After a brief discussion in which the president, Dr. Kober, Dr. Fewkes and Dr. Hrdlicka took part, the matter was postponed to the next meeting. WALTER HOUGH,

Secretary.

DISCUSSION AND CORRESPONDENCE.

THE ANIMAL PARASITE SUPPOSED TO BE THE CAUSE OF YELLOW FEVER.

TO THE EDITOR OF SCIENCE: In your issue of October 23, 1903, you publish a communication from Mr. J. C. Smith, of New Orleans, in regard to the animal parasite in the bodies of mosquitoes infected from yellow-fever subjects. While the article is on its face contradictory and unsatisfactory, its burden is to claim the credit for scientific work to which he is not entitled. It reflects unfairly and unjustly upon Professor George E. Beyer, associate professor of biology in Tulane University, who was the biologist of the working party of the yellow-fever institute of the U. S. Public Health and Marine-Hospital Service, which made the investigations in Vera Cruz in 1902.

Professor Beyer is an acting assistant surgeon in that service, and for that reason can make no publication in the matter.

In the first paragraph of the article Mr. Smith claims that he was 'the first to have correctly interpreted and given value to the things found in the bodies of the mosquitoes infected from yellow-fever patients.' After setting forth this claim, he closes with the vastly more modest claim that he was entitled to have printed in the report of the working party an acknowledgment of his valuable services in working out the sexual life history of the parasite.

Mr. Smith fixes January 23, 1903, as the time when his assistance was asked, and his work was performed subsequent to that date.

The facts are that the working party discovered the animal parasite in mosquitoes infected from yellow-fever subjects in the summer of 1902, that they classified and named the parasite, illustrated it with drawings, and sent the drawings in November, and a preliminary report to the Surgeon-General in July of 1902, nearly six months prior to the time fixed by Mr. Smith. This report is an official record, is on file in Washington, and of itself shows that Mr. Smith was neither the discoverer nor the first correctly to interpret the parasite.

The eighth paragraph of the article does a particular injustice to Professor Beyer. It says: "Up to this time (January 23, 1903) Professor Beyer, who was the biologist of the party, knew of no evidence of a parasite in these mosquitoes, excepting some granular bodies, as they were styled, which were found in the cell of the salivary glands, and which I afterward showed the party were not granular bodies, but were linear bodies, five or six times longer than wide, the sporozites. On January 30 [1903] I reported having found in the bodies of a number of the mosquitoes an animal parasite in process of sexual development."

Professor Beyer had found this parasite six months before the time fixed by Mr. Smith as the day when he saw it in slides loaned him by Professor Beyer and known by the latter to contain the parasite. A number of physicians were acquainted with the discovery, its interpretation and value, in the summer and fall of last year. Dr. N. Del Rio in a statement acknowledged before the American Consul at Vera Cruz, June 8, 1903, says that as delegates of the Superior Board of Health of Vera Cruz, he, Dr. Matienzo and Dr. Iglesias were, during June and July, 1902, shown by Professor Beyer in the stomach and