cusses and figures 'Arcterica, the Rarest Genus of Heathers,' living on Bering Island. W. F. Ganong has begun a series of descriptions of 'New Precision-appliances for Use in Plant Physiology,' this first paper dealing with a clinostat and a portable clamp stand.

SOCIETIES AND ACADEMIES.

THE NATIONAL ACADEMY OF SCIENCES.

THE following papers were presented at the spring session held at Washington on April 19, 20 and 21.

E. L. NICHOLS and ERNEST MERRITT: 'On Fluorescence Spectra.'

JOHN TROWBRIDGE: 'Spectra of Gas at High Temperatures.'

THEODORE LYMAN, presented by JOHN TROWBRIDGE: 'Short Wave-Lengths of Light.'

H. W. MORSE, presented by JOHN TROWBRIDGE: 'Spectra produced by the Wehnelt Interrupter.'

GEORGE F. BARKER: 'Note on Radioactivity and Autoluminescence.'

R. S. WOODWARD: 'A Double Suspension Apparatus for determining the Acceleration of Gravity.'

R. S. WOODWARD: 'The Compressibility of the Earth's Mass required by the Laplacian Law of Density Distribution.'

HENRY L. ABBOT: 'The Disposition of Rainfall in the Basin of the Chagres.'

A. F. ZAHM, introduced by A. GRAHAM BELL: 'Surface Friction of the Air at Speeds below 40 Feet a Second.'

R. H. CHITTENDEN: 'Physiological Economy in Nutrition, with Special Reference to the Minimal Proteid Requirement of the Healthy Man.' A preliminary Report.

HENRY F. OSBORN: 'Recent Paleontological Discoveries by the American Museum Exploring Parties.'

HENRY F. OSBORN: 'Reclassification of the Reptilia.'

W. D. MATTHEW, submitted by HENRY F. OSBORN: 'Position of the Limbs in the Sauropoda.'

HORATIO C. WOOD, JR., presented by HORATIO C. WOOD: 'A Preliminary Report upon *Apocynum cannabinum*.'

ARTHUR T. HADLEY, presented by the HOME SECRETARY: 'Biographical Memoir of James Hadley.'

CHARLES L. JACKSON: 'Biographical Memoir of Henry Barker Hill.'

ALEXANDER GRAHAM BELL: 'The Multi-nippled Sheep of Beinn Bhreagh.'

SIMON NEWCOMB: 'Application of New Statistical Methods to the Question of the Causes Influencing Sex.'

C. S. PEIRCE: 'Note on the Simplest Possible Branch of Mathematics.'

THE AMERICAN CHEMICAL SOCIETY.

NEW YORK SECTION.

THE seventh meeting of the season was held April 8, at the Chemists' Club, 108 West Fifty-fifth Street. The following program was presented:

The Determination of Manganese as Sulphide and the Composition of the Pink and Green Sulphides: J. C. OLSEN.

Professor Olsen discussed the advantages of separating and determining manganese as sulphide. The method is only practicable, however, when the sulphide is obtained as the green modification which is larger grained than the ordinary pink sulphide and, therefore, settles more readily and is more easily filtered and washed. This is best accomplished by pouring the manganese solution into a boiling solution of ammonium chloride and ammonium sulphide.

On analysis the pink sulphide showed variable amounts of water. This was found to be due to the fact that it is a mixture of a gray sulphide which holds more than three per cent. of water and a red sulphide. This modification was obtained pure and was found to hold the same amount of water as the green sulphide, about three fourths per cent. The difference between the pink and green sulphide is held to be one of molecular structure, rather than of chemical composition or degree of hydration.

On the Combination of a Solvent with the Ions (preliminary paper): J. LIVINGSTON R. MORGAN and C. W. KANOLT.

Preliminary experiments were reported which show that by electrolyzing a solution of silver nitrate and pyridine in water, pyridine migrates with the silver and increases in concentration at the cathode, while it decreases at the anode. With cupric nitrate and water, dissolved in alcohol, water migrates with the copper ions and increases on the cathode and decreases at the cathode.

This indicates the presence in solution of combinations of the ions with the solvent to form complex ions, which break up at the electrodes. The results show only the difference in the amount of solvent carried by the two ions. The application of the law of mass action to one such equilibrium shows that by it van't Hoff's form of Rudolphi's empirical dilution law can be readily derived. Thus, if MA is the salt and S the solvent, we have

$$2MA + (X + 2y + Z)S = (\overset{+}{M}_2 \cdot \overset{+}{X}S) + 2(A \cdot \overline{YS}) + 2S,$$

and if C_S is the undissociated concentration and C_i that of one of the ions and z large compared to x and y, it follows that

$$C_i \frac{(2C_i)^2}{C_S^2} = 4\frac{C_i^3}{C_S^2} = \text{constant},$$

The authors call attention to the fact that in this way it is easy to account for the variation in the speed of migration of the ions with the dilution, the presence of solvent of crystallization and the variation in the value of n in the general empirical dilution law $C_i^n/C^S = \text{constant}$. It was observed that this takes nothing away from the theory of ionization, but, in fact, conditions only those portions of the theory which have hitherto failed to hold.

Thorium, Carolinium, Berzelium: CHARLES BASKERVILLE.

Professor Baskerville reviewed the history of thorium, and especially the recent work bearing upon the question of its complexity. The study of radioactivity of thorium preparations led to the conclusion that thorium itself is not primarily radioactive and that the radioactive substances existing in thorium as ordinarily prepared are far too small in quantity to influence the atomic weight values as reported. Discrepancies in atomic weight determinations led to the fractionation of thorium by means of phenylhydrazine. The investigation of the fractions thus obtained and of the so-called 'volatile thorium' has given evidence of the two new elements, carolinium and berzelium, which differ markedly from thorium in the densities and solubilities of the oxides and in the results of atomic weight determinations by the sulphate method. The purified thorium shows phosphorescence with ultraviolet light, while carolinium and berzelium do not.

Exhibition and Demonstration with Radium of 1,800,000 Activity and Actinium of 10,000 Activity and their Action upon Minerals and Gems: G. F. KUNZ.

Dr. Kunz showed a number of photographic prints made from specimens of pitchblende now in the possesion of the Imperial Museum of Vienna, and added to that collection in the years 1806, 1807, 1814 and 1853. There seemed to be no difference in the intensity of the radioactivity of the specimens recently found (within a year or two in the mines) and those that are fully one hundred years old. Another photograph shown was made in eight seconds by laying a diamond upon a photographic plate and holding a specimen of radium (300,000 activity) on the back. Actinium chloride made by Dr. Debeirne and radium bromide from the Curie laboratories, were exhibited and their effects upon diamond, kunzite and willemite were shown experimentally, as well as a number of illustrations of the penetrating power of the radium rays.

H. C. SHERMAN,
Secretary.

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 358th meeting was held March 22. The election of Lieutenant William E. W. MacKinlay, U. S. A., was announced. The secretary read the notice of the 14th International Congress of Americanists which will be held at Stuttgart, August 18–24, 1904.

Professor Holmes gave an account of the successful archeological work in the West Indies in which Dr. J. Walter Fewkes is engaged this winter.

Dr. I. M. Casanowicz read a paper entitled 'The Scarab.' He gave a description of the beetle and spoke of the ideas of the ancients concerning the habits of this peculiar insect. The earliest scarabs are those of King Nebka, 3,000 B. C. They were in use for 3,000 years, and show the earliest sculpture and evidences of art. The scarab is essentially an Egyptian

gem as the cylinder is Assyrian. Among the funeral scarabs especially to be mentioned were those placed upon the heart of the dead; these were usually inscribed with passages from the book of the dead; they were worn by the living as ornaments and amulets, and the historical scarabs, as those of Amenophis, were of large size and covered with inscriptions recording royal deeds. The paper was discussed by Dr. Weston Flint.

'The Franco-Egyptian Medal,' was the title of a paper by Col. Paul E. Beckwith, of the Division of History in the National Museum. Col. Beckwith briefly described the Napoleonic expedition to the valley of the Nile and spoke of Champollion and other French men of science who gave undying luster to this otherwise disastrous campaign. Col. Beckwith gave a history of the issuing of a medal by Louis XVIII. commemorative of the Egyptian explorations and described figures of Egyptian divinities which appear on this remarkable work of art.

Professor W. H. Holmes read an illustrated paper on 'Significant Analogies between Pre-Columbian and Oriental Art.' Professor Holmes discussed the subject of the peopling of America from the east and placed on the screen a series of portraits of various peoples from India, Mexico and around the Pacific. The views showed a remarkable similarity of types between the continents as to external features. Professor Holmes spoke briefly on the latitudinal modifications of peoples. A series of views showing types of architecture and art following the same range were next shown. Professor Holmes pointed out the use of pyramids in both hemispheres and the efflorescence of decorative designs to cover surfaces, these designs both in Cambodia and Mexico arising from religion. There is, said Professor Holmes, sufficient reason for studying the problem of art in southeastern Asia, and in the light of our present knowledge one is led to feel that there may have been oversea contact between America and Asia at the period of the great Buddhist revival about 1,000–2,000 years ago.

In the discussion Dr. Casanowicz said that there is unity in the multiplicity of anthropological phenomena. Buddhist art at the time of Asoka was affected by Persian art which was itself influenced by Assyro-Babylonian culture, and these facts explain the transplanting and derivation of architectural and art forms. By establishing a connection between Hindu and aboriginal American art an unbroken chain, as it were, is formed.

Col. Flint spoke of the similarity of the dragons of Chinese mythology to those of Central America. Miss Alice Fletcher said that there is unity of race and of art culture based on psychical conditions, hence the continents touch.

Dr. Hrdlicka agreed with Professor Holmes as to the Asiatic influx to America, and, discarding language as a factor, said that somatologically there are many points of agreement between the entire Malay-Mongolian stock and the American aborigines. The main difficulty in identifying the Americans with the Malay-Asiatics was the old error of making from the Indian a 'red' race.

Walter Hough,
General Secretary.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

The 385th regular meeting was held Saturday evening, April 2, 1904. Henry Oldys spoke on 'The Use of Our Musical Scale by Birds.' He briefly sketched the history of music, and then analyzed examples of bird music, showing that, judged by modern standards, they take higher rank than such specimens of the music of ancient Greece and the early church as have been preserved. The evolution of the modern diatonic scale among various peoples, some of whom must have developed it independently—Egyptians, Chinese, East Indians, Papuans, Bushmen, Aztecs, Iroquois Indians, Bellacoola Indians (British Columbia), Greenland Eskimos, and many others—indicates that there is something in this particular combination of definite and mathematically related intervals that is peculiarly satisfying to the musical taste, a taste shared by man only with birds. As some birds exhibit other essentials of modern music—rhythm, melodiousness, symmetry, etc. —we should naturally expect them to use the

modern scale, another essential, and, therefore, the burden of proof is upon those that deny its use by them. Two instances were cited in which the same notes were taken down on separate occasions, in each of which the record was completely independent and the first was not in mind when the second was taken. A phonographic record of an Eskimo song secured on one of Lieutenant Peary's expeditions was presented to demonstrate the identity of the intervals used by the singer with those of the modern scale. In conclusion, a whistled imitation was given of a melodious and rhythmical song of a wood pewee, and it was remarked that the technical requirements of modern music observed in the construction of this song are far more wonderful than the use it makes of the intervals of the modern scale.

Wilfred H. Osgood spoke on 'The Caribou of Alaska,' giving an outline of the present state of knowledge of the subject and detailing his own experience with one of the still remaining herds. The caribou of Alaska are all of the barren-ground type and their specific or subspecific relationships are still very imperfectly understood. They are found in comparatively large numbers in three general areas—the Alaska Peninsula, the region between the Yukon and Tanana rivers, and northeastern Alaska between the Yukon River and the Arctic coast. They have been exterminated over a large part of their former range and are now being killed in large numbers for their flesh and hides. Their annual increase, however, is large and they might easily be preserved under very liberal shooting regulations provided these could be enforced. A number of small scattering herds were observed in the region between the Yukon and Tanana rivers near the town of Eagle. The habits of the animals and the methods of hunting them were described. Lantern slide views showing small herds of the animals and the character of the country inhabited by them were shown.

M. W. Lyon, Jr., read a paper presenting the results of a study of the existing hares, rabbits and pikas, based on skulls and skeletons mainly in the collection of the U. S. National Museum. The hares and rabbits, family Leporidæ, were shown to contain ten distinct genera, many of which have previously been recognized as subgenera. Two were pointed out as new. The pikas, family Ochotonidæ, were shown to contain a single genus, *Ochotona,* composed of three subgenera. The characters by which the groups are determined are found in the enamel pattern of the teeth, the form of the cervical and lumbar vertebræ, sterna, ribs, bones of the forearm, etc., in addition to characters of the skull. Regret was expressed that only very few skeletons were available for study and the desirability of securing at least one skeleton of each species of mammal in addition to numerous skins and skulls was emphasized.

M. C. Marsh read a paper on 'The Gas Disease in Fishes.' The subject was first investigated at the Bureau of Fisheries' station at Woods Holl, Mass. The sea water for the aquaria was forced by steam pumps into elevated tanks for a gravity flow. Leaks in the suction pipe allowed air to enter, which, upon passing through the pump, was forced into solution by the hydrostatic pressure. The water reaching the aquaria was supersaturated with atmosperic nitrogen, possibly also with oxygen. In this condition it was rapidly fatal to all adult fishes, death usually being due to gas embolism. The occurrence of the free gas in the blood vessels was explained as a precipitation due to the slight elevation of the temperature in the systemic circulation, the blood as it passed through the gills tending to supersaturate like the water. A hydrostatic pressure of about six pounds prevented all symptoms of the disease, presumably by raising the saturation point of the blood plasma. The water could also be rendered harmless by a deaerating process as by passing it through perforated pans and allowing it to fall through several feet in a shower of slender streams. The renewal of the suction pipe, preventing access of free air to the water under pressure, likewise did away with all manifestations of the disease.

WILFRED H. OSGOOD,
Secretary.