This exhibit is shortly to be transferred to Brooklyn.

The Bulletin of the Boston Society of Natural History for March gives notice of the coming meeting of the geologists and mineralogists of the northeastern section of the United States, to be held in New York, April 6. It also gives a description of the botanical collection of the society and the work in its development.

Leaflets Listing and Describing Birds of Oregon may be added to the ever-increasing number of publications whose intent is to furnish information as to the habits and value of birds and the desirability of protecting them. These just mentioned are intended largely for use in the public schools. No. 1, by William L. Finley, treats of the "Study of Birds and Their Economic Value"; No. 2, by the same writer, tells of "Some Common Birds of Oregon with Notes on their Economic Value."

SOCIETIES AND ACADEMIES

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

THE regular monthly meeting of the Section of Geology and Mineralogy of the New York Academy of Sciences was held on Monday evening, January 6, 1908, at the academy rooms in the American Museum of Natural History, New York City.

The section authorized the officers to arrange for a joint meeting of sections and departments of geology and mineralogy from neighboring academies, museums, surveys and colleges to be held in April. Invitations are being prepared and will be distributed through New England and the Middle Atlantic States.

Two papers were presented, the titles and abstracts of which follow.

A Revised Classification of the North American Siluric System: AMADEUS W. GRABAU.

A review of the successive modifications of the classification of the Siluric system in North America brings out the fact that the process of refining has been largely by separation off from this system of those divisions not properly belonging to it. Thus Dana in 1863 (first edition of the "Manual") included the Ordovicic and Cambric as Lower Silurian, dividing it into Potsdam, Trenton and Hudson, and dividing the Upper Silurian into Niagara, Salina and Lower Helderberg. In the fourth edition of the "Manual" (1895) the Cambric, Ordovicic and Siluric systems are recognized as distinct, though the name Lower Silurian is still preferred for the Ordovicic. The three-fold division of the Siluric is into (1) Niagara, (2) Onondaga (Salina), and (3) Lower Helderberg. In 1899 Clarke and Schuchert published their revised classification of the New York series, which has been pretty generally adopted. In this the Helderbergian exclusive of the Manlius was separated as Lower Devonic, while the remainder of the Siluric (Niagara and Onondaga (Salina), of Dana, 1895) was divided into the Oswegan (Oneida Conglomerate-Shawangunk grit and Medina sandstone), Niagaran (Clinton, Rochester, Lockport and Guelph), and Cayugan (Salina, Rondout and Manlius). Since then Grabau and Hartnagel have independently demonstrated that the Oneida is the equivalent of late Medina, and the Shawangunk, Salina. In 1905 Grabau suggested the Richmond age of the lower 1,100 feet of the Medina of Western New York,[1] uniting the upper with the Clinton. These relations were more fully discussed in 1906[2] and again in 1907 before the Geological Society of America, New York meeting, after a prolonged investigation of the Appalachian deposits. This relationship is now fully established and the dividing line between Ordovicic and Siluric is drawn at the base of the Upper Medina or the Medina proper. For the red Medina shales now recognized as of Ordovicic age the name Queenston beds is proposed, from the town of that name on the Niagara River opposite Lewiston, where these beds are partly exposed.

Recent studies by Grabau and Sherzer in southern Michigan and adjoining regions in Canada and Ohio have demonstrated the existence of about 900 feet of fossiliferous strata above the Salina, to which it is proposed to restrict the name Monroe. These will be fully

[1] SCIENCE, XXII., p. 529, October 27, 1905.

[2] Bull. 92 N. Y. State Museum.

discussed in a forthcoming memoir, where the correlation of the eastern attenuated Upper Siluric beds will be given. The fauna of the Upper Monroe above the Sylvania sandstone is a remarkable mixture of Siluric and Devonic types as recently demonstrated before the Michigan Academy of Sciences, the Chicago meeting of Section E, American Association for the Advancement of Science and the Albuquerque meeting of the Geological Society of America.

The following classification of the Siluric System of North America is proposed as most expressive of the relationships indicated by the facts now known.

- Upper Siluric or Monroan (900 ft.)
  - Upper Monroe.
  - Middle Monroe (Sylvania sandstone the only known representative).
  - Lower Monroe.
- Middle Siluric or Salinan (1,000 ft.)
  - Represented so far as known only by non-marine sediments.
- Lower Siluric or Niagaran (500–1000 ft.)
  - Guelph (possibly to be placed with Middle Siluric).
  - Lockport dolomite.
  - Rochester shales.
  - Clinton
    - Clinton shales and limestones.
    - Medina sandstone including Oneida conglomerate.

Ordovicic—Queenston shales.

A Study of the Mineral Constitution of the Chloritic Group Termed Delessite: ALEXIS A. JULIEN.

In regard to the constitution of minerals and mineral micro-aggregates, as in rocks, it is entirely insufficient and often misleading to depend upon chemical analyses alone, or upon formulæ deduced therefrom, although commonly this is all that is supplied in the treatises. In place of these, a calculation of the actual mineral constitution of the aggregate through a recasting of the analyses is required for the needs of the mineralogist or petrographer. All are mixtures. Even the best crystallized mineral has definite mineral impurities. From the well-crystallized form to the amorphous compact mass, in which only the microscope can perhaps barely detect the structures and optical behavior of obscure crystalline conditions—all are mineral mixtures. For each group of minerals under such investigations it is found advisable to prepare a tabulated scheme comprising all possible mineral constituents, together with their percentage composition. Using this, on the assumption of absolute accuracy of the certainly determined mineral formulæ, allowing for the limitations of replacement inherent in each mineral as far as known, and making careful correlation with the ascertained physical and optical characteristics of the identical mineral or micro-aggregate, its mineral constitution can be deduced with satisfactory accuracy.

In illustration, this simple method has been applied to a most complex group of micro-aggregates, many of which now pass as definite mineral species—the delessite group. It will suffice here to give one example covering the hitherto accepted mineral "delessite" itself. The analysis is of material from Zwickau by Delesse.

	Per Cent.
Silica, SiO_2	29.45
Alumina, Al_2O_3	18.25
Ferric oxide, Fe_2O_3	8.17
Ferrous oxide, FeO	15.12
Lime, CaO	0.45
Magnesia, MgO	15.32
Water, H_2O	12.57
Total	99.33

In explanation we are informed by Dana: "Comp.—Perhaps (Groth) $H_{10}(Mg, Fe)_4(Al, Fe)_4Si_4O_{25}$." By using, however, the theoretical percentage composition of each of the minerals stated below, in harmony with the description of "delessite," the figures of this analysis will be found to correspond to a mere mixture with the following mineral constitution:

	Per Cent.
Prochlorite	72.13
Halloysite	10.34
Limonite	9.54
Colloid silica with water	7.32

By similar calculations the constitution of

the whole delessite series has been approximately brought to light. The paper will be published in full in the *Annals* of the academy.

Charles P. Berkey,
Secretary of Section

THE BIOLOGICAL SOCIETY OF WASHINGTON

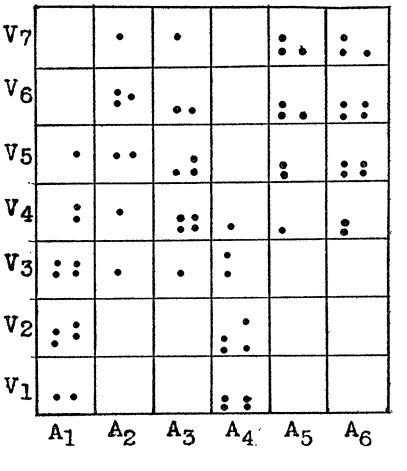
The 441st meeting was held on March 7, 1908, President Stejneger in the chair.

Mr. H. W. Clark noted a case of fasciation in two specimens of hyacinth seen in a Washington market. The flattening of the flower stalk gave a larger floral surface and made it conspicuously showy. The bulbs of these flowers were said to be imported from Holland and new stock was asexually propagated from lateral tubers. This is the beginning of a new and very showy stock of cultivated plants probably worth developing. Fasciation is a unique and remarkable phenomenon in the history of cultivated plants, and occurs frequently in such plants as the sweet potato and yam which are cultivated asexually. In the cultivated cockscomb (*Celosia*) it is propagated by seed. Among our native plants it is common in *Œnothera,* and occasional in *Leptilon* and the sumacs. It is also common in the imported *Ailanthus.*

Professor W. P. Hay by request demonstrated "Some Additional Colored Lantern Slides by the Autochrome Process." He showed on the screen many colored pictures, illustrating the possibilties, difficulties and defects of the autochrome process. He explained the technique of the process, calling attention to the difficulties in handling the plates and the differences between autochrome and ordinary photography.

Mr. Vernon Bailey gave a lantern-slide lecture on "Home Life of the Lobo or Buffalo Wolf of the Great Plains." This was an account of the observations of the speaker on the large or timber wolf of the western plains, undertaken partly to learn to what extent the forests harbored these wolves. Forest reserves have been opposed with the argument that the wolves breed in them. Mr. Bailey found wolf dens in the open and on the edge of the forest reserve, but none in the timber. He described the habits of the wolves and their wary avoidance of attempts to trap them and showed many photographic lantern slides of the dens, the young, and of the wolf country.

Dr. Marcus W. Lyon, Jr., read a paper, describing and illustrating "A Simple Method to Represent Graphically the Trend of Variation in a small number of Specimens of Related Species." Where there is but a small number of individuals in a group of related organisms, A_1, A_2, etc., to be examined, the usual curves representing the extremes of variation with the average at the highest part of the curve, do not give satisfactory results as the curve will present too many irregularities and sometimes show no distinct maximum for the average. A modification of the regular coordinate system may be used, however, to represent graphically the extent and trend of variations, V_1, V_2, etc., by running a series of parallel lines at right angles to the vertical axis, the space between the lines corresponding to the variable character, with its least development at the level of the horizontal axis and its increasing development at regular intervals above it. The horizontal axis is similarly divided by a series of parallel lines, the space between any two lines corresponding to the groups of the organisms under consideration. To allocate the individuals with respect to the variations it is only necessary



to examine each specimen in turn and place a dot in one of the small squares made by the

intersections of the parallel lines, which corresponds to its proper group and the extent of its variation. The resulting system of dots shows at a glance the extent and trend of the variations in any of the groups, and in a much more graphic manner than an examination of the specimens, or tables of measurements, or descriptions.

In the diagram, groups A_1 and A_4 show the possession of similar characters, groups A_2, A_3, A_5 and A_6 possess another set of characters. Some specimens in each group show an overlapping of characters or intergradation. The two major groups thus show a subspecific relation to each other.

M. C. MARSH,
Recording Secretary

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 648th meeting was held March 28, 1908, President Bauer in the chair.

Dr. C. G. Abbot presented a paper entitled "Total Eclipse Observations of January 3, 1908," giving an illustrated account of his trip to Flint Island in the south Pacific Ocean, via California and Tahiti, for the purpose of observing the recent solar eclipse. His principal object was to ascertain the comparative brightness of the solar corona and the sun, and to compare the quality of the radiation of the corona with that of the sun, the moon and the sky. He was successful in measuring the brightness of the corona at five points with the bolometer, and by interposing a screen of asphaltum varnish determined roughly the proportion of its radiation which falls in the visible spectrum. At brightest the corona was little more than 1/1,000,000 as bright as the sun, but the quality of its radiation as tested by the asphaltum screen differed little from that of the sun. The results are perhaps best explained by considering the corona to shine mainly by reflected sun rays.

Informal Communications

Professor C. F. Marvin spoke of the seismograph records of the recent Mexican earthquake (March 26, 1908) which had been obtained from the Omori and Marvin types of seismographs at the U. S. Weather Bureau, and pointed out significant differences in the amplitudes and the character of the wave motion as recorded by the two forms of instrument which were installed under exactly similar conditions.

The secretary read a communication prepared by Professor Cleveland Abbe, giving the following abstract of the results of a computation, by Professor H. A. Peck, of Syracuse University, of the orbit of the meteor of Christmas eve, 1873, based on the data in the report of the meteor committee.[1]

First, the point of *disappearance* was determined from records at four of the best observing stations, following the method given by Bauschinger. The resulting location is:

Longitude, 0° 57.8′ west of the dome of the capitol.
Latitude, + 38° 42′.
Altitude, between 5 and 9 miles—the mean of which, 7 miles, is adopted.

With this determination as a foundation the position of the radiant point was determined by the method of least squares from the observations at twelve good stations. The result is:

A (right ascension of radiant)	66° 55′
D (declination of radiant)	+ 29° 51′

This last result may be otherwise expressed thus: The bearing and apparent angular altitude of the radiant point, as seen by an observer *at* the point and moment of disappearance, would be

Azimuth	S. 86° 55′ E.
Altitude	56° 27′

The first appearance of the meteor, or the beginning of its visible path, may plausibly have been at about 130 miles above a point in latitude 38.6°, longitude 76.3°, or above the mouth of the Choptank River, Maryland. The corresponding length of the visible path would be 154 miles and the velocity relative to the earth's center 38.5 miles per second.

The computation of the path relative to the sun and the ecliptic gives the true radiant point:

Longitude	(λ)	50° 47′
Latitude	(β)	+ 6° 26′
Velocity		50 miles per second.

[1] *Bull. Phil. Soc.*, 1877, Vol. II., pp. 139–161.

The meteor was following and overtook the earth, the angle between its path and the direction toward the apex of the earth's motion being 132°. The elements of the orbit with reference to the sun are:

Ω	273° 22′	longitude of ascending node.
i	9° 28′	inclination to the ecliptic.
π	150° 12′	longitude of the perihelion.
$\log q$	9.7937	logarithm of the perihelion distance.
$\log e$	0.6329	logarithm of the eccentricity.

Professor Peck's paper will be printed in full in the *Monthly Weather Review*.

R. L. Faris,
Secretary

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

At the meeting of February 18, Miss Frances Densmore read a paper entitled "Music of the Chippewa," and used as illustrations many phonographic records secured by her during a season's work for the Bureau of American Ethnology among the Chippewa of Minnesota. Miss Densmore said that the music of the Chippewa is an echo from the land of the pine trees, the lakes and the little hills. All their life is intertwined with music; from babyhood to death the songs of the people express the joys and sorrows of life, the exultation of war, the solemnities of their religion, the tenderness of love and the cradle songs, farewells to the warrior and dirges for the departed. Miss Densmore gave a cradle song, the invitation to a ceremony, a plaintive love song, the requiem of Chief Flatmouth, the song of Wain-ah-bo-zho (who wrung the ducks' necks), and a series of songs of initiation into the Grand Medicine Society, which latter ceremony was described in some detail. At the close of Miss Densmore's paper three Chippewa Indians visiting Washington gave a representation in costume of the initiation of a candidate for membership in the medicine lodge, and the effect of the songs accompanied with the rattle and tom-tom was very striking. The chief also made a speech laudatory of his white friends in Washington, Rev. J. W. Gilfillan interpreting. The paper was discussed by Miss Fletcher and Mr. Wead, and Miss Densmore answered a number of inquiries.

Walter Hough,
General Secretary

DISCUSSION AND CORRESPONDENCE

TOXICITY AS A FACTOR IN THE PRODUCTIVE CAPACITY OF SOILS

The U. S. Department of Agriculture in 1903 promulgated, through its Bureau of Soils, in Bulletin 22, the teaching (1) that practically all agricultural soils contain sufficient plant food for good crop yields and that this supply will be indefinitely maintained; (2) that not only is the soil moisture a natural nutritive solution, but that it has sensibly the same concentration in productive and unproductive soils; (3) that this concentration is by natural processes constantly maintained of sufficient strength to meet the needs of crops giving good yields; and (4) that the good effects observed in all parts of the world to follow the practise of proper rotation of crops, the application of stable and green manures and of mineral fertilizers, must be due to some other mode of action than that of supplying the crop on the ground with needed additional plant food.

During the four years since the publication of these views the Bureau of Soils has devoted much of its time, energy and funds to an attempt to show (1) that crops excrete through their surfaces, and leave in the soils or upon the field toxic substances which, when tilth and climatic conditions are right, are the chief cause of reduced yields and runout lands; and (2) that proper crop rotations, stable and green manures and mineral fertilizers owe their observed good effects on crop yields to destroying or removing these toxic principles rather than to contributing plant food to the crops.

In the support and promulgation of these views there have now been published four other bulletins from the Bureau of Soils and one circular from the office of the Secretary of Agriculture in reply to adverse criticisms made upon them. It is the purpose here to discuss broadly but concisely what basis there may be for these views.

Amount of Plant Food Carried by Soils.

When no distinction is made between the amount of *plant food proper* and the amount of the elements and substances from which