SCIENTIFIC JOURNALS AND ARTICLES

THE closing (October) number of volume 8 of the *Transactions of the American Mathematical Society* contains the following papers:

MAX MASON: "The expansion of a function in terms of normal functions."

MAURICE FRÉCHET: "Sur les opérations linéaires (troisième note)."

A. G. GREENHILL: "The elliptic integral in electromagnetic theory."

Also "Notes and errata, volume 8," and index of volume.

THE December number (volume 14, number 3) of the *Bulletin of the American Mathematical Society* contains: Report of the September Meeting of the San Francisco Section, by W. A. Manning; "On Quadratic Forms in a General Field," by L. E. Dickson; "On the Canonical Substitution in the Hamilton-Jacobi Canonical System of Differential Equations," by D. C. Gillespie; "The Maximum Value of a Determinant," by F. R. Sharpe; "Third Report on Recent Progress in the Theory of Groups of Finite Order," by G. A. Miller; "The Dresden Meeting of the Deutsche Mathematiker-Vereinigung," by C. A. Noble; "Bryan's Thermodynamics," by E. B. Wilson; "Shorter Notices" (G. Vivanti's Funzioni Poliedriche e Modulari, by J. I. Hutchison; J. Sommer's Vorlesungen über Zahlentheorie, by G. H. Ling; L. Couturat's Les Principes des Mathématiques, by J. W. Young); "Notes"; "New Publications."

The January number of the *Bulletin* contains: Report of the October Meeting of the Society, by F. N. Cole; "On Triple Algebras and Ternary Cubic Forms," by L. E. Dickson; "Isothermal Systems in Dynamics," by E. Kasner; "On the Equations of Quartic Surfaces in Terms of Quadratic Forms," by C. H. Sisam; "Symbolic Logic" (Review of works by Couturat, MacColl and Shearman), by E. B. Wilson; "Shorter Notices" (H. Durège's Elemente der Theorie der Funktionen (fifth edition), by J. Pierpont; H. Burkhardt's Elliptische Funktionen, by J. Pierpont; Bromwich's Quadratic Forms, by Maxime Bôcher); "Notes"; "New Publications."

SOCIETIES AND ACADEMIES

THE CONVOCATION WEEK MEETINGS OF SCIENTIFIC SOCIETIES

THE American Association for the Advancement of Science and the national scientific societies named below will meet at the University of Chicago during convocation week, beginning on December 30, 1906.

American Association for the Advancement of Science.—December 30–January 4. Retiring president, Professor W. H. Welch, The Johns Hopkins University, Baltimore, Md.; president-elect, Professor E. L. Nichols, Cornell University, Ithaca, N. Y.; permanent secretary, Dr. L. O. Howard, Cosmos Club, Washington, D. C.; general secretary, President F. W. McNair, Houghton, Mich.

Local Executive Committee.—Charles L. Hutchinson, chairman local committee; John M. Coulter, chairman executive committee; John R. Angell, Thomas C. Chamberlin, Joseph P. Iddings, Frank R. Lillie, Charles R. Mann, Robert A. Millikan, Charles F. Millspaugh, Alexander Smith, J. Paul Goode, local secretary.

Section A, Mathematics and Astronomy.—Vice-president, Professor E. O. Lovett, Princeton University; secretary, Professor G. A. Miller, University of Illinois, Urbana, Illinois.

Section B, Physics.—Vice-president, Professor Dayton C. Miller, Case School of Applied Science; secretary, Professor A. D. Cole, Vassar College, Poughkeepsie, N. Y.

Section C, Chemistry.—Vice-president, Professor H. P. Talbot, Massachusetts Institute of Technology; secretary, Professor Charles L. Parsons, New Hampshire College, Durham, N. H.

Section D, Mechanical Science and Engineering.—Vice-president, Professor Olin H. Landreth, Union College; secretary, Professor Wm. T. Magruder, Ohio State University, Columbus, Ohio.

Section E, Geology and Geography.—Vice-president, Professor J. P. Iddings, University of Chicago; secretary, Dr. Edmund O. Hovey, American Museum of Natural History, New York City.

Section F, Zoology.—Vice-president, Professor E. B. Wilson, Columbia University; secretary, Professor C. Judson Herrick, University of Chicago.

Section G, Botany.—Vice-president, Professor C. E. Bessey, University of Nebraska; secretary, Professor F. E. Lloyd, Desert Botanical Laboratory, Tucson, Arizona.

Section H, Anthropology and Psychology.—Vice-president, Professor Franz Boas, Columbia Uni-

versity; secretary, George H. Pepper, American Museum of Natural History, New York City.

Section I, Social and Economic Science.—Vice-president, Dr. John Franklin Crowell, New York City; secretary, Professor J. P. Norton, Yale University, New Haven, Conn.

Section K, Physiology and Experimental Medicine.—Vice-president, Dr. Ludvig Hektoen, University of Chicago; secretary, Dr. Wm. J. Gies, College of Physicians and Surgeons, Columbia University, New York City.

Section L, Education.—Vice-president, Hon. Elmer E. Brown, U. S. Commissioner of Education; acting secretary, Professor Edward L. Thorndike, Teachers College, Columbia University, New York City.

The American Society of Naturalists.—December 28. President, Professor J. Playfair McMurrich, University of Toronto; secretary, Professor E. L. Thorndike, Teachers College, Columbia University, New York City. Central Branch, president, Professor R. A. Harper, University of Wisconsin; secretary, Professor Thomas G. Lee, University of Minnesota, Minneapolis, Minn.

The American Mathematical Society. Chicago Section, December 30, 31. Chairman, Professor Edward B. Van Vleck; secretary Herbert E. Slaught, 58th St. and Ellis Ave., Chicago, Ill.

The American Physical Society.—President, Professor E. L. Nichols, Cornell University; secretary, Professor Ernest Merritt, Cornell University, Ithaca, N. Y.

The American Chemical Society.—December 27–January 2. President, Professor Marston T. Bogert, Columbia University; secretary, Professor Charles L. Parsons, New Hampshire College, Durham, N. H.

The Association of American Geographers.—December 31–January 1. Acting-president, Professor R. S. Tarr, Cornell University, to whom correspondence should be addressed; secretary, Albert P. Brigham, 123 Pall Mall, London, Eng.

The Entomological Society of America.—Secretary, J. Chester Bradley, Cornell University.

The Association of Economic Entomologists.—December 27, 28. President, Professor H. A. Morgan, Knoxville, Tenn.; secretary, A. F. Burgess, Columbus, Ohio.

The American Society of Biological Chemists.—December 30–January 2. President, Professor Russell H. Chittenden, Yale University; secretary, Professor William J. Gies, College of Physicians and Surgeons, Columbia University, New York City.

The Society of American Bacteriologists.—December 31–January 2. Vice-president, F. D. Chester, Delaware Agricultural College, Newark, Del.; secretary, Professor S. C. Prescott, Massachusetts Institute of Technology.

The American Physiological Society.—Beginning December 31. President, Professor W. H. Howell, Johns Hopkins University; secretary, Professor Lafayette B. Mendel, 18 Trumbull St., New Haven, Conn.

The Association of American Anatomists.—January 1–3. President, Professor Franklin P. Mall; secretary, Professor G. Carl Huber, 1330 Hill St., Ann Arbor, Mich.

The American Society of Zoologists.—Central Branch. Secretary, Professor Thomas G. Lee, University of Minnesota, Minneapolis, Minn.

The Botanical Society of America.—December 31 and January 1, 2 and 3. President, Professor George F. Atkinson, Cornell University; secretary, Dr. D. S. Johnson, Johns Hopkins University.

The Botanists of the Central States.—Business Meeting. President, Professor T. H. Macbride, University of Iowa; secretary, Professor H. C. Cowles, University of Chicago, Chicago, Ill.

The American Psychological Association.—December 27, 28. President, Dr. Henry Rutgers Marshall, New York City; acting secretary, Professor R. S. Woodworth, Columbia University, New York City.

The Western Philosophical Association.—Secretary, Dr. John E. Bowdoin, University of Kansas, Lawrence, Kans.

The American Anthropological Association.—December 30, January 4. President, Professor Franz Boas, Columbia University; secretary, Dr. Geo. Grant MacCurdy, Yale University, New Haven, Conn.

The American Folk-lore Society.—December 30–January 4. President, Professor Roland B. Dixon, Harvard University; secretary, Dr. Alfred M. Tozzer, Harvard University, Cambridge, Mass.

Other national societies will meet as follows:

NEW HAVEN

The American Society of Zoologists.—Eastern Branch. December 26, 28. President, Dr. C. B. Davenport, Cold Spring Harbor, N. Y.; secretary, Professor W. L. Coe, Yale University, New Haven, Conn.

The American Society of Vertebrate Paleontologists.—December 26–28. President, Professor Bashford Dean, Columbia University; secretary, Professor Frederick B. Loomis, Amherst College, Amherst, Mass.

NEW YORK

The American Mathematical Society.—December 27, 28. President, Professor H. S. White, Vassar College; secretary, Professor F. N. Cole, Columbia University.

ALBUQUERQUE, N. M.

The Geological Society of America.—December 30–January 4. President, President Charles R. Van Hise, University of Wisconsin; secretary, Dr. Edmund O. Hovey, American Museum of Natural History, New York City.

ITHACA

The American Philosophical Association.—December 26, 28. President, Professor H. N. Gardiner, Smith College; secretary, Professor Frank Thilly, Cornell University, Ithaca, N. Y.

NEXT SUMMER, AT SOME PLACE TO BE DETERMINED

The Astronomical and Astrophysical Society of America.—President, Professor Edward C. Pickering, Harvard College Observatory; secretary, Professor Geo. C. Comstock, Washburn Observatory, Madison, Wisconsin.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

The 638th meeting of the society was held November 9, 1907, President Hayford in the chair. Mr. C. E. Waters, of the Bureau of Standards, presented by invitation a paper entitled "The Standard Cell." The speaker reviewed briefly the earlier efforts to fix adequate standards of electrical measurements, the unit of resistance having first received attention, mention being made of the work of the British Association in this connection. It was noted that present requirements demand higher accuracy in the standards of measurement. The development of the standard cell, down to the present time, was briefly reviewed and the defects of those formerly used were pointed out, especial reference being made of their lack of stability.

The principal feature in the preparation of a standard cell is that of securing materials of requisite purity. The methods employed to secure satisfactory materials and the results obtained by Messrs. Wolff and Waters at the National Bureau of Standards, in preparing the H type of standard cell were spoken of at considerable length.

Several chemical compounds were tested in the experiments. The difficulties of obtaining mercurous and cadmium sulphates were especially pointed out, and the methods devised for obtaining them in a sufficiently pure state were described. Before setting up the cells the materials were carefully cleaned. More accordant results were obtained by amalgamating the platinum terminals. The cells were measured in an electric bath in order to maintain a steady temperature. The thermo-electric effects were eliminated by the methods of observation. The experiments showed that mercurous sulphate can be obtained in several ways that will give good electromotive force properties. Standard cells are now found constant enough to be depended upon for a considerable length of time. The final conclusion was that satisfactory cells can now be set up by different observers of different materials.

The second paper of the evening was presented by Mr. C. W. Burrows on "The Reduction of Iron to a Magnetically Neutral State for Permeability Measurements." In the experiments described several different kinds of iron were used. The test pieces were 50 cm. in length and varied in square cross-section from 0.3 mm. to 1 cm. The ballistic method was used in the demagnetization tests. Numerous diagrams were exhibited showing permeability, induction effect, effect of temperature and of vibration, and also curves of tests of non-homogeneous iron.

As a matter of definition iron is in a magnetically neutral state when it is free from all residual induction and yields as readily to positive as to negative magnetizing forces. A small magnetic needle or a movable test coil will give evidence of any residual induction, but they tell nothing as to any difference in susceptibility to positive and negative forces. A long series of experiments leads to the conclusion that iron is in the neutral state when the change in induction observed on reversal of a given magnetic force is a maximum. Imperfect demagnetization always results in a lower induction. The following points are noted:

1. The higher the rate of reversal or fre-

quency of the demagnetizing current, the less complete is the demagnetization. This effect of frequency is more marked in large bars and in soft iron.

2. A sufficient range for the demagnetizing current carries the iron from just above the "knee" of the induction curve down to the lowest value to be studied. Hard iron and steel require a relatively higher initial current than soft iron.

3. The demagnetizing current is best reduced in such a way that the induction decreases approximately uniformly.

4. One initial demagnetization produces the same results as a separate demagnetization before each step in the induction curve.

5. Even many thousands of reversals of the magnetizing force to be studied do not accomplish the effect of demagnetization.

After iron has been demagnetized the apparent induction observed increases for a few reversals, passes through a maximum, and then decreases, approaching a lower limit asymptotically. This final limiting value is *defined* as the true induction.

The influence on permeability determinations of temperature, small mechanical vibrations, magnetic viscosity, and the terrestrial field are investigated, and it is shown experimentally that these elements must be considered if an accuracy of one per cent. is to be obtained. Their influence is greatest in the steep part of the induction curve.

R. L. FARIS,
Secretary

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 433d meeting was held October 19, 1907, with President Stejneger in the chair.

The single paper of the evening was offered by Dr. E. D. Merrill, on "The Geographic Distribution of Philippine Plants." The subject-matter presented was the outcome of five years' experience of the author and others, during which large collections had been made and many of the islands visited. He first discussed the relations of the Philippine flora with that of Hawaii and northern Australia, noting the interesting fact that of many Australian types found, all were confined to the high mountains of the island of Luzon. He then considered the relations with Celebes, Borneo, Formosa and the Asiatic continent. The great number of plants common to Luzon and Formosa he thought might indicate a former land connection. Similarly it was thought that the Philippines might have been connected with Queensland. Although the flora of the high mountains was Asiatic, it was evident that the great migrations had come from the south.

A brief discussion followed on the distribution of Philippine animals. Dr. Stejneger gave various reasons for considering reptiles, batrachians and mammals the best guides in determining former land connections. Judging by the reptiles, there is no indication of a connection between Formosa and Luzon since the Jurassic.

Dr. Lyon, speaking of the mammals, said this group gave no indication of a connection with Formosa. The mammals of the mountains of Luzon are so peculiar that it is difficult to say what their relationships are, but their strongest leanings seem toward Australian types.

Mr. Oberholser spoke of the birds, of which there are about 700 known species representing 175–200 genera. They may be divided into Cosmopolitan, Palearctic and Philippine groups. The latter comprises the following subdivisions: (1) East Asian, with few species, (2) Australasian, with rather few, (3) Celebesian, with somewhat more, (4) Bornean, with a still greater number, (5) Indo-Malayan, with the largest of all, (6) Endemic, not considered.

Dr. Gill said the freshwater fishes of the Philippines were of little interest in the present connection, most of them being Asiatic and many of them widely distributed. They show no relationship with Australian forms.

The 434th meeting was held November 16, 1907, President Stejneger in the chair. The evening was taken up with an account by Dr. B. W. Evermann, of "Freshwater Mussels and the Pearl Button Industry" along the Mississippi River, illustrated with specimens of shells, buttons, pearls, etc.

WILFRED H. OSGOOD,
Recording Secretary pro tem

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

The meeting of November 19, 1907, was addressed by Professor Marshall H. Saville, Columbia University, on "Archeological Researches on the Coast of Ecuador." Professor Saville, who has charge of the G. G. Heye expedition, plans to examine the antiquities of the entire region between Mexico and Peru, taking up in order the coast and interior valleys, and thus far, two seasons have been spent in western Ecuador, between the 4° south latitude and 1½° north latitude. Two cultures anciently occupied the coast; the Manabé, in the dry region of the south; and the Esmaraldas in the humid region on and north of the equator. The ruins of the former are situated on the slopes of forested foothills which are watered with night fogs that descend about midway on their flanks. The houses, which were light wooden structures capable of resisting earthquakes, were placed on terraces excavated from the hillsides resembling the trincheras of Mexico. The remains are a few slabs sculptured in bas relief and numerous great stone seats of U-shape resting on the back of a puma. Mounds occur in which skeletons and pottery are found. The remains of Esmaraldas are exposed on the sea bluffs and along the river banks. Enormous deposits of artifacts are found along the coasts for two hundred and fifty miles, and on the Atacamanes River are great deposits in the alluvium, showing on sections two lines of human remains, pottery, etc. In these deposits were upright tubes of pottery which were coffins. Numerous gold objects and some emeralds were found by the expedition. A remnant of the Caiapas Indians living in northern Ecuador, about sixty miles north of the town of Esmaraldas, were visited and photographed.

The thanks of the society were extended to Professor Saville for his interesting paper.

Walter Hough,
General Secretary

THE NEW YORK ACADEMY OF SCIENCES. SECTION OF BIOLOGY

On May 13, 1907, the section met at the American Museum of Natural History for an interesting session. The papers were as follows:

Brief Account of the Expedition to the Fayoum, Egypt: Professor Henry F. Osborn.

A summary of the valuable results of this expedition in search of *Palæomastodon* and *Arsinoitherium* was given and illustrated by a fine series of stereopticon views. A detailed account of the expedition has already been published in Science.[1]

The Supernumerary Chromosomes of Hemiptera: Professor Edmund B. Wilson.

In striking contrast to nearly all forms heretofore described, the genus *Metapedius* presents a considerable range of variation in the individual number of chromosomes, though the number is constant in each individual. The following numbers have thus far been observed in a total of 30 individuals (spermatogonia in the males, ovarian cells in the females). *M. terminalis,* males 22, 23, females 22, 25; *M. femoratus,* males 22, 23, 26, females 24, 26; *M. granulosus,* males 23, 26, 27 (?), females 26. The variation is thus seen to be independent of sex; and it is not a casual fluctuation within the individual, since the individual number is constant and in the male is definitely correlated with the number present in the maturation-divisions. Thus with 22, 23 or 26 spermatogonial chromosomes the first spermatogonial division shows, respectively, 12, 13 or 16 chromosomes—a relation shown constantly and in a large number of cells. Study of the conditions shown in the males leads to the conclusion that all individuals possess a fundamental or type group of 22 chromosomes that are always present and show the same general arrangement in the first division. To these may be added in certain individuals one or more "supernumerary chromosomes" which, like the idiochromosomes, differ in behavior from the others in failing to couple at the time of general synapsis, dividing as univalents in the first division where they appear smaller than the bivalents (as will be shown hereafter in photographs). Thus are explained the peculiar numerical relations above stated—

[1] N. S., Vol. XXV., No. 639, March 29, 1907.

e. g., 16 chromosomes in the first division include ten bivalents and six univalents (two idiochromosomes and four supernumeraries). In the second division the supernumeraries almost always unite with the idiochromosome-bivalent to form a compound element; and the facts indicate that the individual members of this complex may undergo an asymmetrical distribution to the spermatozoa, which probably gives the explanation of the variations observed in the somatic numbers of different individuals. The new proof given by the facts of the genetic identity of the chromosomes, and their possible bearing on certain phenomena of heredity, were indicated.

Variations in the Leaf Type of Liriodendron Tulipifera during a Season's Growth: Dr. L. HUSSAKOF.

The leaves were collected from a single tree during three successive summers beginning with 1904, and their variations in form statistically studied. During 1905 and 1906 "average samples" (about 500 leaves, representing all parts of the tree) were collected at intervals of about a month and systematically tabulated. It was found that at the end of May the six-pointed type of leaf constitutes over half the total foliage (.58 in 1905; .65 in 1906), and that the four-pointed type is totally absent. During the next month there is a remarkable growth of four-pointed leaves so that at the end of June they constitute over 50 per cent. of the total foliage. The six-pointed leaves become reduced to about 35 per cent. of the total. During the remainder of the summer these figures vacillate only within about 5 per cent. The leaves with 8, 10, 12 and 14 points were also studied; each makes up only a small per cent. of the total foliage, the last being very rare.

The talk was illustrated by charts and specimens.

Orthogenesis in Gastropods: Professor A. W. GRABAU. (Illustrated with lantern slides.)

No abstract of this paper has been received.

On October 14, 1907, the section met at 8:15 P.M., in the American Museum of Natural History. The evening was devoted to brief reports on summer work by members of the section. Among others the following members addressed the section: Professor W. M. Wheeler: "A Study of Ants in Switzerland"; Professor N. L. Britton: "Recent Explorations in Jamaica"; Professor H. E. Crampton: "A Second Journey to the Society Islands."

Professor E. B. Wilson also gave a brief account of the summer work at Woods Holl, and described some interesting experiments made by him on the structure of living cells.

Brief reports were also made by several other members of the section, after which the meeting adjourned.

On November 11, 1907, after a short business meeting, at which sectional officers for 1908 were elected, the following papers were read:

A Paleontological Trip to Northwestern Nebraska: Professor HENRY F. OSBORN.

Professor Osborn reported upon two excursions, during the seasons of 1906 and 1907, into the Lower Miocene beds of northwestern Nebraska, variously known as Arikaree, Harrison and Rosebud.

The recognition of these beds as containing fauna transitional between the Oligocene and Lower Miocene is due to the successive explorations of Hatcher, Barbour, Peterson, Matthew and Thomson. The lower division (Lower Harrison, Lower Rosebud) is somewhat more recent than the true Upper Oligocene of France. The upper division (Upper Harrison, Upper Rosebud) may also represent the beginning of the Miocene, and is sharply defined from the lower division by the absence of certain mammals and the presence of others. The formation as a whole is a very grand one, extending continuously over 200 miles east and west; varying in thickness from 1,200 feet in the west to 800 feet farther east. It is, in fact, one of the most extensive, most readily distinguished, and most definable of the Tertiary series, but it still awaits accurate definition and distinction, especially from overlying beds, partly owing to the fact that it has been embraced under the "Arikaree," which practically includes a considerable part of the Miocene series.

In the region of Agate, Sioux County, Nebr., the first discoveries of fossils were made by Mr. James H. Cook and his son, Mr. Harold Cook. This region has been especially explored by Carnegie Institute parties under Mr. O. A. Peterson and Mr. W. H. Utterback. The Monroe Creek, Lower Harrison, and Upper Harrison divisions are very distinctly separated from each other geologically and faunistically. The remarkable deposit known as the "Agate Spring Quarry" is about forty feet below the summit of the Lower Harrison and its fauna, and has been especially described by Mr. Peterson. This is on the same level as the Dæmonelix Beds of Barbour, and is characterized by the presence of *Moropus, Syndyoceras, Oxydactylus, Diceratherium* (smaller and larger species), *Parahippus, Blastomeryx, Dinohyus, Thinohyus* and *Promerycochœrus. Steneofiber,* a castoroid, is quite abundant and is frequently found in the Dæmonelix spirals. The origin of these spirals still remains a very difficult problem. The Upper Harrison is sharply defined by the appearance of the large *Merycochœrus* in the upper levels, by the presence of cameloids of three or four types. *Dinohyus* persists in the lower levels but disappears above.

A more exact determination of the geological and faunal characters of these beds will mark a great advance in our knowledge of the Tertiary series.

A fine series of lantern slides illustrated the paper.

The Ptarmigan—Living and Dead: Frank M. Chapman.

Both the distribution and color of ptarmigans are of special interest. In distribution, we have a circumpolar group extending its range southward on the Arctic Alpine summit of mountain ranges with isolated groups (for example, *Lagopus mutus,* in the Alps and Pyrenees, and *Lagopus leucurus,* in the Rocky Mountains of Colorado and New Mexico) occupying restricted areas at the south, which it is probable they reached at some time during the Glacial Period. The fact that the birds of these south Alpine islands are specifically like their representatives at the north indicates absence of differentiation since their isolation, and consequent great stability of color characters.

The ptarmigan's seasonal changes of plumage were described at length and were said to furnish one of the most conclusive proofs of the necessity for protective coloration known among birds.

Particular attention was called to the transitional autumn plumage which, in defiance of the laws of molt, is interpolated between the known summer plumage and the white winter plumage, to carry the bird from the end of the nesting season to the season of snowfall in October. If the winter plumage were to be acquired at the end of the nesting season, when molt is apparently a physiological necessity, the bird would be white before the coming of snow.

All the changes in plumage, it was asserted, were accomplished by actual feather loss and growth, no basis being observed for the theory of change of color in the individual feather.

The paper was illustrated with specimens and a series of slides showing the White-tailed Ptarmigan and its haunts on the summits of the Canadian Rockies in Alberta.

The Distribution of the Juncos, or Snow Birds, on the North American Continent: Dr. Jonathan Dwight, Jr.

The birds of the genus *Junco* are widely distributed, occupying in the breeding season the whole of Canada, the higher parts of the Appalachian, Rocky and Coast ranges of mountains, and the pine forests of Mexico and Central America. They fall quite naturally into several large groups that differ widely in plumage and are also farther divisible into lesser groups that possess characters more or less intermediate. Intergradation between the various forms seems to be complete and one view is to consider them all geographical races of one species, but a view more in harmony with the apparent facts, is to recognize several of the groups as species and to consider the intermediates either as hybrids or as races, or perhaps as both. A blackheaded junco, for instance, would seem to be specifically distinct from a red-headed bird, because each possesses

a character not found in the other, while mere color variations, attributable to climatic conditions, point to geographical races.

Whether Mendelian principles will or will not explain the complicated plumage characters of the juncos, here at least there seems to be a promising field for experimental research to supplement the facts derived from field study.

The paper was illustrated by a large series of specimens brought together by Dr. Dwight for his investigations, and representing collections in all parts of the country.

The meeting then adjourned.

ROY WALDO MINER,
Secretary of Section

THE TORREY BOTANICAL CLUB

THE club met at the American Museum of Natural History on November 12, 1907. The meeting was called to order by Dr. J. H. Barnhart. Dr. E. B. Southwick was elected chairman. In the absence of the secretary, Miss W. J. Robinson was elected secretary *pro tem.* Eleven persons were present.

The following scientific program was presented:

Demonstration of Regeneration in Drosera: WINIFRED J. ROBINSON.

Miss Robinson observed regeneration in the leaves of plants of *Drosera rotundifolia* which she had under observation for experimental purposes, at the propagating house of the New York Botanical Garden, in August, 1907. Young plants appeared upon old and apparently dead leaves which were attached to the plant and were at first thought to be seedlings which had penetrated the leaf tissue in their growth. Sections showed that this was not the case but that the young plant grew from the cells of the old tissue which had remained in an embryonic condition. No formation of callus was observed. Regeneration occurred with equal facility from blade or petiole of the leaf or from the flower stalk. The first leaves of the young plant bear no tentacles, but later leaves are exactly like those of the parent plant. The roots appear after the stem has attained some size and are at first diageotropic, but later bend toward the substratum.

Drosera is not mentioned in recent literature upon regeneration but Spencer in his "Principles of Biology," 1867, referred to the subject as a matter of common knowledge. Naudin recorded the appearance of a bud upon the upper surface of the leaf of *D. intermedia* in *Ann. Sci. Nat.*, II., **14**: 14, *pl. 1, fig. 6,* 1840. Planchon gave his observations upon certain "monstrous flowers" of *D. intermedia* in *Ann. Sci. Nat.*, III., **9**: 86, *pl. 5 and 6,* 1853. His observations were verified by various later writers. The most extended study of regeneration in *D. rotundifolia* was made by Nitschke, professor at Westphalia, whose investigations were printed in the *Bot. Zeit.* **8**: 239, 237, 245, 1860. He studied plants in the bogs and observed that the age of a plant could be determined by the successive rings of young plants about it.

Photographs of regenerating plants and of sections showing relation of the regenerating tissue to the parent plant were shown, also specimens in alcohol, demonstrating the origin of young plants from petiole and blade of leaf and from the flower stalk.

Notes on Tumboa (Welwitschia): NORMAN TAYLOR.

After a short account of the history and synonymy of *Tumboa Bainesii* (*Welwitschia mirabilis*), a general description of the mature plant was given. Attention was called to the peculiar characters of *Tumboa,* which is exogenous in the two cotyledons and the 2–4-merous perianth, endogenous in the parallel-veined leaves and six stamens, angiospermous in the general structure of the flower, and gymnospermous in the naked ovule and typical "cone" flowers.

Particular mention was made of the seedling, of which there are two now growing at the New York Botanical Garden. In germination the two ligulate cotyledons appear first above the soil, followed by the two nepionic leaves, at first erroneously supposed to develop into the only two leaves that the plant ever has during the conjectural one hundred years of its life, but this interpreta-

tion of the foliage was subsequently corrected in the "Genera Plantarum." Photographs were shown illustrating the two cotyledons and also the position and character of the two nepionic leaves. The latter, which will subsequently develep into the long, tentacle-like leaves of the mature plant, are at first small and linear, springing up directly between the cotyledons, which they closely resemble, and at right angles to them. It was noted that sometimes these leaves were pressed close together, and at other times spread as far apart as possible; that is, they were prostrated on each side of the axis of the plant. From being thus flattened out on the soil they would gradually become erect and finally touch their inner surfaces together. In seeking an explanation of this peculiarity several ideas suggested themselves, the true one seeming to be that the movement of the leaves was a direct response to the presence or absence of water. When they were prostrate they were simply wilted, and it was the water that made them stand erect. On account of the typically xerophytic aspect of even these seedling leaves one would not suspect that they were wilted, there being no external evidence of any loss of turgidity, except the change of position above described.

Some Recent Species of Plantago: E. L. Morris.

Plantago is the genus of plants containing our common plantain. Probably these plants are by most people considered nothing more than weeds, but in contrast to these as weeds there is a large group of species typically at home and indigenous in the semi-arid regions of our west and southwest. The species for a long time were included under one name, a name which was applied originally to the South American species found only in Patagonia.

The speaker called attention to a series of sheets of some fifteen species which, he stated, were until 1900, or a few years preceding, classified under the name of *Plantago patagonica* Jacquin, or, to speak more definitely, since 1845 there had been but three specific segregations from this composite and decidedly variant group. One of these was described by Dr. J. K. Small, another by Miss A. M. Cunningham and another by Dr. E. L. Greene. The misapplication of the name of Miss Cunningham's species to a specimen received in exchange, led to the study of the group and the segregation of the species into two distinct types, those with relatively long and definitely acute bracts, in distinction from those with typically short and definitely obtuse or rounded bracts. Among the group of perennial species of the genus, reference was made to a species from Mt. Shasta, formerly included in a species typical only of the extreme southwest. Reference was then made to a recent species from Alaska, characterized by the marked septation or partitioning of the leaf hairs. A most notable fact regarding this species is that the next important collection of it was made in Montana. It appears that no collections of this species have been made along the Rocky Mountain regions between the Yukon and Montana stations. The last group of species noticed was that belonging to the typical South American subgenus *Plantaginella,* represented there by several species. A species recently reported from Mexico belongs unquestionably to this group, though quite out of its formerly known range. The chief characteristic of this species is the unifloriate spike, which, preceding anthesis, is enclosed within a prominent sheathing bract. Then followed a brief discussion of variation in our common eastern species, the facts being noted that certain forms may soon require a segregation with the rank of species.

A brief discussion followed the presentation of each of the topics of the evening.

Winifred J. Robinson,
Secretary pro tem.

THE SCIENCE CLUB OF WELLESLEY COLLEGE

The club held its 90th regular meeting on October 8. Dr. Lincoln W. Riddle presented a paper on "Some Fungi Parasitic on Insects." The paper took up two groups of fungi: *Entomophthora* and *Empusa* parasitic on flies, grasshoppers and various hairy cater-

pillars; and *Cordyceps,* parasitic especially on various subterranean insect-larvæ. Attention was called to the economic importance of these fungi, and to the possibility of the use of *Empusa Anlicœ,* parasitic on the caterpillars of the brown-tail moth, in fighting the moth-pest. The paper was illustrated by specimens of the various fungi described.

At the 91st meeting, held on November 5, Dr. Caroline B. Thompson reviewed the recent work of McClung, Montgomery, Wilson, Stevens and others, on the chromosomes of insects, and especially Wilson's theory of the heterochromosomes as sex determinants.

MARY T. HOLLISTER,
Secretary

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA

THE 173d meeting was held in the main lecture hall of the Chemical Laboratory, Tuesday evening, November 12, 1907, at 7:30 o'clock. Dr. W. C. Coker described "A Trip to Porto Rico." The talk was fully illustrated with lantern slides and a large collection of botanical specimens.

A. S. WHEELER,
Recording Secretary

DISCUSSION AND CORRESPONDENCE

LODGE'S ETHER AND HUYGHENS'S GRAVITATION

THE alarming density of the ether which Sir Oliver Lodge believes must be taken into consideration is liable to leave one more open-mouthed with astonishment than did Lord Kelvin's famous molasses-candy ether, even if open mouths are suggested in connection with the latter. But 10^{12} grams per cubic centimeter is not an every-day experience, consciously at least. I have thought of it in relation to Huyghens's ingenious mechanism for gravitation. If a body rotates in a fluid *lighter* than itself, it must in virtue of centrifugal force and Archimedes's principle, *sink* toward the center of rotation. Electronists insist that the ether is absolutely stationary: but suppose that it rotated just a little with the earth. We may then write for the buoyancy per cubic centimeter $\rho_e\omega_e^2R$ and for the centrifugal force per cubic centimeter of submerged matter $\rho_m\omega_m^2R$, where ρ, ω, R denote density, angular velocity and radius of curvature, respectively. In other words

$$\omega_e^2/\omega_m^2 = \rho_m/\rho_e = 10^{-12};$$

that is, if the angular velocity of the ether were but one millionth that of the earth about the sun, there would be no centrifugal force to compensate gravitation. The brilliant experiments of our recent medallists show that observationally, $\omega_e = \omega_m$. The electronist gets around this by the principle of relativity. But if, granting Lodge's ether as little as $\omega_m/10^6$ would imply conditions comparable with gravitation, one can not escape a little uneasiness unless, from the interpenetration of matter and ether, ρ_m is ultimately, *i. e.,* per corpuscle, much larger than ρ_e. As a whole, however, a fixed ether would be the only satisfactory inference.

CARL BARUS

BROWN UNIVERSITY,
PROVIDENCE, R. I.

METAGENESIS IN INSECTS

IN a recently issued paper by Professor Montgomery[1] attention is called again to the condition approaching an alternation of generations in the case of insects with complete metamorphosis:

> Among insects with a more or less complete metamorphosis the crawling larva becomes a quiescent pupa; then from a series of points of the hypodermis of the pupa the organs of the imago are formed, while all the remaining tissues of the pupa degenerate by histolysis and then become ingested by phagocytes. Therefore an adult fly or moth or wasp is an individual quite different from the pupa, an individual produced asexually by the conjunction of a series of buds. This is in every sense as truly metagenetic as the development of a medusa from a polyp (Montgomery).

This is, in a way, true (the word larva, however, should be substituted for pupa in most of the above, as the histoblasts from which the adult parts are derived are already distinguishable and have begun development in the larva), and is suggestive. And the fact

[1] *Trans. Texas Acad. Sci.,* Vol. IX., pp. 75–94.