Herbert Bolton, pointing out their usual mixed character and lack of relation to the school curriculum and suggesting how they may be made of real value. G. A. Dunlop describes "Drying Plants without Pressure" by the use of fine sand or boxwood sawdust, the latter material preserving many of the natural colors and much of the texture of flowers and leaves. It is pointed out that care should be taken in using sawdust owing to its irritating effect on the mucous membrane of the eyes and air passages. There is an account of the exhibit of "British Grown Trees in the Natural History Museum." Among the many "Notes" is one to the effect that the London and North-Western Railway is gathering material to be ultimately displayed in a railway museum.

The Museum News of the Brooklyn Institute for April contains articles on "The Giant Stork, or Jabiru," "Zuñi Silver Working," and "Lizards in Human Stomachs." The section devoted to the Children's Museum discusses "Elementary Physics as a Subject for Children's Museum Instruction" and notes the various living animals at the museum.

A NEW psychological journal, *Le revue psychologique,* has been established at Brussels under the editorship of Mlle. I. Ioteyko, M.D.

SOCIETIES AND ACADEMIES

THE NATIONAL ACADEMY OF SCIENCES

THE scientific program of the meeting of the National Academy of Sciences held in Washington on April 21, 22 and 23 was as follows:

"A Proposed International Atlas of Land Forms," by W. M. Davis.

"The Geological Age of the Santa Cruz Beds of Patagonia with Restorations of Santa Cruz Mammals" (with lantern illustrations), by W. B. Scott.

"The Biological Station for Research, at Agar's Island, Bermuda" (with lantern illustrations), by E. L. Mark.

"The Cytological Basis of Heredity and the Determination of Sex" (with lantern illustrations), by E. B. Wilson.

"On the Functions of the Parathyroid Glands in their Relation to Calcium Metabolism and to Tetany," by W. G. MacCallum and C. Voegtlin (introduced by W. H. Welch).

"Supplementary Atmospheres," by T. C. Chamberlin.

"Great Tangential Movements of the Earth's Crust," by Bailey Willis (introduced by Ira Remsen).

"Some Results of the Magnetic Survey of the United States," by L. A. Bauer (introduced by R. S. Woodward).

"The Metasilicates of Lime and Magnesia—An Application of Physical Chemistry to Minerals," by E. T. Allen (introduced by R. S. Woodward).

"The Exact Measurements of Quantities of Heat, up to 1,500° Centigrade," by W. P. White (introduced by R. S. Woodward).

"Spermatogenesis in the Bee and in the Wasp," by E. L. Mark and Manton Copeland.

"Biographical Memoir of Alpheus Hyatt," by W. K. Brooks.

"Perceptions, Ideas and Hallucinations," by J. McK. Cattell.

"Application of Periodic Solutions of the Problem of Three Bodies to the Motion of the Moon," by F. R. Moulton (introduced by E. H. Moore).

"Biographical Memoir of Asaph Hall," by G. W. Hill.

"The Elevated Reefs of Mombasa and Adjacent Coast," by A. Agassiz.

"The Pelagic Fauna of Victoria Nyanza," by A. Agassiz.

"Recent Work of the Smithsonian Astrophysical Observatory," by C. G. Abbot (introduced by Chas. D. Walcott).

"The Hydration of Ions in Solution," by E. W. Washburn (presented by A. A. Noyes).

"Radiant in the Star-group in Taurus" (with lantern illustrations), by Lewis Boss.

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 442d meeting was held on March 21, 1908, with President Stejneger in the chair.

The first paper was by Professor W. J. Spillman, on "Fixation of Breed Characters in Animals and Plants." He first illustrated the manner of behavior of a character pair (non-albinism and albinism). The character of the population from the second to the tenth generation of the descendants of a Mendelian hybrid was illustrated by lantern slides for different methods of selection. First, with no selection, it was shown that with close

fertilization the descendants of a hybrid constitute, after a few generations, a population consisting of 2, 4, 8 and so on, fixed types, each constituting half, a fourth, an eighth and so on, of the population, depending on the number of character pairs considered, the number of the fixed types resulting being equal to two with an exponent equal to the number of character pairs. Along with these fixed types is found a decreasing proportion of hybrids between the fixed types. With promiscuous cross fertilization and with no selection to type the proportion of the various types occurring in the second generation of the hybrid remains the same in later generations.

By that method of selection in which extracted recessives are discarded it was shown that both with cross fertilization and close fertilization the population gradually approaches the type selected. In close-fertilized plants the approach is rapid, making in ten generations a nearly pure population. With promiscuous cross fertilization this method of selection tends to produce a pure population, but at a much slower rate than with close fertilization. For instance, with two character pairs, when cross fertilization occurs, in the tenth generation the type selected becomes approximately 65 per cent. of the population, while under similar conditions, with close fertilization, the type selected becomes approximately 99 per cent.

With animals another type of selection is practicable, viz., that in which one of the sexes is tested for gametic purity and only homozygotes of the type desired used. When this method is used the selected type increases even more rapidly than with close fertilization and elimination of extracted recessives.

In plants still a different process is practicable, viz., that of testing each second genration individual by saving its seed and planting them separately. When the next crop matures the character of the progeny of the various individuals enables the breeder to select those which are homozygote and those thus establish at once a pure breed.

The speaker also referred to the so-called elementary species secured by Nilsson, of Sweden, and Shull, of this country, explaining them as the descendant of a completely homozygote individual. It is claimed that in these completely homozygous forms all hereditary variation is completely eliminated and that only such variation occurs as is due to environment.

Dr. C. O. Townsend asked whether the speaker considered variation caused by environment to be hereditary. In answer it was stated that that question had not been sufficiently investigated to permit of a categorical answer. When plants are moved to an entirely new environment, important variations frequently occur. Some of these variations are hereditary, at least under the new environment. Whether they would be permanent should the descendants of the plant be returned to the original environment has not been sufficiently investigated.

Mr. M. C. Marsh read the second paper, describing "A New Method of Marking Salmon Fry." Distinctive marks on young salmon, provided they do not interfere with the life and movements of the fish and are recognizable in the adult, are very useful in acquiring information concerning the age and migrations of salmon and the efficiency of artificial propagation. The Bureau of Fisheries has obtained definite returns from salmon fry marked in Alaska by the amputation of certain fins with scissors. These marks were placed upon fry about three months old. The operation of marking is rather slow and tedious. The possibility of rapidly marking salmon fry in the sac stage or at the time of planting, by cauterizing the fins with a thermo-cautery needle was shown. Either the adipose, dorsal or anal may be removed in this way and probably other fins. The shock of the operation causes a moderate loss which ceases after two or three days and the remaining fry recover. Evidence thus far gives reasonable assurance that regeneration will not interfere with the recognition of the marked fish which return as adults. Combination marks on the same fish may to some extent be made and in this way the number of distinctive marks may be increased. A given

mark should, of course, be confined to one locality and one season, unless an interval of years has elapsed.

A character shaped like the letter s may be branded upon the skin of salmon fry by the aid of a thermo-cautery with small mortality. The subsequent obliteration of the wound by healing and regeneration, and failure of the scar to grow sufficiently with the growth of the fish, are possibilities which may interfere with recognition of the adults. Salmon fry, however, are to be marked by these methods on a considerable scale in Alaska, and the outcome awaited.

By partly stupefying the salmon fry with chloroform the marking and branding is greatly facilitated and the loss reduced.

A method for marking the fry of the great commercial species, such as the cod, shad and whitefish, is greatly desired. Such fry are too small and delicate to withstand the shock and handling incident to a mechanical mark.

The last paper was by Dr. M. W. Lyon, Jr., consisting of "Remarks on the Horns and the Systematic Position of the American Antelope." The history of the literature on the subject of the periodic shedding of the horns of the American antelope was reviewed and an outline of the growth of the horns and the method of shedding presented. Two abnormal cases in which horns were not annually shed were mentioned. Dr. Lyon concluded that in structure and method of growth the horns of the American antelope do not differ essentially from the horns of the cattle, sheep, goats and true antelopes, family Bovidæ, and that the genus *Antilocapra* should not rank as the representative of the family Antilocapridæ of the order Artiodactyla, but as a subfamily, Antilocaprinæ, of the family Bovidæ. Illustrations of the growing horns of males, of female horns, and of an abnormal horn which had not been cast off were shown.

M. C. MARSH,
Recording Secretary

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

AT the meeting of March 3, 1908, a necklace, consisting of a human lower jaw suspended from a string of beads and human teeth, and two leather bands ornamented with ends of fingers, all from the Apache and Ute Indians of the southwest United States, were exhibited and commented on by the president and secretary, who referred to the use of parts of the human body for fetichistic purposes. The paper of the evening was by George R. Stetson, "The Industrial Classes as Factors in Racial Development." Mr. Stetson said that the factory began in England under the Romans and that early the evil effects of overcrowding, bad air and lack of sanitation were known, causing attempts to be made to alleviate the troubles. In England, in 1906, 109,068 factories employed four and one fifth million workers, seventy-one per cent. women and children, and in Scotland sixty-eight per cent. were females. Mr. Stetson named various occupations which are dangerous, laundries being the worst. Cotton mills are damp and sometimes have 31–49 volumes of carbonic acid to 1,000 volumes of air, whereas, the law allows only nine volumes to 10,000 volumes of air. In fact few mills are sanitary and the result is to lower the weight, stature and general health among children, and produce rachitis and trade diseases. Much of the terrible deterioration shown among recruits offered is due to the perils of the modern manufactory. Overcrowding, also, is a great evil, which causes pauperism and disease. In Sheffield, for instance, the infant death rate is 236 to 1,000, and in other localities the condition is deplorable. Mr. Stetson said that deterioration is more marked than it was twenty-eight years ago, and it is manifest that the industrial classes must be relieved by some means or the viability of the race will be decreased. The paper was discussed by Professor Holmes, who said that in a small way much has been done to protect the worker, but to secure ideal conditions is difficult and that there would probably always be a certain amount of deterioration; by Dr. Hrdlicka, who said that the employment of children is the chief source of danger, because the seeds of disease are implanted at a period when the body is undeveloped; by Major Clark, who

said that child labor is not an unmixed evil, and that it is chiefly a sanitary question; and by Mr. Robinson, who suggested old age pensions as means of avoiding pauperism.

WALTER HOUGH,
General Secretary

THE GEOLOGICAL SOCIETY OF WASHINGTON

AT the 202d meeting of the society, held at the Cosmos Club, on Wednesday evening, March 11, 1908, under informal communications, Mr. W. H. Emmons presented a formula for determining the angle of intersection of a plane with the strike of a vertical section which is drawn oblique to the strike of the plane.

Regular Program

Preliminary Notes on Recent Earth Movements at Butte, Montana, as shown by Precise Levels of the U. S. Geological Survey: R. H. CHAPMAN.

In 1904 precise levels were run at Butte, Montana, and many bench marks established with the purpose that they should be used as a base to compare future changes of surface level.

In 1906 the Coast and Geodetic Survey brought one of its precise lines into Butte and obtained checks on several benches of the 1904 work. These checks show changes which are interesting. Using a bench mark near the Butte Reduction Works as a datum and extending the comparison of benches northward an increasing difference is found.

	Difference
Butte Reduction Works	0.000
Webster School	— .017
Colorado Street School	— .051
Owsley Block	— .436
Court House	— .737
Government Building	— .888

From the Government Building a comparison along another line to the flat southward shows a decreasing difference.

	Difference
Government Building	— .888
Florence Hotel	— .791
Braund House	— .130
South Butte	— .051

Butte Reduction Works again the zero.

The maximum change at the Government Building represents a sinking of .444 foot per annum.

The Owsley Block compared with the Butte Reduction Works shows a sinking of .344 foot between 1899 and 1904, and of .436 foot between 1904 and 1906, the former giving a rate of .069 and the latter of .218 foot per annum. The figures obtained from the earlier work are not so reliable as those depending upon the notes of 1904 and 1906, but comparison shows the rate of change to be increasing.

The bench marks were located in the hope that eventually it would be possible to determine if there is continued movement along the local fault planes, but the 1906 work did not include a sufficient number of checks to be of value for this purpose.

No reliable comparison has yet been had with the benches established on the east side of the continental fault of the Rocky Mountains.

The systematic repetition of check levels at intervals of two years—to bring out the facts of value—was strongly urged.

Pleistocene Phenomena of Central Massachusetts: WM. C. ALDEN.

The Worcester County plateau is well glaciated, retaining in but few places residuum of preglacial weathering. There is much drift in the valleys, but on slopes and crests it is very thin, probably not averaging 15 feet over the area.

No undoubted evidence of pre-Wisconsin glaciation was observed. Drumlins are numerous, while in places the bed-rock surface between them is but thinly covered. Consideration of the elevation of the glaciated summits of Mounts Wachusett and Monadnock, their distances from the terminal moraine, and other factors leads to the inference that there may have been 1,500 to 1,900 feet of ice over the central part of the area, and 2,000 to 3,000 feet in the Connecticut Valley.

No moraines of recession are traceable continuously across the area. Terminal moraines, kame and outwash terraces, eskers and delta plains and deposits formed in temporary glacial lakes are numerous, but while they enable

one to determine fairly well the positions of the retreating ice front at these particular places, the deposits are almost wholly confined to the valleys, not being traceable across the intervening ridges. However, a consideration of all the factors affords a basis for their correlation as marking thirteen stages of halt in the recession of the ice front across the 30-minute quadrangle. These seem to show a probable gradual development of a broad re-entrant over the Worcester County plateau with lobes lagging behind in the Connecticut Valley and on the lower ground to the eastward, so that in the western part the retreat was from southeast to northwest, and in the eastern part from southwest to northeast.

The phenomena noted above appear to have been formed immediately in connection with the retreating ice front. Nothing was observed indicating that the elevation was lower than at present or that there was an incursion of the sea up the valleys following the deglaciation.

Notes on Recent Changes in the Bogoslof Islands: PHILIP S. SMITH.

In 1900 Merriam summarized the changes that have taken place in the Bogoslof Islands up to the time of the Harriman Expedition of 1899. Since that time two new volcanoes have been formed and one of these later peaks has disappeared. Many of the stages in the rapid changes noted in the islands have been mapped by different observers, especially in the critical years 1906 and 1907. Maps made by Dunn and Stromburg in 1906 were exhibited, but the most interesting series were maps made by Camden, July 4, 1907, Jaggar, August 7, 1907, Camden, August 11, 1907, and October 16, 1907. The two last maps represented the conditions approximately a month before and a month after the disappearance of McCullock Peak, the new volcano which was formed between September, 1906, and July, 1907. Fragments of the ejectementa collected by the Revenue Cutter Service, on examination showed at least two distinct kinds of rock; one an andesite with both hornblende and augite, a rather basic feldspar and an abundance of volcanic glass; the other showed a granular rock similar to a diorite with essentially the same minerals as those of the andesite, but crystallizing with a distinct hypidiomorphic texture. None of the specimens were collected from ledges and it is not known whether or not the diorite is from a fragment riven from the walls of the conduit and thus brought to the surface. The presence of granitoid rocks on the southern margin of the Aleutian chain, however, suggests that the basement on which the recent volcanics have been poured out is in many places a coarsely crystalline granular plutonic rock. No flows of lava were noted in connection with any of the recent eruptions on the Bogoslof islands.

PHILIP S. SMITH,
Secretary

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 649th meeting was held on April 11, 1908, President Bauer presiding. Mr. Bailey Willis, of the U. S. Geological Survey, presented by invitation a very interesting paper on "The Mobility of the Lithosphere."

The address of the last retiring president of the society, Mr. John F. Hayford, was on "The Earth a Failing Structure." In it Mr. Hayford discussed the relations of weight, mass and stability of the earth, and gave physical and geological evidence in favor of the view that the earth yields more or less constantly to the internal stresses due to gravitation. Mr. Willis took up this theme along the lines of geological evidence and presented the conclusion that no considerable mass of the lithosphere has been in a state of rest, that is of static equilibrium, within any period known to geological history.

Referring to the distinction initially made by Powell and Gilbert between epeirogenic and orogenic movements in the earth's crust, the speaker first showed a series of lantern slides illustrating different geographic conditions of North America from late pre-Cambrian to the present time. These charts are necessarily, in the present state of the science of paleogeography, of a provisional nature, and subject to material modification, so far

as details of distribution of land and sea at any particular epoch are concerned; but there is no doubt as to the general character of the changes which have occurred from period to period, and these changes are of very notable degree. It was shown that we could distinguish at least four great diastrophic cycles, each one of which consisted of an initial epoch of pronounced continental emergence associated with mountain building, and a later period of planation of lands to a peneplain condition and very wide marine transgression. Of these four cycles, the latest is that in which we live, and we are at the present time in the initial epoch of that cycle which is marked by decided mountain features. If it be assumed that the volume of the oceanic waters has not varied materially throughout the geologic ages which these cycles comprise (and the physical evidence substantiates this assumption) it follows that changes in the superficial extent of seas and lands must be the result of changes in the shape and depth of oceanic basins; but such variations of form can only proceed from movements of the lithosphere, movements which have the character of warping; and as such variations are traced throughout the entire legible period of geologic history, it follows that movement has been an equally persistent factor. From the nature of the effects, which as stated in the early part of the cycle are more vigorous and in the later part more gradual, it follows that there is a pronounced variation and a certain periodicity in the movements; but we are not able to distinguish any time when epeirogenic change has not been in progress in some perceptible degree.

Taking up the other aspect of diastrophism, namely, orogenic or mountain-building movements, the speaker showed a map of the world on which were delineated the axial trends of great folded mountain chains. From a study of their distribution and of their relations to areas of maximum elevation and denudation it appears (*a*) that the Atlantic and Pacific oceanic basins have widened at the expense of the continental margins which have been crushed in; and (*b*) that the whole southern hemisphere (the oceanic hemisphere) has spread northward at the expense of the northern (continental) hemisphere. The very extensive areas about the Arctic Ocean, which have remained undisturbed since an early Paleozoic time, have formed a central mass against which the more southern portions of Eurasia and North America have been folded.

From the detailed consideration of these orogenic movements Mr. Willis concludes that the great tangential displacements are due to an expansion of the suboceanic masses. This conclusion is independent of any particular hypothesis of the causes of such expansion, but in his opinion the effects are so distributed as to be inconsistent with any interpretation on the lines of the contraction theory. Following Dutton, Gilbert and Hayford in the general concept of isostatic adjustment toward an equilibrium among denser and lighter masses of the lithosphere, he holds that the persistent epeirogenic movements as well as the occasional orogenic movements are due to strains set up among the heterogeneous bodies of the earth's crust which differ from one another in density. It appears obvious that were the suboceanic masses enough denser than the subcontinental masses, the former would displace the latter, provided the firmness of rocks be insufficient to maintain their form. In masses of large dimensions, cubes measured by tens of miles on the side, rocks are not firm enough, even under the pressures that exist down to a depth of 100 miles below the surface, to maintain their form if unsupported at the sides; and thus there must exist throughout the lithosphere a tangential strain or tendency to spread which is somewhat greater in the denser than in the lighter masses. This strain is apparently not initially sufficient to cause movement if we may assume that the lithosphere were at any particular instant in a state of equilibrium; but it is a persistent strain of constant direction in any particular locality, and in the event of disturbance through changes of molecular arrangement or temperature, it would serve to direct the effects of any growing strain and ultimately to cause movement in the effective

direction, that is from the denser towards the lighter mass.

Mr. Willis thus explains the persistency and periodicity of movement in the lithosphere through the efforts of unstable heterogeneous masses toward equilibrium; efforts which are assisted by variations in molecular arrangement, temperature and pressure, and which are directed by the tendency of the heavier masses to spread at the expense of the lighter masses. The resulting tangential strain grows during a prolonged period and produces more or less incomplete efforts towards equilibrium, which are apparent in epeirogenic warping, but from time to time the increase in strain becomes such that the margins of the lighter areas, continents, are crushed in, and an episode of orogenic movement ensues.

These effects of warping and mountain-building thus result from the mobility of the lithosphere, which is, however, conceived to be highly rigid in relation to sudden stresses or when taken in small masses.

A sufficient mass to account for all the superficial variations of form that are known is found within a depth of 70 to 100 miles below the surface, the geologic results being thus in accord with the determinations by Hayford of the depth of the zones of isostatic compensation. The inner mass of the earth, 3,900 miles radius, is conceived to be held in a state of relatively great stability by the high rigidity induced by pressure of the superincumbent load, and it is thought to graduate into the relatively unstable superficial layer through decrease of rigidity. The great nucleus itself is conceived to be the source of those energies which are expressed in variations of temperature and molecular condition through which the tangential strains gradually develop.

R. L. FARIS,
Secretary

THE AMERICAN CHEMICAL SOCIETY. NEW YORK SECTION

THE seventh regular meeting of the session of 1907–8 was held at the Chemists' Club, 108 West 55th Street, on April 10.

The Wm. H. Nichols medal, awarded annually for the best paper read before the section, was presented to Professor William H. Walker, of the Massachusetts Institute of Technology, for his paper on "The Corrosion of Iron and Steel."

The ceremony of awarding the medal was witnessed by many prominent members of the society. The chairman of the section, Professor Sherman, after reading a letter from the donor of the medal, Dr. Nichols, who expressed his regret at not being present, spoke of the great diversity in the subjects of research for which the authors had received the medal. These included agricultural chemistry, investigation of rare elements, organic synthesis, technical chemistry and finally a physico-chemical investigation of the properties of one of the most important metals.

The president of the society, Professor Bogert, in presenting the medal, gave a short history of the professional career of the recipient. He said, in part, that W. H. Walker graduated from Pennsylvania State College in 1890 and took his doctor's degree at Göttingen about a year later. Since then he has been professor of industrial chemistry at the Massachusetts Institute of Technology and lecturer on that subject at Harvard. Outside of his teaching he has been very successful in technical work, having made improvements in the manufacture of cut glass, in annealing silver, in brewing processes and in the preparation of wood products. He has also contributed much to the chemistry of cellulose.

Professor Walker, in acknowledging the medal, gave a résumé of the paper for which he received the award and outlined further investigations on the same subject which are now in progress.

The remainder of the evening was devoted to papers by Chas. Baskerville on "Courses in Chemistry for Colleges," and Jerome Alexander on "The Effect of Colloids on Crystallization: the Function of Gelatin in Ice Cream"—preliminary paper.

C. M. JOYCE,
Secretary