of Nervous and Mental Diseases, Dr. Smith Ely Jelliffe of New York has become the responsible editor. Dr. William Osler, Dr. Frederick Peterson and Dr. Wharton Sinkler have joined the advisory board. Dr. William G. Spiller of Philadelphia will continue to be acting editor.

SOCIETIES AND ACADEMIES.

THE AMERICAN PHYSICAL SOCIETY.

THE Annual Meeting of the Physical Society was held at Columbia University on Dec. 27, 1901. From some points of view the date was an unfortunate one, coming as it did so soon after Christmas day. But in spite of this fact the attendance was unusually good, while the program included a larger list of papers than that of any previous meeting except the one held in connection with the New York meeting of the American Association in 1900.

Officers were elected for the year 1902 as follows:

President, Albert A. Michelson; *Vice-President,* Arthur G. Webster; *Secretary,* Ernest Merritt; *Treasurer,* William Hallock.

Messrs. Carl Barus, D. B. Brace and A. L. Kimball were elected members of the Council of the Society.

The following papers were read:

'A Suspected Case of the Production of Color by the Selective Electrical Resonance for Light Waves of Very Minute Metallic Spheres': R. W. WOOD.

'Report on Electrostriction': LOUIS T. MORE.

'Further Experiments on Electrostriction': J. S. SHEARER.

'The Transmission of Excited Radioactivity': E. RUTHERFORD.

'Excited Radioactivity and Ionization of Atmospheric Air': E. RUTHERFORD and S. J. ALLEN.

'Note on Drude's Elektronentheorie': E. H. HALL.

'The Disturbances of a Plumb-bob suspended on a Steel Wire': WM. HALLOCK.

'A Thermograph for Earth Temperatures': WM. HALLOCK.

'The Viscosity of Water determined by the Aid of Capillary Ripples': F. R. WATSON.

'Magnetization of Steel at Liquid Air Temperatures': C. C. TROWBRIDGE.

'The Pfanndler Calorimeter': W. F. MAGIE.

'Standards of High Electrical Resistance': H. C. PARKER.

'Variation of Contact Resistances with Change of E. M. F.': H. C. PARKER.

'On a Ruling Engine for Diffraction Gratings': A. A. MICHELSON. (Read in abstract by the Secretary.)

The next meeting of the Society will be on Feb. 22, at 10:30 o'clock A. M., in Fayerweather Hall, Columbia University.

ERNEST MERRITT,
Secretary.

OHIO STATE ACADEMY OF SCIENCE.

THE eleventh annual meeting was held at Columbus, November 29 and 30. This was a month earlier than the usual time but the attendance was as good as usual, about thirty-five. The policy of holding a summer field meeting every year the Academy decided to abandon. Some of these meetings have proved very successful, but of late the attendance of members living at a distance has been small, except when held in connection with the meeting of some other organization. Hereafter the executive committee each year may or may not call a summer meeting.

The following resolution was passed: "That the Academy, through its secretary, respectfully represent to the postal authorities that the present provisions and rulings of the postal department regarding transmission of natural history specimens are inconsistent and a serious hindrance to exchange of scientific material and urge that better provisions be afforded."

The secretary read obituary notices of Edward W. Claypole, first president of the Academy, and of Mrs. Claypole, and a committee was appointed to draft a suitable memorial.

A letter was read from Emerson E. McMillin, again placing $250 at the Academy's disposal. Eighteen persons were elected to membership.

The topographic survey of Ohio by the U. S. Geological Survey in cooperation with the State was begun in 1901 as a result of determined efforts put forth by the Academy of Science beginning in 1896, when Albert A.

Wright made the matter the subject of his presidential address. The progress of the topographic survey during the past season was described by C. N. Brown. The report of the Committee on Topographic Survey, prepared by Albert A. Wright, the chairman, was read by Lynds Jones. In conclusion it says: "It is very desirable that the members of the Academy and all other supporters of the survey, should make known, to their representatives in the legislature and to the governor and other officers of the State, their desire that this work, so well inaugurated, should be followed out to its completion, in the mapping of the entire area of every county of the State."

The following officers were elected for the ensuing year: President, W. R. Lazenby; Vice-Presidents, C. J. Herrick and C. S. Prosser; Secretary, E. L. Moseley; Treasurer, Herbert Osborn; Elective Members of Executive Committee, Wm. Werthner and John Uri Lloyd.

The program was as follows:

'New Fossils, including Sea-weeds, two new genera, Carboniferous, Marietta; Land Plants, two species, Carboniferous, one species, Corniferous; Corals, fifteen Cyathophylloids, Corniferous; Brachiopods, one, Corniferous; Cephalopods, six, Corniferous': H. Herzer.

'Notes on the timber of trees of Ohio': William R. Lazenby.

'The self-pruning of woody plants': John H. Schaffner.

'The Ohio species of *Phyllachora*': W. A. Kellerman and J. G. Sanders.

President's Address—'The Future of Vegetable Pathology': A. D. Selby (will be published in Science).

'A striking case of mimicry, with exhibition of specimens': Herbert Osborn.

'Smut infection experiments': W. A. Kellerman and O. E. Jennings.

'Further observations on the preglacial drainage of Wayne and adjacent counties': J. H. Todd.

'The weight, waste and composition of apples': William R. Lazenby.

'Plant ecology of Ohio; a general outline': John H. Schaffner and Fred. J. Tyler.

'Observations on the flora of the Gauley Mountains, West Virginia': W. A. Kellerman.

'Preliminary list of tamarack bogs in Ohio': A. D. Selby.

'Report for 1901 on the State Herbarium with additions to the Ohio Plant List': W. A. Kellerman.

Joint Meeting of the Academy of Science and the Modern Language Association of Ohio. (Three titles.)

'Modern Languages and Science in High School Course': William Werthner.

'Botanizing in the Colorado Mountains'—Illustrated: A. D. Selby.

'Some notes on a trip to southeastern Siberia': Gerard Fowke.

'Notes on' Hemiptera with some records of species new to the Ohio list': Herbert Osborn.

'Observations on some South American Hemiptera, with exhibition of specimens': Herbert Osborn.

'A species of Diptera mining the leaves of wild rice at Sandusky': Jas. S. Hine.

'Experiments with chemicals to improve seed germination': W. A. Kellerman and F. M. Surface.

'A possible cause of Osars': G. H. Colton. Read by the secretary.

'The introduced species of *Lactuca* in Ohio': A. D. Selby.

'Gradations between *Verbena stricta* and *Verbena angustifolia*': Thos. A. Bonser.

'New plants for the Ohio Catalogue': A. D. Selby.

'Observations on the origin of forest belts in Clay County, Kansas': John H. Schaffner.

'A report on the Revised Catalogue of Ohio Birds': Lynds Jones.

'The summer birds of Lake Erie's Islands': Lynds Jones.

'Perverted Benevolence': Gerard Fowke.

'Notes on *Anthurus borealis* and *Erysiphe graminis*': W. W. Stockberger.

'Report on Ecology of Big Spring Prairie': T. A. Bonser.

'Some aspects of plant growth as illustrated by methods of watering': W. J. Green. Presented by the president.

Shall we continue the field meetings?

What places of interest to scientists or to the general public are in need of protection by the State?

In what manner may the Academy become more serviceable to the scientific interests of the State?

'An insect pest new to Ohio': F. M. Webster. Read by title.

'The trend of insect migration in America': F. M. WEBSTER. Read by title.

'A plasmodium found in the blood of a turtle and related to the plasmodium of malaria': C. B. MORREY. Presented by Herbert Osborn.

E. L. MOSELEY,
Secretary.

NEW YORK ACADEMY OF SCIENCES.
SECTION OF BIOLOGY.

A REGULAR meeting of the Section of Biology was held on January 13, Professor Charles L. Bristol occupying the chair. The following program was presented:

1. 'The Relation between the Variability of Cells and that of Organisms': FRANZ BOAS.

2. 'Degeneration in *Paramœcium* and so-called Rejuvenescence without Conjugation': GARY N. CALKINS.

3. 'Natural Selection in *Samia cecropia*': HENRY E. CRAMPTON.

Professor Boas, in his paper, which has been printed in full in SCIENCE for January 3, 1902, established the following conclusions: "(1) The elements of organisms are more variable than the organisms themselves. (2) The elements of organisms vary in correlated groups. (3) The characteristics of the variability of an organism depend upon the correlations of its constituent elements, so that a knowledge of these correlations will enable us to determine the characteristics of the variability of the organism." (4) It was also pointed out that skew distribution of variations does not necessarily indicate selection, or instability of type, but may occur in stable forms.

Dr. Calkins presented the history of two individuals, *A* and *B*, of *Paramœcium caudatum*, from different localities, which were isolated February 1, 1901. These were fed on twenty-four hour hay-infusion, and the number of divisions recorded at periods of from one to three days throughout the year, one individual being isolated each time. Conjugation occurred for the first time, among the extras, in May. This period was followed, in July, by well-marked degeneration of both *A* and *B*, which went so far that nearly all of the stock was lost. The survivors were stimulated to renewed activity by treatment with extract of lean beef. After three months of normal and active divisions, another period of conjugation occurred. This again was followed by degeneration and again the cultures were saved by treatment with beef-extract. At the present date (January 13), *A* is in the 416th generation, and *B* in the 375th generation, and no conjugation has taken place in the direct line of the cultures. Thus far the experiments have yielded the following results: (1) *Paramœcium* unquestionably passes through more or less regular cycles of activity and weakness. (2) The period of weakness is preceded by one of greater dividing activity. (3) The period of weakness ends in death, provided the diet (hay-infusion) remains the same. (4) Beef-extract, without conjugation, restores the weakened functions of growth and division. (5) Exogamous conjugation of *A* and *B*, if followed by the same diet (hay-infusion), does not restore these weakened activities, but is soon followed by death. (6) Exogamous conjugation between wild gametes, and followed by hay-infusion diet, results in normal growth, division, and life. (7) Endogamous conjugation among gametes from the cultures does not differ from exogamous conjugation. The ex-conjugants live and divide normally if fed for a time with beef-extract, but die if fed directly with hay-infusion. (8) One intra-cellular effect of beef-extract upon weakened *Paramœcium* is the formation of 'excretory granules.' Another is the disintegration of the old macronucleus. (9) A few conclusions to be drawn are: (*a*) a change of diet is necessary for the continuance of vital activities; (*b*) the equivalent of parthenogenesis in higher animals may be induced by change in diet; (*c*) conjugation, by itself, does not 'rejuvenate'; (*d*) conjugation probably has some other significance than that usually accepted, though what this significance may be is not indicated, thus far, by the experiments.

Professor Crampton presented the results of a statistical study upon pupæ of *Samia cecropia*. Twenty-five characters were determined for a lot of 456 pupæ, the measurements were tabulated, and the usual constants of the curves of variation were ascertained, viz., the

range, mode, mean, standard deviation and coefficient of variability. It was found that only 349 of these pupæ produced perfect moths at the time of metamorphosis, the others being imperfect to a greater or less degree, and therefore presumably ruled out as far as reproduction is concerned. When, now, the former class was compared, sex by sex, with the whole group of pupæ, it was found to be a selected class of the less variable individuals, while the more variable ones were eliminated. Selection is therefore 'periodic' in the sense of Pearson. The fact of primary interest appears when this case is contrasted with that of *P. cynthia*. As reported last spring, selection in the latter species is similarly of the less variable individuals, but is 'secular' as well, that is, the perfectly metamorphosing pupæ form a class by themselves, with a type which differs from that of the whole group. It was pointed out that the real basis of selection was probably a correlative one, a physiological 'fitness' depending upon the proper coordination or correlation of the various parts of the organism.

Henry E. Crampton,
Secretary.

SECTION OF ASTRONOMY, PHYSICS AND CHEMISTRY.

The Section met at the Chemists' Club on the evening of January 6. Mr. H. C. Parker gave the results of some experiments he had made on the 'Variation of Contact Resistance with Change of Electromotive Force.' The resistances used in the experiments consisted of oxide of manganese on cobalt glass, the new form of standard high resistance described in a previous paper given before the Academy. The electromotive forces employed consisted of 10, 50 and 100 dry cells, respectively. It was found in every case that the resistance decreased with increase of electromotive force. This decrease might be only a small percentage, or the resistance might be reduced to a small portion of the original value. Improving the contacts rendered this change in resistance much less marked. It was stated that the decrease in resistance when the electromotive force was increased might possibly be due to a kind of coherer action taking place at the contacts. Very high resistances, measured by the electrometer method, were found to practically obey Ohm's law. It was pointed out that in such cases the contact resistance was probably only a small portion of the entire resistance.

Professor Hallock presented a paper on the 'Magnetic Deflection of Long Steel Wire Plumb-lines.' He stated that in the course of the work in the very deep shaft of the Tamarack Mining Co. on Lake Superior it had been found desirable to plumb down certain points from the surface. The plumb-lines used were of No. 24 piano wire and the weights were fifty pounds of iron. At first the lines were 16.33 feet apart at the top and they were later moved to 17.66 feet. The remarkable observation was made, that in the first case they were 0.08 ft., and in the second case 0.07 ft., further apart at the base than at the top. It was pointed out that a deflection of such an amount could not be explained as due to the gravitational attraction of the walls of the shaft for the nearer plumb-bob. Professor Hallock suggested that the effect was probably due to the magnetization of the wire and the consequent repulsion of the north poles at the bottom. In order to test the possible applicability of this theory a number of experiments were made in the research shaft at Columbia University which gave much corroborative evidence. Two plumb-lines about 85 ft. long were suspended in the shaft. One was of copper wire and the other of iron wire, about 0.03 in. in diameter. Lead weights were attached and it was found that the lines were about $\frac{1}{75}$ in. closer together, at the bottom, when the iron line was south of the copper than when it was north. Two lines of iron wire were also used and the distance apart at top and bottom measured. The deflections obtained were of the same order of magnitude as those produced by the earth's field. The deflections, thus obtained, give evidence of the action of magnetic forces of sufficient magnitude to explain the deviations observed in the plumb-lines in the Tamarack shaft.

Professor Hallock also described a form of recording thermometer which he had lately devised. It consists of a large copper bulb

which was connected by means of capillary copper tubing to a series of cells similar to those used in the construction of aneroid barometers. The bulb, tube and cells, were filled with oil and the recording mechanism attached to the aneroid cells.

F. L. TUFTS,
Secretary.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

AT the 545th meeting, held on January 18, 1902, Mr. L. P. Shidy, Chief of the Tidal Division, Coast and Geodetic Survey, gave a brief 'Explanation of the Currents in Unalga Pass, Aleutian Islands, Alaska.' Dr. Dall spoke of the difficulties of navigation in this pass when there is a strong current, and of the unaccountable dying away of the wind near the center of the pass.

He said that these currents seem to conform to Torricelli's theorem for the flow of liquids due to a difference of head, which may be expressed thus:

$$V=\sqrt{2gd} \text{ feet per second,}$$

where $g=32.1722$ feet = the velocity of a falling body at end of first second, and d = the difference in feet between the elevation of the water surfaces at each end of the strait.

If we extract the square root of $2g$, we have

$$V=8.0215\sqrt{d} \text{ feet per second,}$$

or converting this into nautical miles per hour, it becomes

$$V=4.75\sqrt{d} \text{ knots,}$$

in which d is expressed in feet, as before.

The tides at each end of Unalga Pass were tabulated in the accompanying table.

The computed velocities of the current in the given table were obtained by the application of Torricelli's theorem. It may be remarked that there is, in general, a satisfactory agreement between the observed and computed velocities. The times of changing direction of flow are correctly given by computation, and the interesting phenomenon which occurred at 16 hours on June 14, 1901, where the southerly current had decreased to 1 knot, and then increased again without reversing its direction, is reproduced by computation within small limits of error.

TIME.	TIDE.		CURRENTS. + Indicates a Northerly Current. — Indicates a Southerly Current.	
12 = Noon.	South End of Pass.	North End of Pass.	Computed.	Observed.
Hour.	Feet.	Feet.	Knots.	Knots.
June 14, 1901				
8	3.14	2.91	+ 2.3	+ 2.6
9	3.75	3.20	+ 3.5	+ 3.7
10	4.38	3.87	+ 3.4	+ 3.1
11	5.00	4.69	+ 2.6	+ 1.9
12	5.66	5.63	+ 0.8	+ 0.6
13	6.31	6.38	— 1.2	— 1.1
14	6.86	7.12	— 2.4	— 2.4
15	7.21	7.34	— 1.7	— 1.7
16	7.20	7.28	— 1.3	— 1.0
17	6.84	7.03	— 2.1	— 1.8
18	6.68	6.89	— 2.2	— 2.0
June 15, 1901				
8	2.86	3.17	— 2.6	— 2.4
9	3.02	3.06	— 1.0	— 0.5
10	3.78	3.22	+ 3.6	+ 3.8
11	5.22	3.75	+ 5.7	+ 5.8

Professor J. H. Gore gave an account of the proposed 'Draining of the Zuider Sea,' illustrated by many lantern slides. The old plans have been found commercially impracticable, and the plan definitely recommended by a large Commission appointed in 1892 is the following: Only those portions are to be reclaimed that have a clay bottom; this leaves free

the mouths of the rivers and the present lines of water communication. First, a great sea dyke should be built at the north end with many locks, and with sluiceways to allow drainage at low tide; this will require some ten years and cost $16,000,000. Then a tract of 52,000 acres in the N. W. part should be dyked and drained, requiring five years and $5,000,000. Continuing the work, in all about a million and a quarter acres would be reclaimed in thirty-three years' time at a cost of $69,000,000. Experience shows that such lands can be rendered arable in about three years; and it is estimated that they could be rented by the state at $7 per acre per year. The report is a model of thoroughness for its consideration of every interest involved. The project now awaits the consideration of the legislative body.

CHARLES K. WEAD,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY.

THE Society held its one hundred and thirty-eighth meeting on Jan. 21 at the University of North Carolina. The following papers were read:

'Recently Discovered Minerals in North Carolina': J. H. PRATT and COLLIER COBB.

'Arizona, Its Mineral Wealth': J. H. PRATT.

CHAS. BASKERVILLE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE DAILY BAROMETRIC WAVE.

IN the *Monthly Weather Review* for Nov., 1901, Dr. O. L. Fassig has an interesting article on 'The Westward Movement of the Daily Barometric Wave.' The article is illustrated by charts showing the lines of equal pressure departure in the western hemisphere for each hour of the day for the month of July. Dr. Fassig's study was suggested by my own paper on the eclipse cyclone and the diurnal cyclones, but he was the first to complete charts of this kind and his charts add much to a knowledge of the behavior of the daily barometric wave and will no doubt aid materially in clearing up the cause of this wave.

The charts show very clearly that the diurnal areas of high and low pressure have distinct centers like the cyclones and anticyclones of the weather map, but unlike the latter move rapidly toward the west instead of toward the east. Moreover, the charts show very strikingly the effect of ocean and continent on the depth and position of the diurnal areas of high and low pressure, and one can scarcely doubt that surface heat and cold play a very important part in their formation.

Particularly instructive in this connection is the behavior of the early morning minimum of pressure. At 2 a. m., 75th meridian time, it is chiefly over the two Atlantic oceans, and is central over the North Atlantic, the cold ocean at this time of year when contrasted with the surrounding continents. Between 3 a. m. and 6 a.m. this barometric minimum passes over the land areas of North and South America and then the low pressure is found central over the cold southern continent where winter prevails, and the pressure scarcely falls below normal in the warmer northern continent. These facts appear to point very clearly to the dependence of this depression on a relatively low surface temperature, and are in line with the suggestions in my papers on the eclipse cyclone and the diurnal cyclones, namely that the morning minimum of pressure is the result of a cold air cyclone.

The afternoon barometric minimum moves from South America to North America during the afternoon following the place of highest temperature, thus indicating its dependence on surface heating.

Mr. Fassig does not state from what source his data are obtained. In drawing my own charts I have found a great scarcity of data from over the Pacific Ocean. The data for South America will be greatly added to when Professor Bailey's observations are published in the Harvard *Annals*. In constructing my own charts I scaled off the values at his stations from the curves published by him in the *American Meteorological Journal*, Vol. XII., p. 331.

H. H. CLAYTON.