

certain parts of the body and eliminating them from others. As the pigmentation changes in extent, under the influence of selection, the various areas typically pigmented are affected in the following order: Shoulder, side, rump and head, the change being greatest in the first named, and least in the last named area, irrespective of what particular spots were present in the selected ancestors."

T. H. MORGAN

SCIENTIFIC JOURNALS AND ARTICLES

Terrestrial Magnetism and Atmospheric Electricity for September contains the portrait of Wilhelm Eduard Weber and the following articles: "Atmospheric Electricity Observations at Battle Harbor, Labrador, during the Solar Eclipse of August 30, 1905," by J. E. Burbank; "Scientific Results of the Ziegler Polar Expedition of 1903-5," by J. A. Fleming; "Biographical Sketch of Wilhelm Eduard Weber," by N. E. Dorsey; Letters to Editors: "Atmospheric Electricity Work, Yacht *Galilee*, Sitka to Honolulu, August, 1907," by P. H. Dike; "Principal Magnetic Storms recorded at the Cheltenham Magnetic Observatory, April 1 to June 30, 1907," by O. H. Tittmann; Notes: "International Association of Academies, Vienna, 1907," "Magnetic Survey of New Zealand Islands."

SOCIETIES AND ACADEMIES

THE NATIONAL ACADEMY OF SCIENCES

THE National Academy of Sciences met at Columbia University on November 19 and 20. The following members were present: Messrs. Allen, Billings, Boaz, Brewer, Brooks, Brush, Cattell, Chandler (C. F.), Chittenden, Dana, Davis, Dutton, Elkin, Emmons, Gooch, Hague, Hastings, Hill, Minot, Morse, Newcomb, Nichols, Noyes, Osborn, Pickering, Pupin, Remsen, Thomson, Verrill, Walcott, Webster, Welch, Wells, Wilson, Woodward.

The program of scientific papers was as follows:

"A New Application of Dynamics to Electrical Circuits," by M. I. Pupin.

"The Selective Reflection Characteristic of Carbonates; Wave-length of Displacement a Function

of the Atomic Weight of the Base," by Leighton B. Morse (introduced by M. I. Pupin).

"Oxygen the Active Atom in the Characteristic Reflection of Carbonates, Nitrates, Sulphates and Silicates," by Leighton B. Morse (introduced by M. I. Pupin).

"A Modification of the Bjerkness Hydrodynamics Analogy," by A. P. Wills (introduced by M. I. Pupin).

"Psychophysical Investigations with the Galvanometer and Pneumograph," by Frederick Peterson (introduced by M. I. Pupin).

"On Rayleigh's Disc as an Absolute Measure of Sound," by A. G. Webster.

"On the Minimum Audible Sound," by Geo. E. Stebbins (introduced by A. G. Webster).

"Buried River Channels of the Hudson Valley," by J. F. Kemp (introduced by C. F. Chandler).

"Glacial Erosion in Wales," by W. M. Davis.

"Summary of Studies of Cambrian Brachiopods," by Chas. D. Walcott.

"On Certain Changes of Nuclei in Relation to Age," by Chas. S. Minot.

"Researches from the Psychological Laboratory of Columbia University," by J. McK. Cattell.

"Additions to the Collections of Extinct Vertebrates in the American Museum of Natural History," by H. F. Osborn.

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

"Biography of Lewis H. Morgan," by W. H. Holmes.

"Drop Weight and the Law of Tate; the Determination of the Molecular Weight in the Liquid State by the Aid of Drop Weights," by Reston Stevenson and J. Livingston Morgan (introduced by C. F. Chandler).

"The Relation of the Spectra, Magnitudes and Colors of Stars," by Edward C. Pickering.

"Tables of Minor Planets discovered by James C. Watson, prepared by Armin O. Leuschner under direction of the Watson Trustees," by Simon Newcomb.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 636th meeting of the society was held on October 12, 1907, Vice-president Bauer in the chair. The evening was devoted to a paper by Mr. J. F. Hayford on "Earth Movements as Determined by Triangulation (San Francisco Earthquake of 1906)."

THE 637th meeting of the society was held on October 26, President Hayford presiding.

Dr. L. A. Bauer presented papers on "The Apparent Alterations of the Mass of a Magnet as disclosed by Weighings in Various Magnetic Fields" and "The Local Magnetic Pole, Treadwell, Alaska." Both papers were treated together and were illustrated by lantern slides and diagrams showing instruments used and giving results so far obtained.

At the meeting of the American Physical Society held last April in Washington, the speaker had made a preliminary announcement that the reduction of the carefully executed observations on the magnetic survey yacht *Galilee* indicated that there might not necessarily be everywhere an exact "balancing" or "coupling" in the magnetic forces acting on the two ends of a suspended magnet. If the action of the earth on a magnetic needle does not consist solely in a couple, then, contrary to our usual ideas, the needle, if free to move, would be subject not only to a motion of rotation but also to one of translation. Accordingly a compass needle might be caused to press against its pivot, or a dip needle exert an additional pressure on the surfaces on which the pivots rest.

As far as known no further experiments to test this hypothesis have been made since the historic ones of Robert Norman, about the year 1576.

To have only a couple acting on the magnet, it is necessary that the following three conditions be fulfilled exactly: (a) that the forces acting on the two ends or "equivalent poles" be opposite, (b) that they be equal, (c) that they be parallel.

The non-fulfillment of any of these conditions will give a resultant force besides that of a couple. It is possible to assume magnetic systems acting on the needle in which even the first condition is not fulfilled, viz., that the acting forces on the two ends shall be opposite. And as to non-fulfilment of the second and third conditions, this occurs in every magnetic field not strictly homogeneous or uniform. An obvious case under this head would be the earth's field disturbed either artificially by the too close proximity of iron structures or of magnetic impurities in the instruments used, or naturally by magnetic

iron ore deposits near the surface. A case of a magnetic system in which the forces acting on the two ends of a magnetic needle are not opposite but in the same direction is that due to a vertical electric current passing through the pivot of a compass needle. Any of these cases may occur in nature or in practise.

The hypothesis has been subjected by the writer during the past summer to a series of preliminary tests, involving careful weighings of a magnet using a non-magnetic Becker analytical balance, embracing the region of the earth from Washington, D. C., to Sitka, Alaska.

The magnet was weighed in two horizontal positions (north end towards magnetic north and next reversed so that north end was towards magnetic south) and also in two vertical positions (north end up and north end down). The weighings were made at Sitka (Alaska), Victoria (British Columbia), Baldwin (Kansas) and Washington, D. C. At these places the earth's magnetic field is approximately uniform, *i. e.*, no marked local disturbances are known to exist.

The magnet was invariably weighed in both scale pans and the weighings in general were extended over two days at each station. Invariably for each station, the result for magnet, north end south, was greater than for north end north, the average difference being nearly 1/1,000,000 part of the weight of the magnet (about 33.6 grams). The differences in the weighings for the two vertical positions ($U-D$) were sometimes positive and sometimes negative, the average, regardless of sign, being of about the same order of magnitude as for the horizontal positions.

Weighings were also carried out in the intensely locally disturbed area at Treadwell Point, Douglas Island (Alaska). Here the average difference for four points of observation was 0.07 mg. or 1/500,000 part, in the case of the two horizontal positions of magnet (weight for north end south being again greater) and for the two vertical positions, 0.25 mg. (weight north end down being the greater or nearly 1/100,000 part of the weight of the magnet). The differences are thus more pronounced—as was to be expected—

than for the comparatively undisturbed fields.

Upon return to Washington, the investigation was amplified so as to embrace another magnet of different style, make and magnetic moment, and the weighings made for eight equidistant orientations of magnet (north end towards magnetic north, northeast, east, etc.). Besides this, the balance itself was swung in order that the beam would not always be directed in the same way for the same orientation of magnet so as to exclude in every way possible any effect that might be attributed to magnetic impurities remaining in the balance, which the special tests failed to disclose. It was found that the orientation of *balance* had no appreciable effect upon the results obtained.

However, a systematic curve of differences or residuals from the mean weight, for the eight orientations of *magnet*, resulted—somewhat similar to the deviation curves which represent the effect on the compass of the iron on board a vessel. Two waves of about the same amplitude were clearly discernible—a semicircular one and a quadrantal one—the latter apparently associated with the inductive effect of the earth on the magnet in its various positions. On account of the presence of the quadrantal term, reversal of magnet does not eliminate the effect on the weight due to the outstanding residual magnetic force. Hence the mean result of weighings of a magnet in two positions 180° apart will not necessarily give the true weight, or say the weight which the same substance would have if demagnetized. This was proved also by repeated magnetizations and demagnetizations of two different magnets. To get the true weight of a magnet within the accuracy attainable with the balance used, the weighings of the substance when magnetized would have to be made for *at least* eight equidistant positions.

The observations were repeated on three days, October 10, 11 and 12 at the Coast and Geodetic Survey Magnetic Observatory at Cheltenham, Md., and practically the same results obtained as before.

For the two stations, Washington and Cheltenham, the range in the results for the vari-

ous orientations of magnet was about 0.05 mg. (1/660,000 part of weight of magnet).

The investigation is being continued.

R. L. FARIS,
Secretary

DISCUSSION AND CORRESPONDENCE

VARIATION OF ENVIRONMENT

THE present writer has always been an advocate of the theory that variation of organic beings is influenced by the environment, and he does not believe in the existence of so-called spontaneous or congenital variation.

Since it is a well-established fact that no two individuals of the same species are absolutely identical, variation seems to be general, and it has recently been alleged that variation, the natural diversity, organisms, is a fundamental law, and is to be observed even when the environment remains unchanged.¹ But, in my opinion, this is not correct, and I believe that *no two individuals of any organic form grow up under identical conditions.*²

The idea that the latter may happen, that two individuals develop under the same environment, demonstrates that those who hold it look upon environment in a very superficial way, and do not appreciate the great variety of conditions involved, and thus it does not seem to be amiss to call here attention to the variety of features which constitute environment, and we shall see, if we understand this properly, interesting correlations to certain

¹ See Cook, in SCIENCE, September 7, 1906, p. 306, "Individual diversity persists in spite of uniformity of conditions."

² In SCIENCE, July 12, 1907, p. 50, Cook quotes my sentence (SCIENCE, December 7, 1906, p. 729): "*if the environment remains uniform, perfect uniformity of individuals will result,*" but misunderstands it entirely, believing that I hold the opinion that uniformity of individuals may or does actually exist. He would not have made this mistake, if he had paid due attention to the sentence immediately following this one: "but since it is practically impossible," etc. Cook's definition of *Amphimixis* in the same article is highly surprising to me, and I should like to know where it is to be found in Weismann's writings, for I have never come across it.