berger's forthcoming, detailed and fully illustrated account.

GEORGE GRANT MACCURDY.
YALE UNIVERSITY.

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*CERTAIN LAWS OF VARIATION.**

IN a former paper† it was shown that the ova of the Echinoid *Strongylocentrotus lividus* were extraordinarily sensitive to their environmental conditions at the time of impregnation. For instance, by keeping the mixed ova and sperm in water at about 26° or 28° C. for an hour, the plutei obtained after eight days' development were some 5 per cent. smaller than those from ova kept at about 20° at the time of impregnation.

These observations were repeated and confirmed, in the case of *Sphærechinus granularis* as well as *Strongylocentrotus*, and others were made upon the reaction of *Strongylocentrotus* to environment in the later stages of their development. Thus after keeping the ova at a normal temperature for an hour at the time of impregnation, a portion of them was exposed to an abnormal temperature. After a few hours some of these were re-transferred to water at a normal temperature, and kept there for the remainder of development. A few hours later, some more of them were transferred, and so on. By measuring the larvæ after six or eight days' growth, the effect produced by various periods of exposure was determined. When the 'normal' temperature was 20° and the abnormal about 8°, it was found that the larvæ were diminished on an average 1.3 per cent. for each hour's exposure between the end of the 1st to the end of the 6th hour after impregnation; 0.3 per cent. for each hour between the 6th and 10th hours; and 0.2 per cent. for each hour between the 10th and 21st hours. When the 'normal' temperature was about 13° and the 'abnormal' about 20°, an increase in size was produced, amounting to 1.1 per cent. per hour during the 5th hour after impregnation; 0.4 per cent. during the 14th hour; 0.13 per cent. during the 46th hour, and 0.01 per cent. during the 120th hour. That is to say, in each case *the effect of temperature on the growth diminished regularly and rapidly from the time of impregnation onwards.*

When the ova were exposed to an abnormal temperature of 26°, an adverse effect of 4 per cent. was per hour produced during the first three hours. For the next four hours the effect was almost *nil*, and after that a *favorable* effect on growth ensued. This was about 0.4 per cent. per hour for the 16th hour, and 0.01 per cent. for the 80th hour. This change of reaction was accounted for by the fact that the fatal temperature, and therefore also the temperatures unfavorable to growth, rise during development. Thus the death temperature is 28.5° for ova, 33.5° for four hours' blastulæ, 36.5° for 12 hours' blastulæ, and 40.3° for six days' plutei.

The effect of change of salinity on the growth was also found to diminish rapidly with progress of development, hence probably a similar relationship would show itself for other conditions of environment.

What is true for echinoids is probably true for most other organisms, or is, in fact, a law of general application. Thus in man the rate of growth during the third week of embryonic existence is about 2400 times greater than between the 13th and 19th years of post-natal development. The reaction to environment must also be much greater during the earlier period, therefore, though not in the same proportion. Thus, in that the variability diminishes considerably during development—Minot has shown that it becomes halved through the post-natal growth of guinea-pigs—retardations or accelerations of growth produced in the young animals must also become partly wiped out by the time the adult stage is reached.

By splitting up into groups the 20,600 measurements which have been made from time to time on *Strongylocentrotus* larvæ, according to the amount of effect which had been produced in their size by varying degrees of favorable and unfavorable environment, and by determining the average variability of the larvæ in each group, it was sought to prove the existence of a law of variability. This may be worded as follows: "An organism varies least

* Abstract of a paper read before the Royal Society on March 29, 1900, by Dr. H. M. Vernon, Fellow of Magdalen College, Oxford.

† *Phil. Trans.*, B, 1895, p. 577.

when it is best adapted to its surroundings, so that the less it is adapted, the more variable does it become."

SCIENTIFIC NOTES AND NEWS.

THE Committee of Coinage, Weights and Measures of the House of Representatives has unanimously agreed to report as an amendment to the Sundry Civil Bill the measure establishing a United States Standardizing Bureau. A full account of this important measure was published in the issue of this JOURNAL for May 4th.

IN accordance with the recommendation of the Rumford Committee, the American Academy of Arts and Sciences has voted to award the Rumford Medal to Professor Carl Barus of Brown University for his various researches in heat.

THE Academy has further granted from the Rumford Fund the sum of $230 to Mr. Arthur L. Clark of the Worcester Academy in furtherance of his research on the 'Molecular Properties of Vapors in the Neighborhood of the Critical Point.'

TWO excursions were recently given under the auspices of the Geological Department of the Johns Hopkins University, in honor of Professor W. C. Brögger, of the University of Christiania, Norway, who completed, May 3d, his course of George Huntington Williams Memorial lectures on the Principles of Geology at the Johns Hopkins University. The first excursion was made upon the State steamer *Governor McLane* to southern and eastern Maryland to examine the several formations of the Coastal Plain, and was participated in by Mr. S. F. Emmons, of the U. S. Geological Survey; Professor B. K. Emerson, of Amherst; Profes- J. A. Holmes, of North Carolina, and Professors William Bullock Clark, Joseph S. Ames and Harry Fielding Reid, of the Johns Hopkins University. Several days were spent along the estuaries of the Chesapeake Bay in studying Cretaceous and Tertiary deposits.

ANOTHER excursion was organized by Professor Clark at the close of Professor Brögger's lectures on May 4th, the steamboat of the General Manager of the Chesapeake and Ohio Canal being placed at the command of the party, who made an all-water trip from Washington to Cumberland, in the heart of the Allegheny Mountains, spending six days *en route* in the study of the rocks of the Piedmont Plateau and the Appalachian Region, and subsequently passing a day as the guests of the Western Maryland Companies, studying the coal deposits of the Georges Creek Basin. Hon. C. D. Walcott, Director of the U. S. Geological Survey, and Messrs. Arnold Hague, C. W. Hayes, Bailey Willis and Arthur Keith, of the same organization, and Professors Clark, Reid and Matthews participated in this excursion.

THE Franklin Institute has awarded an Elliott Cresson medal to Professor W. O. Atwater and Mr. E. B. Rosa for their respiration calorimeter.

PROFESSOR R. W. WOOD, of the University of Wisconsin, has been elected a fellow of the London Physical Society.

MR. CARL HERING has been appointed a member of the jury of award for the electrical group of the Paris Exposition.

MR. S. HARBERT HAMILTON, former Jessup scholar in geological chemistry at the Academy of Natural Sciences of Philadelphia, has accepted a call to the Museum of Geology and Archæology of Princeton University.

GEORGE GRANT MACCURDY, instructor in prehistoric anthropology at Yale University, has been made a corresponding member of the Society of the Institute of Coimbra, a society especially interested in developing literature, science and the liberal arts. Coimbra was once the capital of Portugal and is still the seat of its only university, an institution founded in 1290.

THE seventieth anniversary of the birth of Dr. A. Jacobi, clinical professor of the diseases of children in Columbia University, was celebrated by a banquet in New York City on the evening of May 5th. Addresses were made by Dr. Joseph D. Bryant, Dr. William H. Thomson and Dr. Carl Schurz, and a poem by Dr. S. Weir Mitchell was read. A 'Festschrift' was presented to Dr. Jacobi, containing scientific contributions from fifty-three medical men representing eleven nations.