exuberance in the earlier stages of European education, the choice is frequently painful. It is to be hoped that means may be found to establish a happy mean between the two; but it is quite certain that among the subjects of education conducive to that end, the history of the intellectual evolution of mankind must find a more conspicuous place than is assigned to it in the latest scheme of higher education. The titles bachelor and master of arts should, in my view, together with the doctor of philosophy, remain the badge of such broader education; and those who are content with narrow lines should also be content to receive only a corresponding degree.

E. W. Hilgard.
University of California.

PHOSPHORESCENCE IN DEEP-SEA ANIMALS.

It is stated, among others, by Beddard in his animal coloration that the brilliant and varied colorations of deep-sea animals are totally devoid of meaning, either by way of protection or warning, for the simple reason that not enough light penetrates to the depths of the sea to permit them to be visible. But in a paper on the 'Utility of Phosphorescence in Deep-Sea Animals,' in a late number of the *American Naturalist*, it is maintained by C. C. Nutting that the quantity of phosphorescent light emitted by the animals of the deep sea is very considerable—so great, in fact, as to supply over definite areas of the sea bottom a sufficient illumination to render visible the colors of the animals themselves. This lighting up of the depths of the sea would be of manifest benefit to the various animals which combine to bring it about—it would serve much the same purposes as protective, aggressive, alluring and directive colorations. For the free-swimming animals—fishes, crustaceæ, molluscs, part of the cœlenterates, most of the protozoa—the utility of phosphorescence is the more readily obvious; but since practically all deep-sea forms live exclusively on animal food, and since it is well known that light exerts a strangely attractive power on widely different forms of animal life, the fixed species would also enjoy at least the benefit of attracting their prey. A very large number of crustaceans are phosphorescent, often brilliantly so; many of them have large eyes and are particularly active in movement and voracious in appetite; they feed on minute organisms for the most part, and it can hardly be doubted that they often use their phosphorescent powers for the purpose of illuminating their surroundings and revealing their prey. Certain cephalopods secured by the *Challenger* have been made out to have a highly specialized apparatus designed to reflect light from their phosphorescent bodies downward to the bottom over which it passes; in this case there is not only light but also a reflector, an efficient bull's eye lantern for use in hunting through the abyssal darkness.

Among the ctenophores and medusæ we encounter amazing displays of the 'living light'; as these animals have eye-spots, and seem to be able to distinguish light, their phosphorescence may serve to keep them together in groups and thus effect the same end as directive coloration among vertebrates and insects. It is important to note that blind species of groups normally possessed of eyes are seldom if ever phosphorescent. Noctilucca and other allied Protozoa are often found at considerable depths, and hence come under the head of deep-sea forms, but they differ from the organisms already mentioned in having no recognized organs of sight, and also in an extreme simplicity of organization. They, however, occur in enormous swarms and hence must have some means of keeping together, and moreover, they have been proved to be, although eyeless, extremely sensitive to light. In fact, it is practically certain that sensitiveness to light is a fundamental property of simple protoplasm. It is easy to conceive, therefore, that in these little creatures their phosphorescence is directive in function; the same thing is doubtless the case with a medusa of the subtropical Atlantic, which thickly covers hundreds of square miles of surface, and which glows like a living coal at night.

C. L. Franklin.
Baltimore, Md.

CURRENT NOTES ON METEOROLOGY.

BALLOON METEOROLOGY.

The rapid development of what may well be called balloon meteorology has resulted in the

publication of a large number of articles on this subject within the last four or five years. Indeed, the number of publications has been so large that it has been difficult even for the student of meteorology to keep up with the literature. We now have an octavo pamphlet of 161 pages, entitled *Beiträge zur Erforschung der Atmosphäre mittels des Luftballons* (Berlin, Mayer und Müller, 1900. Price, 4 Marks), which will serve well as an introduction to the study of the most recent work done in balloon meteorology. This report is edited by Dr. Assmann, and has chapters by Berson, Gross, Kremser and Süring—all of them men who have been closely associated with scientific ballooning in Europe. Dr. Assmann contributes an introduction and a chapter on the equipment needed on a scientific balloon voyage. The others have prepared chapters on the various ascents between March 1, 1893, and February 15, 1895. An appendix contains tables showing the most noteworthy data in connection with the ascents from February 15, 1895, to the end of 1899. This book is a striking illustration of the rapidity with which the investigation of the upper air by means of balloons has progressed. Record is given of 77 ascents.

ERRORS IN SCHOOL BOOKS.

IN a recent number of the *Monthly Weather Review*, Professor Abbe calls attention to the fact that the geography adopted by the Legislature of Montana for use in the public schools of that State contains the following remarkable statement: "The warm winds known as the chinook winds, from the Pacific, heated by the Japan current, may spring up even in the coldest weather." This view as to the source of warmth of the chinook winds is entirely erroneous, just as is a similar view formerly commonly held in regard to the warmth of the Swiss *foehn*, viz, that that wind, coming down warm and dry in the northern Alpine valleys, has its origin in the desert of Sahara. The warmth and dryness of chinook and foehn are the result of the warming by compression of the descending air, as was very fully explained by Hann, in the case of the *foehn*, some years ago. It is a serious thing to have children in the public schools of one of our States taught any doctrine so erroneous as that which refers the warmth of the chinook to the Kuro Siwo.

THE CLIMATE OF NEW YORK STATE.

A RECENT number of the *Bulletin of the American Geographical Society* (No. 2, 1900) contains an article on the climate of New York, by E. T. Turner, which gives an excellent presentation of the chief climatic features of the State. The article is largely a reprint of a report upon the same subject by Mr. Turner, originally published in the *Fifth Annual Report of the Meteorological Bureau and Weather Service of the State of New York* (Albany, 1894, pp. 347–457). Several new charts have, however, been added, including some typical barograph and thermograph curves, and two thunderstorm charts. It would be well if similar condensed reports upon local climates were available for our other States.

LOSS OF LIFE BY LIGHTNING IN 1899.

ACCORDING to A. J. Henry (*Monthly Weather Review*, March, 1900) the loss of human life by lightning in the United States during the year 1899 was greater than in any preceding year for which statistics have been collected. The number of persons killed outright, or who suffered injuries resulting in death, was 562, and the number of those who received injuries varying in severity from slight physical shock to painful burns and temporary paralysis of some part of the body was 820. The greatest number of fatalities (45 per cent.) occurred in the open; the next greatest number (34 per cent.) occurred in houses; 11 per cent. occurred under trees, and 9 per cent. in barns. At least a dozen persons were killed either in the act of stripping clothes from a wire clothes-line, or by coming in proximity thereto during a thunder storm.

RECENT PUBLICATIONS.

Studies of Cyclonic and Anticyclonic Phenomena with Kites, by H. H. Clayton. Second Memoir. Blue Hill Meteorological Observatory, Bulletin No. 1. 1900. 4to. Pp. 36. Pls. IV. This is Mr. Clayton's second Bulletin on the theory of cyclones and anticyclones as viewed in the light of the Blue Hill kite records. The author holds that a modified convectional theory,

rather than the Hann, or driven, theory, best explains the facts discovered.

Anales de la Oficina Meteorologica Argentina, por su Director, Gualterio G. Davis. Tomo XII. *Climas de Asuncion del Paraguay y Rosario de Santa Fe.* Segunda Parte: *Discusion de las Observaciones hechas en Asuncion y Rosario.* 4to. Buenos Aires. 1898. Pp. 297. This is one of the valuable series of publications on the climate of the Argentine Republic which is being issued by Mr. Walter G. Davis, the Chief of the Argentine Meteorological Service.

R. DeC. Ward.

Harvard University.

CURRENT NOTES ON PHYSIOGRAPHY.

PHYSIOGRAPHY OF MARYLAND.

'A General Report on the Physiography of Maryland,' a dissertation by Cleveland Abbe, Jr., for the degree of doctor of philosophy at Johns Hopkins University (Maryland State Weather Service, i, 1899, 41–216), stands with the account of Missouri by Marbut, of New Jersey by Salisbury, and of New York by Tarr as one of the few thorough studies of State geography that have yet appeared in this country. Many items of interest might be abstracted from it. For example, those concerning the lower courses of the 'falls' or young cascading streams in the narrow gorges by which the Piedmont plateau is dissected for eight or ten miles inland from the fall-line, and the upper courses of the same streams which flow quietly through shallow open upland valleys where the effects of the elevation of the region are not yet felt. Again, those concerning the Hagerstown (Appalachian) valley, a well-finished and evenly uplifted peneplain, now rather sharply dissected by young streams in narrow meandering gorges, from which it is inferred that the streams meandered upon the valley floor before uplift of the region to its present altitude (500 feet in the neighborhood of the Potomac). A chapter on the development of the streams of the Piedmont plateau bears evidence of the greatest proportion of original study; it leads to the conclusion that the streams east of Parr's ridge (which represents a low swell surmounting the former lowland of the Schooley peneplain) have been superposed through a cover of coastal plain strata that once extended further inland than now.

An introductory account of 'Physiographic Processes' contains a paragraph which may mislead by stating that the ridges of the Appalachian province have been 'formed by the folding and faulting of the paleozoic strata of that district.' A learner might thus be tempted to compare them with the young unsculptured mountain blocks of southern Oregon; yet, as indeed appears from other pages of the Report, the Appalachian ridges of to-day are as truly forms of circumdenudation as are the low hills of the coastal plain or the high hills of the Allegheny plateau.

THORODDSEN ON ICELAND.

Thoroddsen has prepared a most interesting summary of his eighteen years of exploration in Iceland (*Geogr. Journ.*, xiii, 1899, 251–274, 480–513). The island, 40,450 square miles in area, is the dissected remnant of a basaltic plateau, averaging 2000 feet in altitude, and for the most part barren and uninhabitable. Non-marine tertiary strata are intercalated within the basalt sheets, and a 'pelagonite breccia'* overlies them on a third of the surface. Deep valleys and fiords have been eroded in the margin of the plateau, where coast cliffs rise 2000 or 3000 feet; but in the interior the relief is less pronounced. Relatively modern lavas have been poured out abundantly on the plateau, building mountains, filling valleys, displacing rivers and altering the coast line. Of 107 volcanoes counted in a certain district, 8 were large lava and ash cones of the Vesuvian type, 16 were large flat domes of the Mauna Loa type, and the remainder were small ash cones arranged in chains along fissures. The summits of the domes, 2000 or 3000 feet in height over the plateau, are broken by large craters (calderas?) containing frozen lava lakes; many lava tunnels are found on the slopes of the domes, whose inclination is seldom more than 7° or 8°, and may be much less. The small ash cones may be as steep as 30° and occasionally 40° or even 50°: one chain contains

* This formation has lately been interpreted as of ancient glacial origin by H. Pjetersson. *Scot. Geogr. Mag.*, xvi, 1900, 265–293.