# SCIENCE.



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## *CURRENT NOTES ON PHYSIOGRAPHY (VI.).*

### SURFACE CURRENTS OF THE GREAT LAKES.

A REVISED edition of the atlas of 'Surface Currents of the Great Lakes,' as deduced from the movements of bottle papers during the seasons of 1892, 1893 and 1894, by Professor M. W. Harrington, has lately been issued as Bulletin B of the Weather Bureau. The text describes the method of study, and gives tables of the prevailing winds of the lake-port stations and a list of recovered bottles, 672 being found out of nearly 5000 floated. The chief drifts are: eastward along the south side of Superior, westward along the north side; south along the west side of Michigan and Huron, north along the east side; generally eastward in Erie and Ontario. Many irregular movements are noted, especially near shore. Local and transient currents, formed during severe gales, are sometimes strong enough to drag vessels from their moorings. "There also occurs, occasionally, on the Great Lakes a phenomenon which may be called a *seiche*, namely, a wave of considerable height which travels unaccompanied by other waves, and is seen by navigators as a white wall approaching and rapidly passing them." Following the use of the term *seiche* on the Swiss lakes, where it originated, it would be more properly applied to the rise and fall of the water on the shore, in periods of generally less than an hour; these being well known at our Lake ports, but as yet very little studied. These white-walled waves also call for investigation.

### BUCHAN'S CHALLENGER REPORT ON OCEANIC CIRCULATION.

THE latest volume of the Challenger reports contains thirty-eight pages of text and sixteen maps, prepared by Dr. Alexander

Buchan, of Edinburgh, to illustrate the density and temperature of ocean water at different depths; all available material being employed in this elaborate discussion, whose ultimate object is the determination of the oceanic circulation. The charts exhibit the mean annual specific gravity of the surface and the bottom waters, the mean annual surface temperatures, and the temperatures at every hundred fathoms of depth to 1000, then at 1500, 2000 and at the bottom. At 400 and 500 fathoms the South Atlantic and the North Pacific are the colder oceans; the North Atlantic and the Indian are exceptionally warm. At 600 and 700 fathoms the most remarkable feature is the relation of North Atlantic temperature to the warm over-saline water that issues from the Mediterranean; a similar but less marked effect being noticeable in the Indian ocean near the Red Sea. The average at 700 fathoms being 38.°1, the northwestern Indian ocean is 44°, the eastern North Atlantic is 51°, with the maximum centering precisely towards Gibraltar. At 900 and 1000 fathoms the temperatures in low latitudes are symmetrically warmer than in high latitudes; but the difference is less than two degrees.

Dr. Buchan's text summarizes the facts and deals little with theories; but he accepts the winds as the chief cause of the surface currents, and he ascribes deep movements to differences of density, thus indicating the truth of both sides of the Croll-Carpenter controversy of a quarter century ago.

### THE EASTERN MEDITERRANEAN.

The third series of the 'Berichte der Commission für Erforschung des östlichen Mittelmeeres,' recently issued in the memoirs of the Imperial Academy of Sciences of Vienna, contains further physical investigations by Luksch and Wolf on the basis of soundings on the 'Pola' in the Ægæan sea in 1893. The sea consists of a number of separate basins, of which the deepest (2250 met.) lies north of the east end of Candia. Much greater depths occur in the Mediterranean east and west of this island. Charts of temperature and salinity at the surface and at successive depths to the bottom exhibit the distribution of these features with much detail. The surface temperatures are maintained to a depth of about thirty meters; then follows a rapid cooling for seventy or a hundred meters, below which there is a gradual cooling to the bottom, where temperatures a little lower than 13° C. prevail.

### AMERICAN GEOGRAPHICAL JOURNALS.

It is regrettable, but for the present perhaps not surprising, that no American geographical society issues a journal from which a student, teacher or general reader can gather a thorough acquaintance with geographical activity over the world. A journal of thorough and scientific character needs a background of accumulated experience, a large library and exchange list, a good number of active contributors and correspondents, and a large subscription list; and we have not yet been fortunate enough to develop all these conditions under a single control. The best association for such a journal in this country would be with the American Geographical Society of New York, its membership being large, its funds comparatively munificent and its library of long-continued growth and certainly much superior to that of any other similar society in the United States; but, although this society counts explorers, travellers, government officials, professors and a large representation of the general public among its members, the number of its producing geographers is small, and its quarterly Bulletin, now in its twenty-sixth volume, can hardly at present be included among the important geographical periodicals of the world. We understand that

plans for greater activity and enlarged form of publication are in consideration. The National Geographic Society of Washington is but a few years old. Its activity at present is greatest in its home city in the matter of geographical lectures, which are very successful. A list of this winter's lectures was given in SCIENCE No. 11. Its Magazine is of irregular publication, presumably on account of lack of funds. While it contains a larger proportion of physiographic matter than any other publication in this country, it gives practically nothing of general news or literature. Appalachia, the organ of the Appalachian Mountain Club of Boston, the Bulletin of the Geographical Club of Philadelphia, the Bulletin of the Geographical Society of the Pacific, and the papers of the Sierra Club, both of San Francisco, complete the list of geographical publications in this country as far as known to the writer. Geographical notes are given in the American Naturalist and in the Popular Science Monthly. All these geographical journals deserve warm support, especially in their own communities, but none of them presents the subject of geography nearly as fully as it is presented by several journals abroad.

FOREIGN GEOGRAPHICAL JOURNALS.

THE small amount of space that can be allowed in SCIENCE to geography makes it impossible to report on the progress of exploration, save when results of especial importance or of immediate physiographic interest are announced. Exploration is, however, fully presented in various foreign geographical journals; and, in the hope of extending their circulation in the libraries of our country, occasional notes of their character and contents will be here introduced. Preëminent among all such publications stand the Geographical Journal of the Royal Geographical Society of London, and Petermann's Geographische Mittheilungen, issued by the great geographical publishing house of Justus Perthes of Gotha and now conducted by Professor Alex. Supan. The Geographical Journal has for the great body of our students of geography the advantage of being in our own language, and it will therefore long continue to reach the larger circle of readers. Besides general articles and current news, ten or twelve pages are given in each number to notes on geographical literature by Dr. H. R. Mill, the entries being conveniently summarized by brief headings in bold type, arranged under countries. Extended reviews are made of important works. But those who can consult German sources—and this ability is now generally demanded of students in higher collegiate and university work—will find in Petermann's Mittheilungen an unrivaled bibliography of the whole range of geographical literature, from the geology of the earth beneath to the meteorology of the air above. Reviews of the more important publications are given in so extended a form that reference to original sources is unnecessary, except for the specialist in some particular division of the subject. Anyone who follows these reviews and the items of monthly news will acquaint himself very fully with the general progress of current geographical work. Other foreign journals will be referred to in subsequent numbers of SCIENCE.

WAGNER'S GEOGRAPHISCHES JAHRBUCH.

THIS indispensable annual, founded in 1866 by Behm and now in its seventeenth volume, is a fitting supplement to the other geographical publications of the house of Perthes in Gotha. The most important reviews and summaries in the Jahrbuch for 1894 are: on terrestrial magnetism by Schering, map projections by Hammer, ethnology by Gerland, geographical meteorology by Brückner, and on the geographical literature of the European countries by va-

rious contributors. Several of the latter are of great thoroughness and may serve as guides in ordering the best recent publications for public and college libraries. The most thorough are by Fischer on Southern Europe, Neumann on Germany and Sieger on Austria-Hungary. That by Schlichter on Great Britain and Ireland unwarrantably omits mention of the recent editions of Geikie's Scotland and Ramsay's England. The volume closes with a series of small scale index-maps, giving the state of advance of topographical surveys in Europe, India and the United States up to the autumn of 1894. One may thus determine at a glance whether the sheet for a certain locality in any country is yet published or not. The practical use of these indexes would have been increased if the name and address of the official bookseller from whom the maps may be purchased had been given.

FORSCHUNGEN ZUR DEUTCHEN LANDES- UND VOLKSKUNDE.

THE eighth and latest volume of these valuable essays, edited by Kirchhoff of Halle, and published at Stuttgart by Engelhorn, contains studies by Schreiber on the climate of Saxony, Partsch on the glaciation of the Riesengebirge, and Follman on the Eiffel, besides three others on historical and ethnological subjects. Schreiber's essay gives a full account of the periodic values of various climatic factors, but it is deficient in omitting all account of the unperiodic or cyclonic changes, which in winter are dominant, and fully deserve recognition as climatic elements. Partsch presents a careful study of the moraines and associated terraces of the Riesengebirge, which rise a few miles south of the extreme limit ascribed to the northern ice sheet in that region. The height of the snow line during glacial times is placed at about 1200 meters, by means of ratios between length of glaciers and area of snow fields, as determined in the Alps. An older and a younger glaciation are separated by a considerable interval, during which normal valley making was in progress. The author dissents from Berendt's views concerning a more general glaciation of the Riesengebirge. Follman's account of the Eifel is chiefly geological and descriptive, little attention being given to the development of the existing topography or to the explanation of the present courses of the streams. The volcanoes and the *maare*, of course, receive special attention.

PENCK'S MORPHOLOGIE DER ERDOBERFLÄCHE.

THIS is the most important work on physiography that has appeared during the past year; indeed, in many respects it is a unique work, one that will stand long at the head of works of its class. It is a worthy successor of earlier volumes in the series of geographical handbooks (published by Engelhorn, Stuttgart) to which it belongs—Ratzel's Anthropogeographie, Hann's Klimatologie, Heim's Gletscherkunde, Boguslawski and Krümmel's Oceanographie and others; and in the matter of citations of authorities it is much superior to any of its predecessors. Penck's acquaintance with the literature of his subject is truly remarkable. Each topic is outlined historically, as well as in its present status. A subject relatively so subordinate as the effect of the earth's rotation on rivers has thirty-five citations; sand dunes have fifty-one. Processes of deformation, deposition and denudation are all considered elaborately, with special reference to the forms that they produce, and this part of the book might properly be called *Morphogenie*. The forms themselves are considered afterwards at length. The more general headings in the table of contents are: Form and size of the earth; area of land and water, mean altitude of lands and depth of seas, volume of lands and

seas; continents and oceans and their permanence. Land surfaces; weathering and denudation by wind, rivers and ice; deformations of the surface. The forms of the land; plains, hills of accumulation, valleys, basins, mountains, depressions, caverns. The sea; its movements, coasts and bottom; islands.

The chief deficiency of the book is the scarcity of illustrations and the rough quality of nearly all the few cuts that are introduced. Many are merely diagrams, often with excessive vertical exaggeration. This is to be regretted in a subject where graphic aid of the highest quality is necessary for the adequate presentation of the facts. But as the work is in two volumes of 471 and 696 pages, the omission of illustrations has evidently been a matter of necessity.

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## *NOTES UPON AGRICULTURE (II.).*

### MUSCARDINE DISEASE OF CHINCH-BUGS.

ONE of the most serious of insect depredations to wheat and corn is that caused by the chinch-bug, and for years methods of checking it by employing a parasitic fungus have been the subject of research. In Kansas special appropriations have been made by the Legislature to determine the best means of propagating and applying the virus. The latest information upon this subject comes in the shape of a sixty-page bulletin with eight plates (No. 38, March, '95) from the Illinois Experiment Station prepared by Dr. Forbes. The fungus experimented with is *Sporotrichum globuliferum*, Speg., which was cultivated successfully upon a mixture of corn meal and beef broth and afterwards distributed to farmers in the chinch-bug infested portions of the State.

The White Muscardine (Sporotrichium) spreads most rapidly in the field when the weather is moist and the 'catch' is quickest in the low spots in the field and among fallen herbage. Professor Forbes is of the opinion that the disease may be developed without infection by artificially producing the above conditions by trampling down the grain in spots or cutting and stocking small portions as starting points for the infection. It was observed that mites feed upon the Muscardine and in some of the artificial cultures eat up 'the last vestige of the fungus.' The Sporotrichium lives upon many kinds of insects, and a plate is given of the appearance of it upon a leaf skeletonizer (Carnarsia), June Beetle (Lachnosterna), Walnut caterpillar (Datana).

### BACTERIOSIS OF RUTABAGA.

THE number of diseases of plants of bacterial origin is rapidly on the increase, or, more strictly writing, the nature of these troubles is in these later days being better understood. A portion of Bulletin 27 of the Iowa Experiment Station is devoted to a disease of rutabagas that Professor Pammel finds, through a long course of bacteriological study, to be caused by a microörganism which he names *Bacillus campestris* n. sp., and figures in details in a plate. This disease is distinguished by its strong odor, the decay usually beginning at the crown of the root, the fibro-vascular zone becomes black, while the softer portions of the root become soft and finally watery. Healthy roots were caused to decay by introducing the Bacilli, previously isolated by cultural methods, into their tissue.

### WEED SEEDS IN WINTER WINDS.

IT is well known that winds play an important rôle in the distribution of seeds. Professor Bolley, in the North Dakota Experiment Station Bulletin (No. 17, March, 1895), records that in two square feet of a three-weeks old and three-inch deep snow drift upon an ice pond ten yards from any weeds he found nineteen weed seeds, and and in another drift quite similarly situated thirty-two seeds representing nine kinds