We cannot enter into a detailed description of the work in the various divisions of the geological branch of the survey which cover extensive portions of the United States. Professor R. Pumpelly continued his researches on the archæan geology of the New England States; Mr. G. K. Gilbert, those on the Appalachian region. Of considerable practical as well as scientific interest, are Professor N. S. Shaler's researches on the swamps of the Atlantic coast. It is estimated that there are 100,000 square miles of coastal lands in the country, which, subject to inundation by tidal and fluviatile waters, are valueless in their present condition. It would appear, from the experience of other countries, that, by the employment of proper methods, these lands might be reclaimed, and rendered among the most valuable of the agricultural lands of the United States. But the relative altitude of land and sea is not constant: in some places the ocean is encroaching upon the land, and elsewhere the land is emerging from beneath the oceanic waters; and even where the level of the coastal land is stationary, the shores are undermined and eaten away by the waves, and thus the sea gains upon the land in another way. The examination of the causes of the changes of coast-line must, in some cases, precede engineering operations for reclaiming land. Connected with these questions of oscillation of the land and the formation of coastal marshes, is that relating to the origin and distribution of the bog ores, phosphatic beds, etc., now in process of formation in the marshes of the Atlantic coast, and embedded in the cenozoic formations thereof, constituting one of the most important of the mineral resources of the Atlantic States.

Other important branches of the geologic division are the surveys of the copper-bearing rocks of the Lake Superior region, Professor T. C. Chamberlin's investigations on glacial geology, and the various Western surveys.

The present report is accompanied by a number of important papers, each illustrative of another part of the work of the survey. Professor T. C. Chamberlin treats the rock-scorings of the great ice invasions; Mr. Joseph P. Iddings describes the structure and petrographic character of Obsidian Cliff in the Yellowstone National Park. The classification of the early Cambrian and the pre-Cambrian formations is the subject of a paper by Mr. R. D. Irving. Professor William Morris Davis's paper on the structure of the triassic formation of the Connecticut valley gives a preliminary sketch of the work done by the archæan division, in charge of Professor R. Pumpelly. The division of mining industries is represented by T. M. Chatard's paper on salt-making processes in the United States.

There are two geological monographs on limited areas: Mr. W. J. M'Gee's description of the geology of the head of Chesapeake Bay, and Professor N. S. Shaler's report on the geology of Martha's Vineyard. After a survey of the Island of Nantucket, Professor Shaler undertook an investigation of the Island of Martha's Vineyard, and the results of this work are embodied in the present monograph.

He found that the front of the ice during the last glacial period remained for some time on the Island of Nantucket. After the disappearance of the ice, the region was suddenly elevated above the level of the sea, after having been depressed below its level during the continuance of the glacial conditions. Since that time it has undergone a depression of about twenty feet. From Professor Shaler's investigation on Martha's Vineyard, it appears that the tertiary beds of that island belong to a great delta deposit accumulated during the middle and later stages of the tertiary age; they have been subjected to a considerable amount of dislocation by the action of mountain-building forces; they thus indicate the action of these forces at a much later date than any for which they have been observed elsewhere on the eastern shore of the continent. Among the interesting studies incident to this inquiry is that of a bowlder train originating in a hill having a diameter transverse to the motion of the ice of less than one thousand feet. Professor Shaler found that it has a fan-like shape; being, at a distance of fifteen miles from the point of origin, not less than eighteen thousand feet in width.

The report is printed and illustrated as beautifully as all the preceding reports. In the brief space allotted to us we can do no more than call attention to some of the important contributions contained in it. The fortunate combination of work that is of scientific and economic value, which is characteristic of our Geological Survey, cannot fail to bring home to the minds of the people the necessity of work of this kind and its eminent usefulness to the public good.

## TWELFTH ANNUAL REPORT OF THE NEW JERSEY STATE BOARD OF HEALTH.

IN addition to the valuable and suggestive report of the secretary, Dr. E. M. Hunt, this volume contains the following articles: I. "The Sanitary Necessity for the Control of the Construction of Dwellings," by Henry Mitchell, M.D. In support of the ground which he takes, that there is such a necessity, the writer refers to the fact, that, of two hundred houses examined in Chicago in which diphtheria existed, but four were perfect in their sanitary arrangements. The same has been found true in other cities. He claims, that, by the loss of life in New Jersey from diseases which are preventable, the State loses annually $5,576,000; if consumption is added to this list, the amount would reach $12,000,000. A satisfactory organization for health-protection could be made at an expense of fifty cents per capita of the population. II. "Our Charitable and Penal Institutions," by Ezra M. Hunt, M.D. In this paper Dr. Hunt describes the condition of the almshouses, jails, etc., of the State, and makes suggestions for their improvement. III. "Water-Supply from Wells, in its Relation to Health," by Francis A. Wilber, M.D. The writer of this paper discusses (1) the source of supply of well-water; (2) its collection; (3) the sources of its impurities; (4) nature's means for removing such impurities, and the failure of these means; (5) the relation between these impurities and public health. He says that absolutely pure water is one of the greatest luxuries of modern life; and nothing in our modern civilization marks more strongly public enlightenment in matters of health than does the interest now being taken in the subject of water-supply for towns and cities. IV. "Ice as a Source of Disease," by William K. Newton, M.D. Several instances are given in which ice was the cause of sickness. Dr. Newton says that it has been abundantly proved that the use of ice cut from streams, ponds, or lakes polluted by sewage or organic refuse of any kind, is dangerous to health. V. "The Water-Supplies of New Jersey," by A. Clark Hunt, M.D. In this paper the writer gives the population of the principal towns and cities of the State, the number of houses contained therein, the source of the water-supply, the size of the reservoirs and of the water-pipes, the daily consumption and the character of the water. VI. "Diseases of Workers in Textile goods," by Drs. J. W. Stickler and J. B. Stubbart, and Mr. F. B. Lane. This is a continuation of the inquiry into State industries, which has been carried on by the State board for a number of years, to the value of which we have frequently referred.

The secretary, in an introduction, well says that it is the high duty of the State to see to it that those upon whom it must depend for productive labor are enabled to pursue that labor without undue peril to health and life: hence all machinery should be properly guarded, all factories should be examined by those expert in detecting the causes of ill health or undue exposure, and those of younger age should be protected from kinds and degrees of work unfavorable to full development and to proper schooling. As a result of the inquiry into the health of those who work in woollen goods, the reporters say, that while there is a slight tendency to bronchitis, catarrh, and rheumatism, workers in wool are to be congratulated on having an occupation which is not necessarily unsafe or unhealthy. They say, however, that there is need of more care as to dust. Workers in cotton suffer from diseased conditions much more than workers in wool, owing to the large amount of dust and the overheated rooms. Of 72 employees engaged in this work, 11 had catarrh; 7, headache; 8, rheumatism; 4, malaria; 2, bronchitis; 3, sore eyes; 3, sore throat; 1, pneumonia. Rheumatism and catarrh are the prevailing deseases. VII. "Means for Preventing the Spread of Contagious Diseases in Cities," by J. C. Bayles, M.E., president of the New York Health Department. This paper describes the methods and appliances employed by the New York department, including the three hospitals for the care of contagious diseases, and the disinfecting plant. D. C. English, M.D.,

furnishes a report of the papers and discussions of the New Jersey Sanitary Association, which met in Trenton during December, 1888. Reports from local boards of health, and health laws and circulars, together with vital statistics, are also given in the report.

## BOOK-REVIEWS.

*Psychology as a Natural Science applied to the Solution of Occult Psychic Phenomena.* By C. G. RAUE, M.D. Philadelphia, Porter & Coates. 8°. $3.50.

THE author of this work is by birth a German, and as long ago as 1847 he published a little book in the German language which is the nucleus of the present treatise. His psychological views are those of Beneke, whom he regards as the real founder of scientific psychology. In this work, however, the author's special object has been to explain the various "occult phenomena," such as hypnotism, thought-transferrence, etc., which have of late attracted so much attention; and the views presented on these subjects are the result of his own researches. The earlier part of the work is simply an ordinary treatise on psychology, containing some doctrines peculiar to the school of Beneke, but on the whole traversing pretty familiar ground. The author holds that all our states of consciousness and all our mental capacities arise from two sources, — the primitive or original forces of the soul, and the stimuli of the external world; the primitive forces, as he is careful to tell us, comprising nothing but the powers of sense. These primitive forces he also divides into two classes, — those that have been modified by external stimuli, and those that have not been thus modified, and which he calls void, unoccupied primitive forces. These forces and stimuli together he calls "mobile elements," by which we suppose he means active elements. These, then, being the sole sources of knowledge and mental power, the problem is to explain by means of them the occult phenomena in question. Dr. Raue holds that physical causes are wholly inadequate to the purpose, and that nothing but psychical forces will account for the facts. The soul he defines as "an organism of psychic forces externalizing itself in the organism of material forces which constitute the body. . . . The psychic forces are spaceless. . . . They act where they are, and yet apparently on objects far away in space, because for them there exists no space" (p. 522). But how is the action of one soul upon another, as in thought-transferrence, suggestion, etc., to be accounted for? Dr. Raue devotes many pages to the discussion of this subject; but it seems to us that he gets lost in a cloud of words. Here is the essence of his doctrine, which the reader can judge for himself. "The nature of thought-transferrence consists essentially in the excitation of the modification in the recipient similar to the one excited in the agent, and is effected by mobile elements, and principally by primitive forces partially modified or charged with external stimuli. Void primitive forces determine the concentration of the mind to the modification which is to be transferred. The mobile elements (as all soul-forces are spaceless) do not move in the sense of corporeal forces from place to place: theirs is an attraction of like to like, independent of corporeal distances or interpositions" (p. 400). We cannot think that Dr. Raue has solved the problem of the occult phenomena; but there are things in his book, nevertheless, that will interest not only special students of this subject, but also general students of psychology.

*Reports on Elementary Schools*, 1852-1882. By MATTHEW ARNOLD. Ed. by Sir Francis Sandford. New York, Macmillan. 12°. $2.25.

WE have here the various reports that Mr. Arnold from time to time made as an inspector of schools. They are, of course, written in his usual excellent style, and contain many remarks of more than merely temporary and local interest. Every thing statistical or of transient importance is omitted, so that the matter presented relates entirely to the general principles of education, subjects of study, methods of teaching, and other topics in which educators everywhere are interested. Mr. Arnold's district at first comprised most of the midland counties of England and a large part of Wales, but schools controlled by the Anglican and Roman churches were not under his charge. At a later time he had the oversight of all classes of schools, but only in a small district consisting of Westminster and its neighborhood. Mr. Arnold was evidently not well impressed with the character of most of the schools, and he complains of the slow progress they made. He speaks of the low degree of mental culture prevailing not only in the lower schools, but also among candidates for the teachers' training-schools, all of whom were eighteen years old or over. This lack of general culture he attributes to the want of true literary training; and he affirms that all the literary culture the mass of English school-children get is the ability to read the newspapers,— a remark which, we fear, is applicable to other countries than England. He strongly recommends the study of English grammar and analysis, on the ground that "grammar is an exercise of the children's wits; all the rest of their work is in general but an exercise of their memory." Besides grammar, he would teach what the Germans call *Naturkunde*, or the leading facts and laws of nature, with geography and national history; this programme being intended for pupils not over thirteen years of age. He deprecates the evils that result from cramming for examination, some of which he predicted in advance. He seems to have had a keen eye for every thing connected with the schools, attending even to the form of the desks, the cleanliness of the rooms, etc. The book presents no theories of importance but such as readers of Mr. Arnold's other works are already familiar with; but it contains much that will be interesting to educators.

*The Principles of Empirical, or Inductive, Logic.* By JOHN VENN. New York, Macmillan. 8°. $4.50.

THIS work contains the substance of lectures which the author has been giving for some years past to his pupils at Cambridge University. It is a discussion rather than a treatise; and the reader must be already familiar with the rudiments of logic, both inductive and deductive, in order to understand it. It is mainly devoted to induction, though there is a chapter on the theory of the syllogism, and other chapters on weights and measures, the possibility of a universal language, and other topics not really belonging to logic. The principal fault of the book is a tendency to trifling distinctions and over-subtle refinements of thought. For instance, Mr. Venn calls attention to the fact that in some departments of investigation, especially in social affairs, our own acts have an influence on the phenomena we study; and he maintains that this is true in all departments. Even the astronomer, he says, by moving to and from his instrument and by the movements of his hand in making his calculations, alters the position of every body in the universe. Again, he inquires whether we can drop a stone twice in the same spot, and answers the question in the negative, because, even if we could hold the stone in exactly the same position the second time, and at the same height, the weight and temperature of the air would be altered, and, anyhow, the moon and stars would not be in the same position as before. The book contains a great number of these hair-splitting distinctions; and, though a few of them may have some scientific importance, the great mass are hardly more than curiosities of thought.

But, in spite of this tendency to over-subtlety, the book is an able one, and professional logicians in particular will find in it much food for thought. Mr. Venn's standpoint is essentially that of Mill; but he goes rather beyond Mill in maintaining the merely probable character of all truth obtained by induction, and he uses the term "empirical" in the title of his book for the purpose of emphasizing this view. His theory of causation is the same as Hume's; while as to the methods of induction he adopts the views of Mill with but little variation. As regards the syllogism, he differs from Mill, holding that it really gives us new knowledge. He has some interesting remarks on hypothetical and disjunctive propositions, and advances a theory of disjunctives that is, we believe, new; and, though we can hardly agree with it, it is well worthy of attention. In his concluding chapter, Mr. Venn discusses the logic of morality and the moral sciences, on which he has some important remarks. He calls attention to the fact that investigations in social matters, and especially predictions as to what will happen, are more or less vitiated by the fact that the course of events will depend in part on what the investigator himself may choose to do, and that in the case of men of genius this influence of the indi-