jugglery" relegated to "incongrous association;" the last part of the report saying, "To accept Mr. Holmes's conclusions, that all rude implements, howsoever and wheresoever found, not only removes the turtle-back of the Delaware valley, but removes the paleolithic implements of Europe, Asia, and Africa from the prehistoric archæology of those continents." In reading the curator's report of the Museum of Archæology relating to Mr. Holmes's work at Piney Branch, and the curator's views thereon, in connection with Mr. Holmes's papers in the *American Anthropologist* referring to this work, I was greatly surprised to find that Dr. Abbott's opinion and conclusions differed so widely from the conclusions which I had drawn from a tolerably careful examination of Mr. Holmes's work while excavating, from a careful reading of his papers, and from what I knew to be his ideas on the subject.

Mr. Holmes, under the direction of the Bureau of Ethnology, dug trenches into the hill at Piney Branch in order to develop the aboriginal workshop on the site. His papers in the *American Anthropologist* are simply an expression of what was developed in the trenches. In the January number of the *American Anthropologist* (1890) his plates of his work are as perfect as art can represent such work, or science could desire it should be represented. The objects found scattered throughout the "shop," from the surface to the cobbles in their original position, demonstrated beyond contradiction that the whole "shop" from end to end, from surface to bed, contained one class of work. Objects identical in material, shape, and manipulation, are found throughout the valley of the Potomac; and I have hundreds of similar specimens from the Patapsco, and South River in Maryland. The shape and work are not distinguishable from those of the paleolith of Europe; and many persons around Washington concluded that our turtle-back, or possibly, better, the double turtle-back, was of the paleolithic age. The Piney Branch shop demonstrated that on that site probably millions of stones had been worked; that those stones were identical with the finds of the Potomac and its vicinity. This is accepted by all as beyond contradiction. Of the shop, Mr. Holmes (*American Anthropologist*, July, 1890, p. 224) says, "A hundred or a thousand years may have passed since the discontinuance of work upon this site. In the Delaware valley all the necessary elements of a time record exist, and there at least the record has been at least partly read." In the *American Anthropologist* (January, 1890, p. 14) Mr. Holmes says, "It causes me almost a pang of regret at having been forced to the conclusion that the familiar turtle-back or one-faced stone, the double turtle-back or two-faced stone, together with all similar rude shapes, must, so far as this site is concerned, be dropped wholly and forever from the category of implements." Further, Mr. Holmes, in the same paper (p. 23), says, "Many of the rude implements of the Seine — assigned to a great antiquity and to an unknown race — are nearly identical with our quarry forms. On the Thames the analogues of nearly all classes of rude implements are found in the high, level gravels, thus carrying history back with certainty to remote ages. In the Delaware valley the rudest forms, corresponding to our failure shapes, are obtained from our glacial gravels, and the less rude varieties occur in more recent formations or under conditions that seem to make them safe indices of the steps of progress. In the Potomac valley, on the other hand, all the rude forms appear to be but failures, or unfinished pieces representing stages in the manufacture of arrow and spear points of the Indian." In conclusion (p. 26) Mr. Holmes says that he is ready to modify any of his statements, conclusions, or inferences, when the facts are found to warrant the change.

If Dr. Abbott can in any place quote Mr. Holmes as either saying, or even intimating, as suggested in his report, by "verbal jugglery" or otherwise, that Mr. Holmes claims that the Piney Branch shop has any bearing "on man's antiquity in America;" or if the curator of the American Museum of Archæology can justify his remarks, "that to accept Mr. Holmes's conclusions, that all rude implements, howsoever and wheresoever found, is not merely to remove the 'turtle-back' of the Delaware valley, but to remove the paleolithic implements of Europe, Asia, and Africa from the prehistoric archæology of those continents,"—I am willing to stand corrected. If, on the other hand, the doctor fails to show that any such theory has been advanced by Mr. Holmes, such as attributed to him, the doctor will have to admit, that, as the representative of the institution of which he is curator, he has been as unfortunate in his remarks as unwarranted in his assertions.

Nowhere that I can find has Mr. Holmes made any such assertion as attributed to him. On the contrary, he has strictly confined himself to the character of the work he had in hand, and has demonstrated that the so-called "turtle-back" was not paleolithic in the Potomac valley and its vicinity; and this demonstration has generally been accepted as conclusive so far as it applies to such objects on the field mentioned. He carefully leaves the paleolith to its proper sphere, as a matter which those who have studied and examined have described as being found "in the high level gravels, thus carrying history back to remote ages." To the Delaware valley finds Mr. Holmes accords a probable antiquity that is creditable to him as a liberal judge. There are in my own collection many surface finds from Anne Arundel County, Md., that are so similar to implements found by Dr. Abbott at Trenton, that an impartial judge might question even the great age of the Trenton implements without laying himself open to the charge of an effort to remove the paleolithic age of any country from the realms of "prehistoric archæology."

Notwithstanding the vast amount of valuable work performed by archæologists in America within the last twenty years, archæology may yet be considered in its infancy; and, while fair criticism should be courted by those making archæological investigations, attributing to an investigator thoughts and notions never advanced by him might be considered as verbal jugglery. New theories are too often advanced, and new implements too often described, the originators of which are frequently the first to repudiate them; and every branch of archæology opens too broad a field for archæologists to have to lay the institutions which they represent open to severe criticism in order to strengthen a pet theory.

J. D. McGUIRE.

Ellicott City, Md., March 2.

Anthropoid Heads in Stone from Oregon.

I HAVE seen the pamphlet of Mr. Terry, describing the anthropoid heads in stone from Columbia River, Oregon. The author offers two suggestions as to their origin. One supposes the existence in former years of anthropoid apes in this region. Professor Marsh, who owns one of the stone heads, could tell us whether any apes or monkeys are known to have existed there. I do not remember to have seen any literature on that subject. The second supposition is, that the people who made the stone heads once dwelt in lands abounding in apes. This is very much more probable. There are many species of anthropoid apes in western Asia, and there is nothing improbable in the hypothesis that the fabricator of the heads, or his ancestors, drew their inspiration from across the Pacific.

If Mr. Terry will allow me, I would suggest that he has omitted a more plausible explanation than either of the foregoing. From Sitka to northern California is the richest timber-belt in the world. The natives of all stocks have depended on the cedar and other trees for house, furniture, clothing, vessels, boats, tools of many kinds, and art materials. They knew how to fell the largest tree, and to divide it into planks and puncheons by means of numerous wedges and stone mauls. These mauls are very abundant in collections. I have seen them in the American Museum, where Mr. Terry's collection is installed. Most of them are carved or pecked into the form of animal heads. The material, heavy eyebrows, round bulging eyes, prominent cheeks, are all identical with the Terry specimens; only, in these, the lower part of the face is apelike. This is easily accounted for.

The Indians of this region are the most imitative creatures in the world. There are in the National Museum from this very Columbia region, and northward to Puget Sound, collected by Wilkes in 1838, carvings, in wood, bone, and stone, of dogs hitched to boats, steamboats with side-wheels, stoves with pipes and cowls on top, wagons, gates on hinges, glass windows, shingle roofs on houses, and, on a totem post, a missionary stealing two Indian

children. I would not say that all these existed in Oregon and Washington in prehistoric times, nor that the Indian artist had travelled around the world, but that all these things had come to him.

We have an excellent bust of Mr. Cleveland made by an Indian from a scrap of *Harper's Weekly*, which one of our collectors had wrapped around a bundle. It is not at all unlikely that the portraits of Mr. Crowley had found their way to Oregon in the same manner. It was a very popular subject about the time of his death, and the papers were full of him.

However, I am very far from depreciating the specimens on that account. The manner in which the lines of our culture move forward into savage culture is the most important inquiry in the history of civilization.

O. T. MASON.

U. S. National Museum, Feb. 28.

BOOK-REVIEWS.

Mineral Physiology and Physiography. By T. STERRY HUNT. 2d ed. New York, Scientific Publ. Co. 8°. $5.

A New Basis for Chemistry; A Chemical Philosophy. By T. STERRY HUNT. 3d ed. New York, Scientific Publ. Co. 12°. $2.

Chemical and Geological Essays. By T. STERRY HUNT. 3d ed. New York. Scientific Publ. Co. 8°. $2.50.

Systematic Mineralogy, based on a Natural Classification. By T. STERRY HUNT. New York, Scientific Publ. Co. (In press.)

THE new and revised edition of the works of the veteran scientist, Dr. T. Sterry Hunt, calls for renewed attention to the great world problems to which he has devoted a long and studious life. Those problems have arisen in the attempts of science to ascertain the ultimate, or at least a truer, conception of matter, and to obtain some theory of the formation of the chemical elements, and then of their combination and order in the formation of the sun, solar system, and especially of our earth. Dr. Hunt, at the close of his "Physiography," calls it "mineralogical evolution," and from it he proposes a new mineralogical classification and nomenclature, and finally "A New Basis for Chemistry."

Those who are not acquainted with the scientific career of the author may at first suppose that an attempt of this adventurous kind belongs to sensational and pseudo-scientific romancing excited by presumption, sentiment, ignorance, and imagination. Far other is the result of a careful examination of these volumes. We find in them a patient, mature, and thoroughly trained physicist, drawing to a conclusion, which he verily believes to be triumphant, the scientific evidence by which he has worked out not only this dream of his own youth, but the dream of the youth of Science herself: for the first question Science had to propose in early Greece, and the last she may have to solve, is the nature of matter and its changes. Her work is all there. How far the solution has progressed is disclosed in an exceedingly instructive history of previous efforts in that regard, made introductory to his own, in Dr. Hunt's main work, "Mineral Physiology and Physiography." This work should be the first taken in hand by the student, and then the "New Basis of Chemistry," and lastly, and by way of greater illustration, "The Essays" and "Systematic Mineralogy." This suggestion may save some disappointment, for Dr. Hunt has little mercy for those not acquainted with scientific methods and terminology. But when taken in the right order, as above indicated, this difficulty gradually disappears. The interest in the subject, than which none can be more sublime or important, fully repays the labor required to master its technicalities.

There are few scientists who are competent to give opinions of weight upon these fundamental questions, but none can be indifferent to them. To compare these great matters with small, we may say that Dr. Hunt has attempted to do for the mighty universe of inorganic matter what Darwin and the modern biologists have done for the little organic world of protoplasm. It is singular that we have been led to chiefly think this little organic world to be complex and inexplicable when compared with physics and chemistry; but the fact seems to be that during this century the organic world has been pretty well made out. Given protoplasm as found in nature, and the laws of growth and environment, and evolution tells the rest of the organic story — except to people who seem to have some reason for not wishing to have the "mystery" solved. So much having been accomplished as to organized matter, Dr. Hunt's works bring forward anew the very timely question, "Is there also one universal substance which, in its knowable changes and combinations, can give us the solution of the vast material world?" The contrast with the organized matter may be used only to state the question; for their methods must be quite disparate, and should never be confounded. Dr. Hunt answers this question affirmatively. He begins with the hypothesis of Newton and his successors, that the universe as far as known is a *plenum* of ether, and from the properties of light, heat, electricity, chemical affinity, etc., infers its reality. From astronomical and spectroscopic data he infers that the nebulæ from whence sun systems result are ethereal condensations. "Thus, perhaps," says Newton, "all things may be originated from ether;" and we are gradually brought to see this hypothesis gather the strength of a true theory under the light of the latest discoveries.

The author carefully lays away the atomic theory as unscientific, and the source of the principal misunderstandings of nature. The counter theory of the ultimate continuity of matter is then brought forward as the basis of the new philosophy by which only the ether theory of Newton (contrary to his own view) can be sustained. We then are taught that "all chemical union is nothing else than solution:" the uniting species or forms of matter are simply dissolved in each other. Chemical union is the identification of the combining bodies in volume and character in the new species formed. The type of the chemical process is found in solution, from which it is possible, under changed physical conditions, to regenerate the original species. All of these "may be supposed to be formed from a single element, or *materia prima*, by the chemical process." The "New Basis for Chemistry" (pp. 16–22, 35–37, *et passim*) elaborates this view. In the third chapter we are introduced to the *materia prima*, from which, by a process of cooling and electric changes, the chemical elements result by a process of "successive polymerization." Matter in its simple form, which must be far beyond the tenuity of hydrogen, can only be looked for by the spectroscope under the inconceivable heat of the grander suns. The author evidently believes that the later observations indicate forms of a primal matter, which, under heat and electrical changes beyond our present intelligence, polymerizes, and appears to us first as chemical elements, and hence as gases, and thence, as polymers of gases arise, under decreasing heat, as liquids, colloids, and solids.

From this vantage-ground the author has the basis of a new law of numbers, weights, volumes, densities, etc., — in a word, a new chemistry. By its light the combinations of matter are reviewed from the experiments of the laboratory to the mighty changes of stellar nebulæ. The stratified "rock-ribbed" bones of our planet are accounted for by an order determined by the nature of the materials, their chemical union, and modes of condensation.

The author takes unmeasured pains to work mineralogy and geology into orderly sciences by showing how the granitic rocks were chemically formed, and then forced to the surface and into the solid forms in which they now appear by "crenitic" or spring-like action. Thus we have a rational, uniform, chemical, account of our sun's and of our earth's formation and history. The chaotic appearances on the earth's surface are not evidences of catastrophes, but the results of the condensation of matter, and the crenitic and other re-arrangements which that process necessarily compelled. Thus we are made to conceive of ethereal, gaseous, liquid, colloid, and solid matter as one infinite polymeric world-forming, never-ending drama.

In order to realize this vastly improved science of matter, our author shows that much of the scaffolding which has served well in the past building of such a science now really prevents its completion. He especially shows that the atomic hypothesis, the present chemical notation, and classification, and the treatment of mineralogy, are not true, or but partly so, and should be replaced by the completed theory of matter and its polymeric changes and