

AMERICAN SYMBOLISM.

IN 1899 Mrs. Morris K. Jesup generously provided the means for a study of the Arapaho Indians, and Dr. Alfred L. Kroeber was entrusted with the work; his general description of the Arapaho and of their decorative art and symbolism recently published in the *Bulletin* of the American Museum of Natural History (vol. xviii. pp. 1-150, 1902) proves how well he acquitted himself of his task. Dr. Kroeber now has charge of the anthropological department of the University of California, and we may expect much good work from him in the future in this new field.

The Arapaho are typical Plains Indians, and belong to the linguistic stock of the western Algonkians. The fullest and most accurate account of these people has been given by Mr. James Mooney ("Ghost-Dance Religion," *Fourteenth Ann. Rept. Bureau Ethnol.*), and the sketch of their social organisation and life given by Dr. Kroeber is instructive, and to some extent supplements the previous descriptions.

The main value of Dr. Kroeber's memoir consists in the careful analysis of the meaning of a very large number of designs that ornament objects in every-day use, and in the wealth of the accompanying illustrations. The conscientious labour which this implies is deserving of the thanks of fellow-students of decorative art and symbolism.

There is a good deal of latitude in the interpretation of decorative designs employed by different individuals; usually an Indian refuses to interpret the ornamentation on an article belonging to someone else, giving as a reason that he does not know what that particular artist intended to represent. For example, the rhomboid or diamond-shaped symbol may signify the navel, a person, an eye, a lake, a star, life or abundance, a turtle, a buffalo-wallow, a hill or the interior of a tent. All except the first of these significations have also been found attached to very different symbols; thus, a person is also denoted by a small rectangle, a triangle or a square, by a cross, a dot or a line, as well as by rudely realistic designs. A lake may be represented by a square, a trapezoid, a triangle, a pentagon, a circle or other figures. The decorative symbolism is not intended as a means of communication, hence there is no fixed system of symbolism. One person thinks about the significance of his designs, while another considers chiefly their appearance. The former may have two or three interpretations for one symbol or design which are appropriate and coherent; the symbols of the latter will have their most conventional meaning, without much relation to a thought-out scheme. In either case, the Indian never dreams of making a picture that can be recognised by everyone at first sight. These peculiarities can be paralleled in other parts of North America, and, indeed, elsewhere.

A pictograph serves as a means of record or communication, and is normally not decorative; while this art is too decorative to allow of its being read in the same way; yet there is considerable similarity in the symbols used in both systems. Moreover, the significance of a piece of decoration is at times as extended and coherent as that of a pictograph.

Dr. Kroeber insists that the closeness of connection between this decorative symbolism and the religious life of the Indians cannot well be overestimated by a white man. All symbolism, even when decorative and unconnected with any ceremony, tends to be to the Indian a matter of a serious and religious nature.

A. C. H.

THE ORIGIN OF NATURAL GAS AND PETROLEUM.

THE volcanic origin of natural gas and petroleum is strongly advocated by Mr. Eugene Coste in a paper read before the Canadian Mining Institute (March 5). The author points to the complete analogy of the products of the oil and gas fields with the products of volcanic solfataric action. These products are water, chloride salts, sulphur, sulphuretted hydrogen, carbonic acid and hydrocarbons. He brings forward facts upon which he bases his view that all the petroleum, natural gas, and bituminous fields or deposits are essentially the products of solfataric volcanic emanations, condensed and held in their passage upward in

the porous tanks (sands, limestones, &c.) of all ages from the Archæan to the Quaternary. He instances the occurrence of carbon and hydrocarbons in gneisses and various ancient plutonic rocks. He likewise refers to the dolerite of the Lothians (described by Mr. H. M. Cadell), in which cavities of the rock are filled with a mineral wax not unlike the ozocerite of Galicia. The oil shales through which the igneous rocks have intruded were in Mr. Coste's opinion impregnated by solfataric emanations, for their bituminous character is local, and in proximity to the igneous rocks. Allusion is made to the occurrence of asphalts and oils along the faulted and broken margins of the Gulf of Mexico and Caribbean Sea, the great asphalt deposit of Trinidad filling the crater of an extinct volcano. Again, natural gas and petroleum are associated with mud volcanoes. The author therefore concludes that carbon and hydrocarbons are derived from deep-seated fluid magmas, in which they exist probably in the form of carbides. The "rock pressure" of natural gas is regarded as a remnant of the initial volcanic energy. This has been registered as high as 1525 lb. to the square inch, but is usually between 200 and 1000 lb., and is a constantly decreasing pressure from the time the gas is first used. The theory that artesian water is the cause of the gas pressure is regarded as untenable.

The author points out how generally the diversified "oil phenomena," which include gypsum, sulphur, dolomite, and salt, are met with in American and other oil and gas fields. Disturbed strata and planes of faulting gave access to volcanic emanations which brought up the various products; the rocks were variously impregnated according to the geological and physical conditions of the strata, and the products were sealed up when impervious unbroken strata remained above. In Galicia solid petroleum or ozocerite exists in veins cutting the strata in every direction, the most important being faults. Elsewhere oil occurs in the fractured strata, and such an elusive fluid, pent up under pressure, could not be in its original home. The local and seemingly accidental occurrence of the oil and gas, and even of bituminous shales, are considered by the author to favour his theory, for he observes that the sedimentary strata could not produce from a limited fossiliferous area the quantity of products. Thus, near Baku, in Russia, a small area of not more than eight square miles has now yielded more than 900 million barrels of oil.

H. B. W.

SMITHSONIAN REPORT ON SCIENTIFIC WORK.

DR. S. P. LANGLEY, secretary of the Smithsonian Institution, has issued his report on the operations of the Institution during the year ending June 30, 1902, including the work in the United States National Museum, the Bureau of American Ethnology, the International Exchanges, the National Zoological Park, and the Astrophysical Observatory.

Following the precedent of several years, there is given, in the body of the report, a general account of the affairs of the Institution and its bureaux, while an appendix presents more detailed statements by the persons in direct charge of the different branches of the work. Independently of this, the operations of the National Museum are fully treated in a separate volume of the Smithsonian Report, and the Report of the Bureau of American Ethnology constitutes a volume prepared under the supervision of the director of that Bureau.

The following extracts from the report will show that a vast amount of scientific work is being instituted and carried on under the auspices of the Institution.

Hodgkins Fund.—In connection with the administration of the Hodgkins fund, papers recording the advance of specialists along various interesting lines of investigation have been submitted, some of which are now in course of publication.

The report of the research on the spectrum conducted by Dr. Victor Schumann, of Leipzig, has received extensive additions during the year, notably through a detailed description of the ingenious apparatus used in his work. A second grant on behalf of Dr. Schumann has been approved during the year, and it is interesting to know that