ETHNOLOGY.

A Mexican Feather Ornament.

THE trustees of the Peabody Museum of Cambridge have decided to issue in a separate form such special papers as have heretofore been published in connection with the annual reports. The first number of this new publication, which will have the title *Archæological and Ethnological Papers of the Peabody Museum*, has just been issued, and is of great interest. Mrs. Zelia Nuttall discusses the meaning of the widely known Mexican feather ornament in the Vienna Museum of Natural History, which dates back to the time of Charles V. The modest title 'Standard, or Head-Dress,' which she has given to her study, covers, however, an historical investigation of the greatest value. Starting from a consideration of the interesting specimen, she gives conclusive proof that it was one of the head-dresses used by Mexican war-chiefs. In this investigation the authoress for the first time applies her discovery of complementary signs in the Mexican graphic system, which was announced two years ago at the Buffalo meeting of the American Association, to deciphering a certain iconograph; and in an appendix she sets forth more fully the essential features of these signs. A hieroglyph may represent various sound-combinations, as the object represented is liable to be designated by synonymous names. In order to show which name was meant, complementary signs were used, the phonetic value of which determined which word was meant. An arm and hand, for instance, might express *maitl* ('arm') as well as *acolli* ('shoulder'). If above the arm the conventional sign for water (*atl*) is painted, yielding in composition the phonetic value *a*, which is also the first syllable of the word *acolli*, this complementary sign indicates that the latter word is meant. This discovery of Mrs. Nuttall promises to be a great help in the decipherment of Mexican texts. The question as to the real significance of the feather ornament is decided by a thorough investigation of the use of banners and head-dresses in ancient Mexico. The authoress's final conclusions are briefly summed up as follows: The testimony of native Mexican paintings and sculpture, and of early Spanish records, taken into consideration with the evidence furnished by its structure, and also by the appellation bestowed upon it in the Inventory of 1596, in which the first record of the specimen is found, proves it to be a head-dress. Manufactured with the utmost care, of materials most highly esteemed by the Mexicans, uniting the attribute and emblematic color of Huitzilopochotli, fashioned in a shape exclusively used by the hero-god's living representative, the high-priest and war-chief, this head-dress could have been appropriately owned and disposed of by Montezuma alone at the time of the Conquest, from which period it assuredly dates.

TEXTILE PATTERNS OF ANCIENT PERU. — Dr. Alphons Stübel, who, in company with W. Reiss, spent five years in travels of discovery through Peru and other parts of South America, and edited conjointly with him the pictorial work, 'Das Todtenfeld von Ancon' (Berlin, 1880–87), in a volume published at the celebration of the twenty-fifth anniversary of the Dresden Geographical Society, treats on "textile patterns of ancient Peru compared with analogous ornaments of classic art." The various ornaments, consisting of squares, trapezoids, lozenges, circles, etc., give origin to more complicated ornaments by a combination of the same geometrical figures whenever one of these is shoved on to another of the same description by sliding it on below, on the sides, or on any point where both can combine. Stübel's ideas are very original and ingenious, but whether the inventors of these ornaments really obtained the ideas for their multiple patterns in this way is rather to be doubted. The pamphlet is illustrated by a large number of designs, and fully deserves notice.

THE MIGRATIONS OF THE BANTU. — Mr. H. H. Johnson, the well-known African explorer, advances, in a recent number of the Proceedings of the Royal Geographical Society, a suggestive theory of the origin and migrations of the Bantu and their northern neighbors. He believes that their common home was in the region between the Shari and Welle-Ubangi. From this centre, he thinks, emigrants had constantly been starting to the west, and had carried with them their languages, which have given rise to most of the languages in western Africa between the Gambia and the Niger. But there still remained in this district north of the Kongo, east of the west coast watershed, south of Lake Chad, and west of the western affluents of the Nile, two flourishing and nearly allied tribes, whom he calls the Bantu and Semi-Bantu. Later on, both peoples were driven from their homes. The Semi-Bantu proceeded due west towards the Niger, and the Bantu turned to the south and south-east. The Semi-Bantu greatly discarded and wore away the grammatical structure inherited from its mother, and which its Bantu sister developed and perfected, but retained in a great measure its primal stock of word-roots. Mr. Johnson continues, "These tongues, while retaining many roots in common with the Bantu, have a grammatical structure which lacks all, or nearly all, Bantu features. The resemblance in vocabulary to the Bantu increases as you proceed eastward, but is not to be explained by the theory of 'loan-words,' because the similarity of the word-roots strikes too deeply into the language-system." We would be more inclined to conclude from this statement that the 'Semi-Bantu' are mixed languages. "The primitive Bantu tribe," Mr. Johnson continues, "moved away from its original home in a south and south-easterly direction, and probably located itself for some time in the district lying between the Welle, the Kongo, and the Muta-Nzige and Albert Nyanza Lakes. Here, no doubt, it settled down for a while, and throve and multiplied; and here probably it received the ox, sheep, goat, pig, and domestic fowl from tribes to the north, to whom they had permeated from Egypt. Rapid increase and its consequent troubles caused the primal Bantu people to again split up and its sections to part company, and the great Bantu invasion and occupation of the southern half of Africa began to take place. Except the feeble, dwarfish races of Akka or Hottentot and Bushmen, there seem to have been few inhabitants to dispute southern Africa with the Bantu, and from their centre of activity they sent out streams of emigrants westward along the Welle and the Kongo, eastward to the Nile lakes and the Zanzibar coast, and southward to Damaraland and Natal." Although this detailed theory seems to be constructed on rather slight evidence, it is an interesting attempt at explaining the complicated ethnological phenomena of Africa.

ELECTRICAL SCIENCE.

Electric Street-Railways.

THE next three months will determine whether there will be rapid advance in the equipment of electric street-railways, or whether they will have a decided set-back. There have been roads equipped in New England during the summer that will have a severe test this winter, and there are few places where the equipment will not have to do heavier work than ever before.

At the beginning of the year the Sprague Electric Railroad and Motor Company did not have a car running; the Thomson-Houston Company — then the Van Depoele Company — had half a dozen roads in operation; the Daft Company, about as many. To-day the Sprague Company has thirty roads completed or in course of construction; the Thomson-Houston Company, about as many; the Daft Company, perhaps a dozen; with a number of other systems represented by single roads in different localities.

There have, too, been radical changes in the methods that were used only a short time ago. The Thomson-Houston truck, with the motor pivoted on the axle and gearing direct to it, is a very different affair from the Van Depoele motor placed in a compartment in the car, driving the wheel-axle by a chain belt. The Sprague Company have also gained something from experience; and the last type of motor and gear with the single magnetic circuit, the admirably simple method of reducing the speed, and with the new brush for the commutator, is a marked improvement on the type they have been building.

It is significant, that, with a few exceptions, the method used to convey the current to the car is by an overhead wire. The question of street-car propulsion is mainly one of economy, and it is but natural that horses should be first displaced where the most economical electrical system is allowable. But it will be seen, that, if we are to retain our prejudices against the overhead wires in our city streets, the real problem of displacing horses in city

tramways has not been solved, nor is it much nearer solution than it was a year ago. The ideal system for such work is undoubtedly the storage-battery system, and the experiments that have been made in that direction are few. In Philadelphia a partial test of storage-batteries was made, with the result — as stated before the Street Railway Convention a month ago — that the cost of running a car was nine dollars per day, — about that of horses. In New York the cars on the Fourth Avenue Road are being slowly equipped, but it is too early to obtain even approximate figures as to the cost. A storage-car was run for a few months in Baltimore, and another in Rochester, but nothing has been heard of them for some time.

So that, although a number of roads have been equipped with electricity, yet the work has been in the direction of suburban tramways, and the question of city tramways remains still unsolved. But the important question now is, what will be the effect of snow and sleet on the overhead structures, and on the possibility of propelling the cars? And according as the reply is favorable or not, will the work of next year be satisfactory or otherwise. If there are no hitches other than any system would be subject to, then it is easy to predict that next year the companies engaged in electric railroading will get as many roads to equip as their capacity will allow, for on the question of economy of operation there is no doubt.

It should be the aim, then, of the electric-motor companies to supply every possible means of clearing the tracks of snow and ice. In Boston the Sprague people have constructed a special clearing car with an abundance of power, and with brushes worked by electric motors, for clearing the track, and it is fair to suppose that such an arrangement will be more efficient than a team of horses. It is probable that both this company and others have equipped all of their roads with some such construction-car. If they have not, they will lose by it, for this winter will test electric tramways; and the company that best stands the test will have the most work next year.

THE WESTINGHOUSE COMPANY'S EXTENSIONS. — The growth of the Westinghouse Electric Company in the last two years is one of the remarkable features of the rapid extension of the applications of electricity now taking place. Two years ago the alternating system of electric distribution was practically unknown in this country: several successful installations were in operation in England and on the continent, but it had not been taken up here. The Westinghouse Company purchased the patents of Goulard and Gibbs, and undertook the exploitation of the system with so much energy and success, that to-day they have over three hundred thousand lights in operation. At first they had no fundamental patents on incandescent lamps, under which to operate; but a combination with the Sawyer-Mann interests gave them the protection of the patents granted to Sawyer and Mann, and in the last few weeks they have absorbed that company. Their latest move has been the purchase of the control of the Waterhouse Electric Company, whose system of arc-lighting has many points of merit. Some time ago the Tesla patents for alternating-current electro-motors were acquired, and now the Westinghouse Company advertises that they are ready to supply motors for their alternating circuits. It would seem as though this company was gathering its energies for the conflict between alternating currents with converters and continuous currents with secondary batteries, — a conflict that is already at hand. They have very wisely secured control of apparatus that will enable them to use their stations to the fullest capacity possible. They can supply arc lamps, incandescent lamps, and motors from the same station, and the latter will partly compensate for the advantages that secondary batteries offer. It is not probable, however, that in the lighting of crowded city districts they will be able to successfully compete with a direct system of distribution, especially if electric-light wires are ordered under ground, and if storage-batteries are slightly improved. But the field for the alternating system is wide enough to fully occupy the energies of even the Westinghouse Company.

THE ELECTRIC LAUNCH 'VISCOUNTESS BURY.' — The London *Electrical Review* describes, in a recent issue, this launch, — the largest, with one exception, in the world. She will carry eighty passengers comfortably. Her dimensions are 65½ feet long by 10 feet beam, with a draught of 22 inches and a displacement of 22 tons. Her rudder is specially designed with the object of clearing weeds and obstructions. The steering-wheel is forward: adjoining it is an indicator communicating with the electrician in charge of the switches controlling the electrical power. The electrical energy is stored in two hundred of the Electric Power Storage Company's accumulators of the 1888 type, each of which has a storage capacity of 145 ampère hours, with a discharge-rate up to 50 ampères. These cells are arranged one hundred on each side under the seats. The space occupied by them is lined with lead, with small drains leading off, so in case of accident there would be no damage from the acid. It is calculated that the stored energy will propel the vessel for ten hours at six miles an hour. Twin propellers are used, each driven directly by a 7½-horse power Immich motor, making one thousand revolutions per minute. The switches are fixed so that either motor can be worked independently of the other; or they can be driven at half speed or astern. All of the machinery is beneath the flooring, leaving a clear space fore and aft for the passengers.

THE DIRECT UTILIZATION OF THE SUN'S ENERGY. — Many plans have been proposed for the direct utilization of the sun's energy, — Ericsson's heat-engine supplied by solar radiations; the plan of MM. Conova, Piffre, and Mouchot, who proposed to concentrate the sun's rays on a mass of water, which would be turned into steam; with a number of others, none of which have even reached the stage of successful experiment. Mr. Edward Weston proposes, and has recently patented, the idea of using a thermopile, which is to be placed in the focus of a mirror or lens, and which is to be used to charge a storage-battery, from which the energy is finally to be drawn. An electro-magnet in the circuit is so arranged as to cut out the pile when its electro-motive force falls below that of the battery. When we consider the very low efficiency of thermopiles, — not over three or four per cent, — it would appear doubtful whether the plan will ever be more than an interesting suggestion.

BOOK-REVIEWS.

Fifteenth Annual Report of the Secretary of the State Board of Health, Michigan, for the Fiscal Year ending June 30, 1887. Lansing, State. 8°.

IN addition to the statistics and routine reports usually found in official health reports, this volume contains a number of exceedingly valuable contributions to sanitary science. The most important of them is that which describes the investigations conducted in the State Laboratory of Hygiene, under the direction of Prof. V. C. Vaughan. These include experimental studies on the causation of typhoid-fever, poisoning from tyrotoxicon, and an exposure of the stenocarpine fraud. At the time this exposure was made we called the attention of our readers to it. It will be remembered that the announcement of the discovery of a new local anæsthetic was made through the medical journals, to which the name of 'stenocarpine' was given. F. G. Novy, M.St., instructor of hygiene in the State Laboratory, analyzed the drug, and found it to be a mixture of cocaine and atropine. Since the publication of his analysis, nothing more has been heard of stenocarpine, and we are informed that it has been withdrawn from the market.

The cases of poisoning from tyrotoxicon which were investigated were those which occurred at Milan, Mich., in September, 1887. Four persons in one family were poisoned; and of these, three died. Professor Vaughan reports that the sickness was distinctly traceable to milk, in which tyrotoxicon had developed. The milk was kept in a buttery, the floor-boards of which had rotted, so that a second layer of boards was necessary. Between these two floors a great mass of moist, decomposing matter was found, the accumulation of years. When the floor was taken up, a nauseating odor was perceived, sufficient to cause vomiting in one of the persons engaged in the examination.

The experimental studies on the causation of typhoid-fever were made by Professor Vaughan and Mr. Novy, and had special reference to an outbreak at Iron Mountain, Mich., in October, 1887. Attention seemed to be directed to the drinking-water used by the