

remarkable that in all these investigations Hertz does not once even mention, as a thing to be explained, the repulsive actions which Crookes observed, and which have been almost universally attributed to the impact of gas particles.

The other important paper, on the transmission of kathode rays through thin metallic films, is particularly interesting as the starting-point for Lenard's work, which has resulted in the discovery of the X-rays. A good deal of what Hertz observed would be accounted for by the production of X-rays where the kathode rays meet the diaphragms, and by the reproduction of kathode rays mixed with X-rays on the other side of the diaphragm, which would thus act as a sort of local electrode. That something exists in a vacuum on the far side of such a thin film, which does not ordinarily exist in X-rays in air, seems conclusively proved by there being something there which can be deflected by a magnet. There seems no doubt that kathode rays themselves are quite invisible, and that it is only where they are interfered with by gaseous molecules or by phosphorescent solids that they are sources of light. This is very much what one would expect. An electrified atom would not in general be a source of light unless its free movement were interfered with by impact.

The concluding article, on his master Helmholtz's seventieth birthday, is a noble and generous tribute to that great teacher's abilities and character. How truly he portrays the important characteristics of a University Professor! "It is true that Helmholtz never had the reputation of being a brilliant university teacher, as far as this depends upon communicating elementary facts to the beginners who usually fill the lecture-rooms. But it is quite another matter when we come to consider his influence on trained students, and his pre-eminent fitness for guiding them in original research." The most important duty of a University is to increase the knowledge of mankind, and to train up a new generation who may be able to continue the good work. It is thus mankind has advanced since the dawn of civilisation in Egypt. He who produced the most enthusiastic disciples has most advanced the well-being and the well-living of the race.

G. F. F. G.

THE BUREAU OF ETHNOLOGY AT WASHINGTON, U.S.A.¹

THE Bureau of Ethnology at Washington has, during the last sixteen years, been carrying quietly on a work of the importance of which, we feel sure, that a number of students of anthropology have no knowledge whatever; we are equally sure that work itself, as well as those who labour in it, has not received due recognition. It is now nearly thirty years since the exploration of the Colorado River of the West was begun by the Act of Congress in America, and it is nearly twenty years since the various geographical and geological surveys which sprang up in connection therewith were dissolved, and since the foundation of the United States Geological Survey became an established fact. In the course of the work carried on by the Survey its various members made most exhaustive anthropologic researches among the North American Indians, and the myriads of facts which these self-sacrificing workers collected were fortunately rescued for the benefit of all students, and for all time, by the beneficent help of the Smithsonian Institution, which had secured provision for the publication of a series of monographs on almost every subject connected with the manners and customs, history, religion, and languages, &c., of the various Indian tribes with which they came in contact. Under

¹ The Annual Reports of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, by J. W. Powell, Director. 13 Annual Reports. (Washington: Government Printing Office, 1881-1896.)

the authority of the Act of Congress, the Secretary of the Smithsonian Institution entrusted the management of this great work to the former Director of the Rocky Mountain Region Survey, Mr. J. W. Powell, and thus the Bureau of Ethnology was practically established. It is a pleasant thing to be able to record that Congress supported the work both with patronage and with pecuniary assistance, and all will confess that the contributors to the success of the Bureau have worked with a will so as to employ in the best possible manner, and to the best possible end, the funds which have been placed at their disposal. We have before us thirteen handsome volumes of Reports, each containing several hundred pages of closely-printed matter, and profusely illustrated with well-executed coloured plates, and many hundreds of woodcuts. No reviewer of these volumes could attempt to give an adequate account of them unless he had some scores of pages at his disposal, and it goes without saying that all that any writer can do here is to call attention to the plan of Mr. J. W. Powell's volumes and to the general contents, hoping that the reader will devote some portion of his leisure to the perusal of a set of works which are at once of the greatest interest to those who study man and his ways, and of the first importance to the student of ethnography.

In setting out on his work, Mr. J. W. Powell says that throughout "prime attention has been given to language," for "with little exception all sound anthropologic investigation in the lower states of culture exhibited by tribes of men, as distinguished from nations, must have a firm foundation in language. Customs, laws, governments, institutions, mythologies, religions, and even arts cannot be properly understood without a fundamental knowledge of the languages which express the ideas and thoughts embodied therein." As a result of this opinion, the officials of the Bureau of Ethnology have devoted themselves to collecting materials for dictionaries of the North American languages, and for chrestomathies, and in time they hope to put grammars of the same before the world. With a view of enabling the philological student to determine what help he may or may not be able to obtain from these languages, the authors of the volumes before us give, every here and there, selected texts accompanied by interlinear transliterations, much in the same way as the early Egyptologists used to do in publishing hieroglyphic texts; and there is no doubt that this is a most useful plan. That it enables the careful reader, at times, to trip up his editor is true; but it is an honest method, and will be much appreciated by all painstaking students, for comparisons of words can thus easily be effected. Turning, though only for a moment, from language and from the characters which express language, that is to say writing, we see at a glance that the peoples of North America had many things in common with the most ancient civilised nations of antiquity. We do not for a moment believe that every custom and belief which may be found among them should be used to connect them with the ancient Chinese, or Indians, or Babylonians, or Egyptians; but it seems perfectly clear that every primitive nation, wherever it may live on the globe, or whatever may be the circumstances under which it lives, has certain fundamental ideas about the future life, and religion, and morality, which closely resemble those of other early nations. It seems tolerably clear, too, that many anthropologists have erred somewhat in tracing connections between peoples of totally different races, which they have deduced from observing that they had many beliefs in common. A careful examination of the characters employed by early nations to express their ideas makes this quite plain, for as pictures were used by them all for this purpose, we have only to trace the conventional sign back to its oldest form to find out what fundamental ideas existed in their minds. Primitive

man, wherever he existed, used as writing materials such natural objects as were readily obtainable. Strips of bark, dressed skins, pieces of wood, bones, flat pieces of slate or stone, rocks, clay, &c.; when he was sufficiently advanced to beat out or to cast plates of metal, iron and bronze were also used by him for this purpose. At a later period he found out the way to make papyrus and paper, and this once done the task of the writer was comparatively simple. His pen varied with the substance which he wrote upon; wood, stone and metal demanded a hard, sharp instrument, and skin and paper demanded only an object which would transmit the writing fluid to their surface in regular quantities at the will of the writer. Ink was in its earliest form simply a mixture of water with some burnt vegetable substance or mineral earth. The style and character of the writing were modified by the materials used; and this is only a natural result when we consider how easy it is to draw circles, curved lines, and intricate devices upon a smooth substance like dressed skin or paper, and how hard it becomes to cut the same in stone. From the Chinese and cuneiform characters we may learn how, little by little, the original picture forms disappeared before the general use of stone and clay, and we know that the style of writing which was used for State documents was very different from that employed in the ordinary business of life. In the clay tablets of the last Assyrian Empire, about B.C. 700, the cuneiform characters bear no resemblance whatever to those which are found on the monuments of the period of Entenna, about B.C. 4500; in the Demotic writing of Egypt, so far back as the period of the Ptolemies, the pictorial character of the ancient hieroglyphics (from which it was derived, through the intermediate form of the hieratic or cursive form of writing employed by the priests) has quite disappeared. When we come to consider the characters used for writing purposes among the North American Indians, so ably discussed by Mr. Garrick Mallery (see "Sign Language among North American Indians," in the *First Annual Report of the Bureau of Ethnology*, p. 263 ff.), we find many pictures which show that they have much in common with picture signs in other languages. The sun is represented by a circle, as in Egyptian and Babylonian; sometimes it has rays shooting out all round it, just as we may see it in one of the vignettes of the ninety-second chapter of the "Book of the Dead." Sunrise is symbolised by a part of the disk showing above the ground; in Egyptian the disk is seen rising between two mountains. The star is represented by a small circle with four rays shooting from it, each towards a cardinal point; in Egyptian the star often has five points, but one of them probably represents the rope or chain by which the Egyptians thought it was hung out in the sky, and in Babylonian a star usually has eight points. The moon is represented by a crescent, as in Egyptian, Chinese, and Babylonian; heaven is a vaulted space, but in Egyptian it is drawn like the flat roof of a house, and has, moreover, supports by which it stands firm on the earth. To represent clouds a number of dark conical masses are drawn within the vault of heaven; the common Egyptian determinative for words meaning cloud is a tress of hair, and it is probable that this idea is common to both Egyptians and Indians. Similarly among both peoples rain was represented by lines of water falling from the sky. In fact it would seem that natural objects, both animate and inanimate, were written always in the same way, whether the writers were Chinese, or Egyptian, or Babylonian, or people of Western Asia, or the makers of the Cretan pictographs which Mr. A. J. Evans has discovered, or North American Indians. Abstract ideas were probably expressed quite differently by all nations; but even to touch on this far-reaching subject would be beyond the scope

of this short notice. It must, however, be mentioned in passing that Mr. Garrick Mallery has collected a series of most important facts in connection with this subject in his "Pictographs of the North-American Indians" (see *Fourth Annual Report of the Bureau of Ethnology*), a work which should be consulted by all who study the history of the development of writing in the world, and that he has further supplemented our knowledge of the subject by his later work, "Picture-writing of the American Indians" (see *Tenth Annual Report of the Bureau of Ethnology*). It is a curious fact that the peoples of North America did not invent an alphabet, as many of the other nations of the world have done, for it is clear to every one that a system of picture-writing, however simple, is really a cumbrous affair, and the misreading of a picture sign might be at times accompanied by dire consequences. At a very early period Chinese, Babylonians, and Egyptians introduced an alphabetic principle into their writing, and the Persians succeeded in abolishing entirely the picture element from their system. The other volumes of Reports are, each in its way, as interesting as those to which we have called attention, and from them we may learn that light and information can come from the West as well as from the East. The carefully made collections of ethnological facts, which we find in the series of works issued under the able direction of Mr. Powell, should do much to help and encourage other workers in their inquiries, and the scholarly way in which they have been set forth by his fellow-workers reflects the greatest credit upon the Smithsonian Institution, and upon all who have been connected with their publication.

NOTES.

It is stated that Lord Rayleigh has intimated to the Council of the Royal Society that he does not intend to seek re-election as one of the Secretaries of the Society.

THE President of the Royal Society (Sir Joseph Lister) will preside at Prof. Dunstan's lecture at the Imperial Institute next Monday evening.

LORD KELVIN has been suffering for some time past from severe neuralgia in the head; but he is now much better, and was able on Saturday to attend at the Royal Society for an hour.

THE celebration of the seventieth birthday of Prof. Stanislao Cannizzaro at Rome has been postponed to November 21, on account of the anniversary on July 12 falling in the University vacation. A Committee has been formed and has collected subscriptions, which are to be devoted partly to the production of a gold medal commemorative of the anniversary, the balance being handed to Prof. Cannizzaro to be applied at his discretion in the interests of science. Congratulatory addresses will be presented from various learned societies, and there will also be a ceremonial presentation of the medal and subscribed fund.

THE recent Conference at Burlington House on the proposed International Catalogue of Scientific Publications appears to have stimulated interest in the subject-index to the Royal Society's "Catalogue of Scientific Papers," upon which the Society's staff is already engaged. The College Section of the American Library Association at their meeting last month unanimously passed the following resolution:—"That the Section has learned with great satisfaction that the Council of the Royal Society proposes to add to the debt which the scientific world already owes to it for its valuable 'Catalogue of Scientific Papers,' by making a subject-index to the papers contained therein."