

way or other its action and its existence traceable to the sun. That there was an unlimited supply of energy in the interior of the earth was a circumstance which had, he said, been overlooked. In speaking of this energy, Mr. Milne first referred to that portion of it which crops out upon the surface in countries like Japan, Iceland, and New Zealand, in the form of hot springs, solfataras, volcanoes, &c. He stated that there was an unlimited supply of water in hot springs within a radius of one hundred miles around Tokio, and that the heat of these springs could be converted into an electric current, and the energy transmitted to the town. The second part of the paper referred to the possibility of obtaining access to the heat which did not crop out in the surface.

The whole behaviour of homogeneous colours is explained (according to Herr Albert, *Wied. Ann.*, No. 5), on the Young-Helmholtz theory, by this assumption: To a lessening of the intensity of vari-coloured light correspond various lessening of the strength of sensation, such that for rays of less wave-length, to whatever part of the spectrum they belong, it decreases more slowly than for rays of greater wave-length.

### GEOGRAPHY IN RUSSIA

THE just issued "Annual Report of the Russian Geographical Society for 1881" shows that during last year the Society has again accomplished a good deal of useful scientific work. A subject to which much attention was given was the establishment of polar meteorological stations. The station at Novaya Zemlya has already been in operation, as is known, for two years, and a new one, which will be established at the mouth of the Lena, is provided with the best instruments, and is intrusted to persons who will be able to make of it a first-class meteorological observatory. During the summer the expedition will reach the shores of the Arctic Ocean, and begin the meteorological observations. The Dutch station will be erected at Port Dickson, at the mouth of the Yenisei.

Among the scientific expeditions undertaken by the Society, that of M. Polakoff, to Sakhalin, promises to give very interesting results. The rich ornithological collections made in the Alexandrovsk Valley, on the western coast, proved that the birds of Western Sakhalin have a remarkable likeness with those of Siberia and Northern Russia. The same is true with regard to the former inhabitants of Sakhalin, whose stone implements and remains of earthenware, discovered in great masses, are much like, or even identical to, those of European Russia; the presence of obsidian implements, however, originally from Kamschatka, or from the islands of the Pacific, hints that the inhabitants were in intercourse with these countries. M. Polakoff has also discovered dwellings of the same period, which were holes, like those of the Kamtchadales, the numerous stone pieces which were used to be attached to the nets, show that the nets of the prehistoric man were very large, and that fishing was carried on to a great extent at that period.

The result of M. Polakoff's explorations of the eastern shores of the island, as well as in its middle parts, are not yet known. M. Adrianoff's journey in very little known parts of the Tornsk and Sayan Mountains, during which the explorer crossed Lake Teletzekoye and the Shapshal Mountains, have given rich materials for the geology, zoology, and botany of these countries. The travels of A. E. Regel to the Pamir, M. Hedroitz's explorations of the alluvial deposits of the Amu-daria, M. Lessar's travel to Saraks, and M. Moushketoff's researches on Caucasus, have already been mentioned in NATURE.

A very interesting journey, mentioned in the "Report," was made by A. W. Eliseeff, who tried to follow the same route to Palestine which was followed by the Jews during their exode from Egypt. M. Eliseeff discovered during the journey numerous traces of man of the Palæolithic and of the Neolithic periods in Arabia Petrea, as well as in Egypt and in Palestine. The prehistoric man of the Sinai peninsula belonged to two different types: one, with light bones, of the Semitic type, and the other, with massive bones, of the Berber type; dolichocephalic skulls are predominant. Both had the custom of burning corpses, and did not neglect anthropophagy; however, their chief food consisted of wild animals, fishes, and molluscs. The disposition of these remains confirms the hypothesis of Owen, that the Sinai peninsula and lower Egypt were under water, excepting the higher terraces, after man inhabited the banks of the Nile. As to the present inhabitants, the Arabs of the peninsula afford two different types: a western one, more akin to the Fellah and

Egyptian type, and the eastern one, which is of a purer Arabian origin. The nomad Bedouins belong to different sub-types, and there are in the Bedouin desert, traces of a fair-haired people, as well as representatives of Berberian and Ethiopian blood. Some very interesting material for a knowledge of prehistoric man was also discovered by M. W. Malakhoff, during his journey on the western slopes of the Middle Ural. The remains of this epoch are very numerous, especially on the shores of lakes, and they are the more interesting, as we find here the first vestiges of an epoch when the Neolithic man began to discover the properties of metals, and to manufacture metallic implements from the rich ores he found on the Ural. The skeletons of men of this period discovered, together with mixed implements of stone, bone, and copper, are most interesting, especially with regard to the skulls, which represent a very low stage of human development. The remains of a later epoch (implements and rock hieroglyphics) are also very numerous. M. Malakhoff concluded his researches by ethnographical observations on the present Permyaks, whom he considers as very nearly akin to the primary prehistoric inhabitants of this region. G. N. Potanin's exploration of the Votyaks, of their migrations, mythology, and customs, and an excursion of S. K. Kouznetzoff to the Tcherenisses of the Vyatka government promises to yield interesting results.

Among the new publications of the Society we notice the following:—The Anthropology of Mordvinians, by W. N. Mainoff, is printing, and will appear in the eleventh volume of the Ethnographical Memoirs of the Society; the anthropological researches of K. S. Mereshkovsky in the Crimea, preliminary reports of which have appeared in the *Izvestia*, will soon be ready to print; G. N. Potanin's work, "Sketches of North-Western Mongolia," being a report, in two volumes, of his first journey in Mongolia, is an important acquisition for the geography of Asia; the first volume contains abundance of valuable geographical information, and the second contains the ethnographical results, with twenty-six tables of drawings. Volumes iii. and iv. of this work, the third already being under press, will contain the results of the second journey of M. Potanin in Mongolia; the work of N. M. Prshevsky, "Travels in the Deserts of Central Asia" will consist of six volumes, with more than 120 drawings and maps, four volumes being devoted to the zoology, botany, and geology of these countries; the first volume is already finished by the author, as well as several parts of the following volumes:—An interesting map of Jungaria, drawn up by the Swedish Lieutenant Renat in the eighteenth century, after several months' imprisonment by Kalmuks, was published last year by A. S. Maksheef. Finally, the "Report" mentions also a series of pamphlets, in French, published for the Geographical Exhibition at Venice, which contains very good reviews of scientific work done in Russia in hydrography, zoo-geography, botanical geography, geology, and statistics during the last five years.

The ninth volume of the Memoirs of the Society for the Physico-Geographical Section contains an excellent work by A. W. Kaulbars on the delta of the Amu-daria—unhappily without the atlas of maps and drawings, which the Society was unable to publish. The tenth volume will contain the materials collected by the expedition of Karelin in 1830, which are not yet published.

### PRELIMINARY NOTICE OF THE RESULTS ACCOMPLISHED IN THE MANUFACTURE AND THEORY OF GRATINGS FOR OPTICAL PURPOSES<sup>1</sup>

IT is not many years since physicists considered that a spectroscope constructed of a large number of prisms was the best and only instrument for viewing the spectrum, where great power was required. These instruments were large and expensive, so that few physicists could possess them. Prof. Young was the first to discover that some of the gratings of Mr. Rutherford showed more than any prism spectroscope which had then been constructed. But all the gratings which had been made up to that time were quite small, say 1 inch square, whereas the power of a grating in resolving the line of the spectrum increases with the size. Mr. Rutherford then attempted to make as large gratings as his machine would allow,

<sup>1</sup> By Prof. H. A. Rowland. (Extract from Johns Hopkins University Circular, No. 16.) Communicated by the Author.