

These two maps are mainly compiled from Dr. Naumann's reconnaissance surveys.

(3) Magnetic map by S. Sekino, representing the isogonic, isoclinic, and isodynamic lines of Japan, constructed from about 200 magnetic observations made at as many different stations.

(4) Map of the great historical earthquakes, volcanoes, solfataras, and hot springs of Japan, by Dr. Naumann and two of his assistants. The relative frequency of earthquakes in different parts of the country is indicated by different shades of brown. The limits of the areas of disturbance of some of the most remarkable earthquakes are likewise given.

B. *Maps Printed and Published.*

(5) Reconnaissance map, Division I., containing the northern part of the main island, from the original survey of Dr. Naumann and his assistants (Tokio, 1884). As already mentioned, this map is on the scale of 1 : 400,000. The mountains are represented by curves of equal height, 40 metres apart. The map is printed in three colours—the mountains brown, the water blue, while the skeleton and writing are black. The surface shape is clearly shown, and the system of representing the mountains is peculiar, and novel at least in a map of such small scale. The curves of equal height are directly used for the production of shades, which latter indicate the amount of slope. Great difficulty was encountered in reproducing this map. There can be no doubt that 40-metre curves applied to a 400,000 scale map represent the utmost limit attainable at present. In the case of an inclination of 45°, which occurs here and there, though rarely, the curves approach each other so closely that a zone of 1 mm. in breadth contains no less than ten lines! There are two different editions of the reconnaissance map—one with Roman, the other with Japanese, lettering. On other grounds all these maps are of interest, for they are the first artistic reproduction of the results of a regular topographical Survey in the far east of Asia.

(6) The three first sheets of the special Survey, showing the topography of the section Yokohama, Idsu, and Kadzusa. Here also there are two editions. Scale 1 : 200,000, and the mountains are shown by curves of equal height 40 metres apart.

(7) Index-sheet, containing the divisions of the whole country into five sections for purposes of the publication of the reconnaissance map, and into ninety sections for the special map. A short statement gives the progress of the Survey up to 1884, while the various signs employed in the maps are explained.

Besides the maps here specified, numerous designs, geological sections, landscape representations, tables, &c., have been made. A large number of practical reports were made for the Government, some of which have been published, but only in Japanese, and they are therefore inaccessible to the rest of the world. Among the papers thus furnished by the Director himself were reports on the waste of ores in Japan, on slate deposits and their utilisation, on Japanese building-stones, on the moving sand-dunes on the coast of Satsuma and how to fix them, on Japanese mineral springs, on the occurrence of gold and copper in various localities, and others.

As to the scientific results obtained by the Survey, they are of much general interest, but it is impossible in the space at our disposal to do more than refer to them cursorily. Those specially interested in the geological work may consult Dr. Naumann's book on the subject, "Bau und Entstehung der japanischen Inseln" (Berlin, Friedländer Sohn, 1885). Almost all systems have a part in building up the colossal mountain-range forming the Japanese islands. The occurrence of Devonian, Carboniferous, Triassic, Jurassic, Cretaceous, and Tertiary, was established by well-characterised fossils. A remarkable discovery of Upper Cretaceous Ammonites was made in the Island of Yezo, which Dr. Naumann proves are identical with Indian species of corresponding age. The considerable collection of Tertiary plants is now being studied by Prof. Nathorst, and his researches promise some interesting results, as appears from some preliminary notes already published by him. A monograph on Jurassic plants by Mr. Yokoyama, one of Dr. Naumann's assistants, will shortly appear. In early Tertiary times the Japanese islands contained numbers of elephants, identical with the celebrated species belonging to the old Indian Siwalik fauna (Dr. Naumann, "On Japanese Fossil Elephants," "Paläontographica," xxviii. 1). Triassic strata have yielded important fossils corresponding to the well-known *Monotis salinaria* of the Alps. Another important result of the Survey is the discovery of Radiolarian slates in almost every part of the archipelago. These are of great age, being probably

older than the Carboniferous limestone, and they are nothing else than hardened mud of the deepest parts of the ocean bottom. Radiolarian mud occurs at present in depths of from 4200 to 8400 metres in the western and central parts of the Pacific Ocean, as ascertained by the *Challenger* Expedition. The mud, as well as the slates, is in great part made up of the microscopic skeletons of Radiolarians, and we learn that at remote periods the conditions at the greatest depths of the ocean have been nearly the same as at present, and that in Palæozoic times a great part at least of the Japanese chain was deeply submerged beneath the sea. Great scientific value must also be attributed to the results respecting tectonic geology, which are perhaps the most prominent of all. The Japanese island chain is one of the finest examples of a mountain-range of unilateral structure; and there cannot be the slightest doubt that it has been shifted by forces acting from the side of the Japan Sea towards the side of the free ocean. Almost all the eruptive and volcanic rocks are confined to a zone facing the Sea of Japan, while the outer zone is for the greater part made up of folded larger masses of Palæozoic and pre-Palæozoic times. Very striking, too, is the great transverse depression, introduced by Dr. Naumann into scientific nomenclature by the name of Fossa Magna, which crosses the main island not far from the capital. It appears that this depression is a kind of fissure or cleft produced by another chain of mountains running from Vries Island to the Bonin Islands. The movements going on in this latter chain may have entered the Japanese chain so as to split it. Some of the largest volcanoes of the country—as for instance the celebrated Fujiyama—issued from that fissure. An inspection of the geological map shows clearly how the advancing folds were stopped by the Fossa Magna, so that they curve back and go around it. Last, but not least, the results concerning the magnetism of the earth may be mentioned. As shown in the magnetic map mentioned above, the magnetic curves are curiously irregular, and these irregularities have an evident connection with those of the geological structure. The Fossa Magna causes the isogonic lines to describe a large irregular curve, like the folds of the geological strata. Dr. Naumann, we believe, is preparing a paper on this subject for the Royal Society, where a fuller treatment of this phenomenon than he has hitherto given may be anticipated.

It is to be regretted that the Japanese Government does not appear sufficiently aware of the importance of a work such as that carried out by its Geological Survey. Its economical value is probably that which would appeal most strongly to a Government, and of its utility from this point of view there can be no doubt. The fundamental ideas with which the undertaking started should be revived: the various sections of the Survey must advance with even step, otherwise the work cannot fail to be irregular and dislocated. It may be hoped, too, that the Japanese will know how to utilise the invaluable experience laboriously collected by the Survey during the past five years.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—An Examination for Minor Scholarships at Downing College will be held early in June. These Scholarships will be awarded for Law, or certain branches of Natural Science. Persons who have not entered at any College in the University are eligible to these Scholarships, which will be of the value of 50*l.*, and tenable until their holders are of standing to compete for a Foundation Scholarship. Further information will be given by the Tutors of the College.

SCIENTIFIC SERIALS

Archives Italiennes de Biologie, tome vii., fasc. 1, Rome, February 1886, contains:—Studies on the drainage of the Roman Campagna, part 5, by C. Tommasi-Crudeli, concludes with the expression of his opinion, based on very numerous facts—(1) that the proposed artificial draining of the Ostian and Maccarean marshes, and their reclamation, will augment in a great degree the malaria exhalations from these basins; and (2) that the hygrometric condition in which the subsoil of the reclaimed district would exist would render it very probable that such malaria exhalations would be persistent. He believes that malaria is produced on the earth, and not on the water, and when an area is covered with a sheet of water, and while it