

interferes with the continuity of the oceanic deposits, it is abundantly clear from numerous sections that they rest unconformably upon the Scotland series, and are as distinct in respect of age as they are in respect of lithological composition, and a greater contrast in all respects can hardly be imagined than these two formations present.

The oceanic series is more than 300 feet thick, and is divisible into five portions, which, however, blend into one another. These are, in descending order—

(1) Grey siliceous mudstones, consisting chiefly of fine volcanic dust, with a few fragments of siliceous organisms.

(2) Very fine-grained argillaceous earths, often red or pink, but sometimes yellow or buff; these are analogous to modern oceanic "red clays."

(3) Pulverulent chalky marls and earths, being consolidated foraminiferal oozes passing down into calcareo-siliceous earth with Radiolaria; proportion of carbonate of lime, 80 to 44 per cent.

(4) Siliceous Radiolarian earth, consisting mainly of Radiolaria, with sponge spicules and Diatoms, and a small amount of fine calcareous matter.

(5) Calcareo-siliceous earths, with 25 to 40 per cent. of carbonate of lime passing down into purer chalky earth, with 60 to 80 per cent., which is in some places converted into limestone by the infiltration of calcite.

There is a considerable variation in the amount of chalky matter even on what appears to be the same horizon, and within short distances. The whole series is more calcareous in the northern than in the southern part of the island.

Interstratified layers of volcanic sand and dust occur at several horizons, some of them being light grey pumiceous and felspathic sand, and others a mixture of such material with Radiolarian earth stained brown by what seems to be petroleum.

With respect to organic remains, the calcareous earths have yielded *Foraminifera* in abundance, a preliminary examination of six samples by the late Dr. H. B. Brady resulting in the discovery of 81 species. The siliceous earths have furnished the specimen of *Cystechinus crassus* recently described by Mr. J. W. Gregory, and they abound in Radiolaria, as is very well known. Certain marls and limestones on Bissex Hill prove to consist mainly of *Globigerina*.

The bearing of these fossils is discussed with regard to (1) the age, (2) the conditions of depth, at which the deposits were formed. The age is Pliocene, or Pleistocene, while stratigraphical considerations make it most probable that they are of Pliocene date.

The depth of water indicated by the Foraminifera is from 500 to 1000 fathoms, according to Dr. Brady. The *Cystechinus* is considered by Mr. Gregory as strong evidence for a depth of over 1000 fathoms, and is quite consistent with a depth of over 2000; while the Radiolaria are, in Prof. Haeckel's opinion, most nearly allied to those which occur in the deepest parts of modern oceans, *i.e.* about 3000 fathoms.

The coloured clays are remarkable for the almost complete absence of carbonate of lime; they correspond in all essential points to those modern argillaceous oozes which occur at from 2500 to 3000 fathoms, and have little or no carbonate of lime.

The available evidence points to the conclusion that the depth of water varied from 1000 to 2500 fathoms, and there may have been two epochs at which it was over 2000 fathoms.

Radiolarian deposits have for some years been known to exist in Trinidad, and the authors, having obtained samples, are able to announce that these closely resemble the Barbadian earths in general aspect, in chemical composition, and in microscopical structure. Similar earths also appear to exist in Hayti.

Finally, they discuss the changes in physical geography

which are indicated by the existence of these deposits, and their probable equivalent in part of the white limestone of Jamaica; and they infer that the whole Central American and Caribbean region was deeply submerged during the Pliocene period, and that during this time there was open and free communication between the Atlantic and Pacific Oceans. The separation of the two oceans, and the deflection of the Gulf Stream, were changes accomplished by the upheaval of which evidence was adduced in a former paper, and this upheaval is a comparatively recent event.

The minute structure of the rocks is described in reports presented by Mr. W. Hill and Miss C. A. Raisin; the former showing that the Barbados chalk is similar in all essential points to the Chalk of England.

EDUARD VON REGEL.

THE learned and genial Director of the St. Petersburg Botanic Garden, Dr. Eduard von Regel, died on April 27, in his seventy-seventh year. He was the son of a Gotha parson, and developed a taste for gardening while still quite young. During the hours that might have been given to play he was usually engaged at his favourite pursuit in his father's garden. After the usual course of education, he spent several years in various botanic gardens, and about 1842 he was appointed "Obergärtner" in the Botanic Garden at Zurich. Here, in conjunction with Dr. O. Heer, the celebrated palæontologist, one of whose daughters he subsequently married, he at once founded a Swiss journal for agriculture and horticulture, and was exceedingly active in promoting horticulture, both in writing and practically. In 1852 he founded the now well-known and still flourishing *Gartenflora*, which, however, he ceased to edit after 1885. He soon gained fame, and when the important post of Scientific Director of the St. Petersburg Botanic Garden became vacant in 1855, it was offered to and accepted by Regel, and held by him to the last. There he found a wide field for his energy and abilities: but although he accomplished much meritorious botanical work, Russia is far more indebted to him for the improvements he effected in horticulture generally than for his botany. At the time when he first went to St. Petersburg, gardening was at a very low ebb, and the vast strides that have since been made in this industry are very largely due to his untiring efforts. He wrote treatises, introduced superior varieties of fruits, vegetables, and flowers, and succeeded in gaining the influence and support of exalted persons for his projects both botanical and horticultural. It was mainly through his exertions, we believe, that the first flower-show was held in St. Petersburg. This was in 1858, and now such a thing is no uncommon event. He was also instrumental in getting botanists attached to the Russian exploring expeditions in Central and Eastern Asia, whereby the gardens and herbaria, not only of Russia, but of Europe, have been greatly enriched, and botanical science advanced. Regel himself elaborated many of the dried collections thus obtained, besides describing a large number of plants cultivated in the garden from seeds or bulbs sent thither by various travellers. One of the best of his numerous writings is a monograph of the genus *Allium*—"Alliorum adhuc cognitorum Monographia,"—the number of species described exceeding 250, including a large number previously undescribed, the fruits of the explorations in Asia. He was also joint author of an enumeration of the plants collected in Siberia by Semenoff, Radde, Stubendorff, and others. Although gradually declining in health during the last year or so, he continued to discharge the duties of his office; and although not so active with his pen as formerly, he contributed some descriptions of new plants

to the *Gartenflora* as recently as February of the present year. Dr. Regel was the recipient of many honours in his adopted country, and he was elected a foreign member of the Linnean Society of London in 1890. This is the second of her few prominent botanists that Russia has lost within a year.

NOTES.

THE annual meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers, 25 Great George Street, London, on Thursday and Friday, May 26 and 27, commencing each day at 10.30 a.m. Sir Frederick Abel, F.R.S., the President, will deliver an address on Thursday, May 26. The following papers will be read and discussed on the same day, as far as time permits:—(1) On experiments with basic steel, by W. H. White, F.R.S., Director of Naval Construction and Assistant-Controller of the Navy; (2) on the production of pure iron in the basic furnace, by Colonel H. S. Dyer, Elswick Works, Newcastle-on-Tyne; (3) on experiments on the elimination of sulphur from iron, by E. J. Ball, and A. Wingham, London; (4) on platinum pyrometers, by H. L. Callendar, London. On Friday, May 27, the following papers will be read and discussed:—(5) On the manufacture and application of chilled cast iron (Gruson's system), by E. Reimers, Technical Director of the Gruson Works, Magdeburg; (6) on valves for open hearth furnaces, by J. W. Wailes, Calderbank, near Glasgow; (7) on the calorific efficiency of the puddling furnace, by Major Cubillo, Trubia Arsenal, Spain; (8) on a practical slide-rule for use in the calculation of blast furnace charges, by A. Wingham, London; (9) notes on fuel, and its efficiency in metallurgic operations, by B. H. Thwaite, Liverpool.

THE annual meeting of the Society of German Men of Science and Physicians will be held at Nürnberg from September 12 to 18. At the same time and place there will be a meeting of the German Mathematical Association. In connection with these meetings there will be a mathematical exhibition, including models, drawings, apparatus, and instruments used in teaching and in research in pure and applied mathematics. The project has the support of the Bavarian Government, and those who are organizing the exhibition have secured the co-operation of various competent men of science, and of the mathematical departments of some colleges, besides that of prominent publishers and well-known technical institutions. Space will be granted free of charge to exhibitors.

PROF. ELISHA GRAY, Chairman of the Committee on the Electrical Congress to be held in connection with the Chicago Exhibition, is about to visit all the important electrical centres in the Old World. He will attend meetings of the different electrical organizations, and hopes to strengthen the interest of European electricians in the Exhibition.

WE learn from *Science* that Mr. Timothy Hopkins has made provision for the endowment and maintenance of the seaside laboratory at Pacific Grove recently established under the auspices of the Leland Stanford Junior University. The Hopkins Laboratory will be under the general direction of Profs. Gilbert, Jenkins, and Campbell. It will be open during the summer vacation, and its facilities will be at the disposal of persons wishing to carry on original investigations in biology, as well as of students and teachers. Microscopes, microtomes, and other instruments necessary for investigations will be taken from the laboratories of the University.

THE great surgeon Richet has been succeeded in the Paris Academy of Sciences by Dr. Guyon.

NO. 1177. VOL. 46]

THE distinguished mycologist, M. Roumeguère, of Toulouse, died on February 29 at the age of sixty-three. He had been for fourteen years sole editor of the quarterly *Revue Mycologique*, and was the author of a number of mycological works, the best-known being "*Cryptogame illustrée, Champignons d'Europe*," with 1700 illustrations.

AN interesting course of lectures is being delivered in connection with the Palestine Exploration Fund. They are being given in the lecture-room of the Royal Medical Society. On Tuesday, Canon Tristram lectured on the natural history of Palestine. The following are the remaining lectures of the course:—May 31, twenty-seven years' work, by Mr. Walter Besant; June 7, the Hittites up to date, by Dr. W. Wright; June 21, the story of a "Tell," by Mr. W. M. Flinders Petrie; June 28, the modern traveller in Palestine, by Canon Dalton.

THE members of the Geologists' Association will make an excursion to Down on June 18. The directors will be Mr. W. E. Darwin and Mr. W. Whitaker, F.R.S. Having arrived at Uppington, the party will walk up the valley to Green Street Green, where shells and bones have been found in the gravel that forms the bottom of the dry upper part of the valley of the Cray. The walk will be continued through High Elms Park to Down (3½ miles from the station). From Down a short stroll eastward gives a good view of a fine chalk valley. An opportunity will be taken for examining the clay-with-flints which caps the chalk over the higher grounds. The formation of this clay will be discussed, with a notice of Darwin's remarks thereon, and with reference to other like deposits. The general geology of the district will also be described, and the marked features caused by the clayey covering over the chalk, by the fine escarpment of the lower London Tertiaries, and by the London Clay hills beyond. By permission of Mrs. Darwin, the house and grounds rendered classic as the residence of Charles Darwin (Down House) will be shown to members, and Mr. De B. Crawshaw will exhibit specimens of the flint implements that have lately been found over the high grounds of the neighbourhood. Messrs. Allen will exhibit others. The return journey will be made across the Tertiary escarpment at Holwood Park, and then down the dip-slope of the Blackheath Beds, over Hayes Common to Hayes (a walk of four miles).

ON Saturday afternoon, May 28, Prof. H. Marshall Ward will begin at the Royal Institution a course of three lectures on some modern discoveries in agricultural and forest botany.

ORCHID-LOVERS find much to admire in the latest of Mr. William Bull's exhibitions. An enthusiastic writer in the *Times* describes Mr. Bull's orchid-house as "at present a dream of beauty."

EARLY on Tuesday morning some parts of West Cornwall were visited by an earthquake. The *Times* says that in the village of Manaccan, in the Lizard district, the shock was so severe that the villagers almost without exception were awakened from their sleep by the shaking of their beds and the rattling of articles in their rooms. Their houses, too, distinctly shook, and in one case a person who was awakened from his sleep saw the door of his bedroom thrown wide open. At Redruth, some 12 or 15 miles distant, the shock was also felt. At first it was thought there had been an explosion somewhere in the neighbourhood.

DURING the past week a complete change of weather conditions has taken place over the British Isles. The anti-cyclone which had lain over the country with such persistency for several weeks showed signs of giving way on the 12th, and during the two following days a large but shallow depression spread over the kingdom from west and north-west, while the wind shifted to south-westward with unsettled and showery weather. The temperature, though cooler, was somewhat high for the time of