

them habits of industry, has resulted in procuring them not only competence but wealth. All the houses were built of crystalline sulphate of lime, and were roofed with cupolas; from a distance a village looking like a collection of bee-hives. This singular custom is explained by the paucity of wood in that country: in the absence of beams to support the planking of a roof, they substitute a vault or a cupola, using the mid-rib of the palm-leaf for centreing.

It is a curious trait in the inhabitants of Souf, that having no other water than that of the wells, and this water never remaining on the sandy surface of the soil, they have no idea of a brook, or a river, or any other kind of running water.

ABSTRACTS OF BRITISH AND FOREIGN GEOLOGICAL PAPERS.

ON THE ESKERS OF THE CENTRAL PLAIN OF IRELAND. By G. H. KINAHAN, Esq.
(Read before the Geological Society of Dublin, Nov. 11, 1863.)

ATTEMPTS to determine the mode of formation of a deposit from intrinsic physical evidence have lately become much more numerous than they were formerly. It was in this way that Mr. Sorby determined, some years since, the mode of formation of the sand-beds of Hastings, Isle of Wight, Yorkshire, &c., and last year the origin of certain mica-schists, through the occurrence in them of the structure he has designated 'Ripple-drift;' and in a similar manner, Mr. G. H. Kinahan has recently discussed, in a paper read before the Geological Society of Dublin, the nature and origin of the Eskers of the Central Plain of Ireland. His paper is important, chiefly on account of its containing a proposed nomenclature of Eskers, which we cannot explain better than by saying that it is nearly parallel to that of Coral-reefs proposed many years ago by Mr. Darwin; we thus have Fringe-eskers, Barrier-eskers, and Shoal-eskers, as parallel terms to those of Fringing Reefs, Barrier Reefs, and Atolls; but the relation of the last-named terms in each series is less evident than that of the others, and partakes more of the nature of antagonism than parallelism.

Mr. Kinahan thus defines the three classes:—'The Fringe-eskers occur fringing high ground; the Barrier-eskers stretch from one high ground to another; or run out as a spit or bar from high ground; and the Shoal-eskers have been so called, as they seem to be similar to shoals and shifting banks of the present day.'

In case any of our readers may ask the question, What is an Esker? we may define it as a ridge, or rarely a mound, of sand or gravel, heaped up by the action of water, and derived from masses of the same material in close proximity to it. These masses, though they occur elsewhere, are most abundant in Ireland, where they have received the name of 'Esker;' they are analogous to the sand-banks, harbour-bars, shoals, &c., now in process of formation, through the antagonistic action of tides and currents causing the accumulation of bottom-material at particular points.—H. M. J.

SUR LA CRAIE GLAUCONEUSE DU NORD-OUEST DU BASSIN DE PARIS. Par M. HÉBERT (Comptes Rendus), 7 mars 1864.

THE author proposes to describe this deposit as it occurs in a triangular area, the base measuring about $37\frac{1}{2}$ miles, from Fécamp to Trouville, and the perpendicular 81 miles, from Trouville to Vernon. The lower member of the deposit rests on the Gault, or on the Neocomian conglomerate, and is distinctly marked by the occurrence of the characteristic sand; in the former case the Gault concretions are mixed with the bottom Greensands. There are eight horizons, with a total thickness of 82 yards. They form two divisions, the lower being separated from the upper by a slight stratigraphical break. The various subdivisions are connected by common fossils and similarity of mineral character. The upper limit of the Upper Greensand in this district is also sharply defined; the beds being separated from the Chalk-marl by a break, indicating an intermediate elevation of the sea-bottom. A characteristic species, however, of the upper beds of Upper Greensand, *Pseudodiadema variolare*, has been found by the author, with *Hemiaster Verneuilli* (a Chalk species), in the Chalk-marl on the right bank of the Seine.

The Upper Greensand is found on the northern coast of Calvados, near Trouville, at the height of about 330 feet, capping first the Jurassic rocks, and afterwards the ferruginous sands of the Lower Cretaceous rocks. Dipping ENE., it is seen about half-way up the cliff at Havre and Honfleur; the dip throughout being from one to ten in a thousand. Dipping continually in the same direction, the upper beds, at first denuded, are gradually brought into view; and the beds are buried under the overlying deposits, and lost sight of at the surface about a mile and a quarter to the west of Étretat. They reappear, by a fault, at Lillebonne.

Besides the known disturbances by which this formation has been affected, the author describes a fault at Villequier, on the right bank of the Seine, where the sands are brought up to 264 feet above the sea. This very considerable upheaval forms an amphitheatre round the village of Villequier, and the beds are on a NW. and SE. anti-clinal, dipping away about 45° to SW. and 30° to NE.—D. T. A.

DIE STADT UND UMGEBUNG VON OLMÜTZ. EINE GEOLOGISCHE SKIZZE ZUR ERLÄUTERUNG DER VERHÄLTNISSSE IHRER WASSERQUELLEN. VON HEINRICH WOLF. [The Town and Vicinity of Olmütz: a Geological Sketch in Explanation of the Conditions of their Water Supply.] (Jahrb. k. k. geol. Reichsanst. vol. xiii. 1863.)

GREAT difficulty having been experienced within the last thirty years in obtaining drinking water for the garrison and town of Olmütz, attempts were unsuccessfully made from time to time on a large scale to discover a supply by boring in the artesian method. These attempts were made without any idea of the geological conditions. The author submits an account of the geology to prevent future experiments, the failure of which may be readily predicted.

The tower of the Rath-Haus in Olmütz is 810 feet above the sea, the wooded heights to the west are 1,386 feet; and these heights extend southward for some distance. To the east we have the

Heiligenberg (1,200 feet, the source of the Oder), and Na-Wartie (984 feet). To the north is the Bradlstein (1,884 feet), connecting the district with the Moravian mountains, which are structurally the same. The heights of the plateau within this ring appear, from the map accompanying the author's memoir, to vary from 720 to 850 feet. The valleys with which the plateau is intersected, and in one of which Olmütz is built, are about 650 feet above the sea.

The author considers that an elliptical boss of granite, a little to the south of the town, is the geological cause of the want of success in boring for water. The hills around are covered for some distance with loess, beneath which Miocene beds, Culm-schists, Devonian limestone and sandstones, clay-slate and granite exist, coming out on both sides; but lines of disturbance, connected with the presence of the granite, are traceable. Thus the Devonian rocks are thrown off to the east at Na-Wartie, and to the west at Kosirzberg, while midway they dip on the north side to the north, and on the south side to the south. A succession of crystalline metamorphic rocks, forming zones of quartzite, clay-slate, and mica-slate, conduct to the granitic axis. The correctness of this view, which is very imperfectly illustrated by surface-geology, is proved by the borings made at various points.

There is a considerable thickness of marine strata of the Miocene period in the neighbourhood of Olmütz; the important deposits of the Danube Valley, belonging to this part of the Tertiary epoch, extending in a narrow tongue a little beyond the town up the valley of the March. At more than 850 feet above the sea, lying on Devonian limestone, and not unfrequently faulted, there are sandy limestones, from one to four feet thick, containing *Cerithium rubiginosum*, *Tapes gregaria*, *Panopæa Menardi*, and *Anomia costata*.

D. T. A.

SULLE PIANTE FOSSILI DEL TRIAS DE RECOARO, RACCOLTE DAL PROF. A. MASSALONGO OSSERVAZIONI DEL BARONE ACHILLE DE ZIGNO. (Memorie dell' I. R. Istituto Veneto di Scienze, Lettere, ed Arti, vol. xi. 1862.)

THIS memoir consists of thirty-one pages of descriptions of species of Plants collected by the late Prof. Massalongo from the Triassic strata of the Recoaro district, and is illustrated by ten plates of figures of the species. The species described, thirteen in number, twelve of which are new, are the following:—

Equisetites Brongniarti (?), <i>Unger.</i>	Taxodites Saxolympicæ, <i>Massal. MS.</i>
Caulopteris? Maraschiniana, <i>Mass. MS.</i>	Araucarites Recubariensis, <i>Mass. MS.</i>
C. Læliana, <i>Massal. MS.</i>	A. Massalongi, <i>Zigno.</i>
C. Festariana, <i>Massal. MS.</i>	A. pachyphyllus, <i>Zigno.</i>
Æthophyllum Fœtterlianum, <i>Mass. MS.</i>	Haidingera Schauerothiana, <i>Mass. MS.</i>
Echinostachys Massalongi, <i>Zigno.</i>	Taxites Massalongi, <i>Zigno.</i>
	T. Vicetinus, <i>Massal. MS.</i>

The author arrives at the following conclusions:—

1. That in the Trias of the Basin of Recoaro there exist two different floras, one characterizing the 'Lower Sandstone' overlying the mica-schist, and the other peculiar to the 'Upper Sandstone, Marl, and Limestone.' The first is distinguished by the remains of

Equisetites, *Caulopteris*, *Æthophyllum*, *Haidingera*, and *Taxites*; the second by that of *Araucarites* and *Taxodites*; and species of one fauna are not found in association with those belonging to the other.

2. That the genera *Taxites* and *Araucarites*, species of which have not hitherto been found below the Lias, occur also, and very abundantly, in rocks of Triassic date.

3. That the occurrence of the genera *Æthophyllum* and *Haidingera*, characteristic of the Bunter, in the 'Lower Sandstone' of Recoaro, leads to the inference that all the rocks between the mica-schist and the Jurassic strata, in the valleys of the Leogra and of the Agno, belong to the Trias.—H. M. J.

Discovery of a New Geological Epoch in the Quaternary Formations.—MM Garrigou and L. Martin have forwarded to the French Academy a long paper upon the epoch of the Aurochs, and that of the Reindeer, as established by their attentive study of the cave of Lourdes, in the Hautes-Pyrénées. Two years ago this cave was the subject of an interesting and detailed investigation by M. Alphonse Milne-Edwards, of which the results were published in the 'Annales des Sciences Naturelles.' M. Lartet and A. Milne-Edwards visited this Quaternary formation, studied its fossils with great care, and described it as belonging to the age of the Aurochs; and they have proved in a very satisfactory manner that man inhabited this cavern during that palæontologic epoch. MM. Garrigou and L. Martin have recently visited the same locality, and the results they now make known are very singular. The careful examination of the bones collected at the upper part of the cavern already explored by the naturalists above-named gave results identical with those of MM. Edwards and Lartet. The presence of bones of the Aurochs, the existence of bones of domestic animals, some bones that had been gnawed by a dog, the presence of nearly the entire normal amount of gelatine in these bones, their comparatively light colour, the discovery of a bone delicately sculptured, all prove that the authors were dealing with the *epoch of the Aurochs*, of which man must have been a contemporary; and also that this *upper portion indicates a geological epoch essentially different from the lower strata in the cave*. As regards the lower portions of the cavern, the presence of bones of the Reindeer in abundance, great quantities of its horns, *coarsely* ornamented objects, flint implements, &c., the reddish-brown colour of the bones, the entire disappearance of their gelatine, and their property of adhering to the tongue, all indicate a more ancient epoch than that alluded to above. This epoch, according to MM. Garrigou and Martin, is *that of the Reindeer*,* which the authors formerly discovered in the cavern of Izeste. The cavern of Lourdes thus furnishes us with the first example of the superposition of two successive palæontologic ages belonging to the Quaternary epoch.—T.L.P.

* See M. Lartet's determination of the 'Reindeer Period,' in his account of the Aurignac Cave, Ann. Sc. Nat. vol. xv. p. 231.—EDRR.