is exposed on the railway a short distance further west, but time did not permit of its examination; so the party pushed on to Dorking station, reaching it but a few minutes before the starting of the return train.

EXCURSION TO CAMBRIDGE.

WHIT-MONDAY AND TUESDAY, JUNE 2ND AND 3RD, 1884.

Director:—PROFESSOR T. McKENNY HUGHES, F.G.S.

(*Report by THE DIRECTOR.*)

On their arrival, the members met in the Woodwardian Museum, where they were received by the Woodwardian Professor, the Rev. Osmond Fisher, F.G.S., Rector of Harlton; the Rev. E. Hill, F.G.S., Fellow and Tutor of St. John's Coll.; Dr. R. D. Roberts, F.G.S., Fellow of Clare Coll., and University Lecturer on Geology; Mr. J. E. Marr, F.G.S., Fellow and Lecturer on Geology, St. John's Coll.; Mr. A. Harker, F.G.S., Demonstrator in Petrology; Mr. Thos. Roberts, F.G.S., Assistant to the Woodwardian Professor. Under their guidance, the Association, in groups, according to the various branches of the subject in which they were interested, spent the greater part of the day, examining the Geological Museum.

The collections date from the middle of the 17th century; the oldest being that of Agostino Scilla, described in his work '*La Vana Speculazione disingannata dal Senso*,' which was published in 1670. This collection was acquired by Dr. Woodward, who continued to accumulate specimens of "native" and "extraneous" fossils in illustration of his views as to their origin until his death, in 1728, when he bequeathed most of them to the University. No great addition was made till the time of Sedgwick (1818-1873), who made the museum what it is—one of the richest educational museums in the world.

Mr. Marr explained the arrangement of the Cambrian and Silurian fossils, a collection which had been much enriched by the President of the Association (Dr. Hicks). Mr. Harker, assisted by Mr. Small, drew attention to some of the more interesting petrological specimens, and exhibited a series of illustrative slices under the students' microscopes.

The Association then examined the stones employed in some of the more important buildings. The Mineralogical Museum was

next visited, where Mr. Solly pointed out the more interesting specimens. This museum was in great part formed and arranged by Professor Miller, whose crystallographic system is still followed in Cambridge, and is gaining ground everywhere else.

From this the Association crossed to the Museum of Zoology and Comparative Anatomy, where Dr. Gadov explained the arrangement, and gave a sketch of the osteological characters of several of the more uncommon and interesting forms.

The next day the Association examined the geology of the neighbourhood, the general character of which may be seen in the accompanying section (Fig. 1), which is drawn across the country seen by the members of the Association from the top of the Gogmagogs.

Below them lay the Cam, with its small, sluggish tributaries and broad, alluvial meadows, under which peat was obviously the sub-soil along the more northern reaches, as shown by the black colour of the ploughed land beyond Fen Ditton, while gravel filled the valley about Cambridge. Banks and terraces of gravel stood out here and there, some of it resorted in recent times, but some of it representing patches of the old Mammoth Gravel which had not been altogether swept away. Remains of Mammoth were not uncommon about Chesterton, for instance, but it was not always possible to determine whether or not they had been washed out of older gravel. These beds were seen by the Association on Midsummer Common, and the peat was crossed between Barnwell and Cherry Hinton.

Along the margin of this alluvial plain terraces of an older gravel were observed, which was more closely examined in the Barnwell Gravel-pits.* This same deposit was seen also in the great Gault-pits lapping over the edge of the Chalk Marl, but here it was composed almost entirely of Chalk, so that it was difficult at first to distinguish the chalky deposit which belonged to the gravel from the underlying Chalk Marl, except where scattered gravel flints were seen in it.

Even in the large Gravel-pits which are further from this small boss of Chalk there is still such a large quantity of Chalk that the surface was seen to be weathered out into pipes and pans by the acidulated water, just as the surface of the Chalk itself is acted upon under similar conditions. In pits on the other side of the

* For a list of the fossils see 'Geol. Mag.,' October, 1883.

FIG. 1.—DIAGRAM SECTION FROM ELSWORTH, BY CAMBRIDGE, TO BALSHAM.

(Vertical scale about 800 feet to an inch. Length of Section, 21 miles.)

hill, nearer Stourbridge Common, this gravel rests on Gault with a very sharp line of demarcation.

FIG. 2.—Scale 20 feet to 1 inch.

<i>a.</i> Surface soil and residuum of decomposed chalk-gravel.	<i>c.</i> Chalk Marl.
<i>b.</i> Barnwell gravel, consisting almost entirely of chalk at <i>b'</i> .	<i>d.</i> Cambridge Greensand.
	<i>e.</i> Gault, with lines of phosphate nodules.

A still older gravel was visited on the top of the Gogmagogs, where also the Boulder-Clay and a stony superficial deposit, the result of the winnowing of the Boulder-Clay, were seen. Around were the Chalk hills, and in the distance, to the north and west, the Lower Cretaceous and Jurassic series rose in gentler elevations. In this walk the outcrop of the Melbourne Rock was crossed, but only a few fragments that might belong to that zone were picked up.

The Chalk between the horizons of the Melbourne Rock and the Totternhoe Stone was well seen in the Great Quarry near Cherry Hinton. Its curious curved joints, often mistaken for bedding, were pointed out, and members obtained a few characteristic fossils.

FIG. 3.—Scale 20 feet to 1 inch.

- c.* Chalk Marl—*d.* Cambridge Greensand—*e.* Gault, with lines of Phosphate nodules.

The Totternhoe Stone was touched in the wooded hollow which marks the site of an ancient chalk-pit nearer the village. It was recognised by its blocky structure and rough texture. Some fossils were obtained here also. A few feet below it water stood in a well in the clayey beds of the Chalk Marl.

The large brick-pit in the Gault at Barnwell (Fig. 3) was visited by the party on their way out in the morning. There the Chalk Marl was seen to pass down into the basement-bed which is called the Cambridge Greensand, from the quantity of glauconitic grains in it, while the very lowest part, full of phosphatised fossils or phosphate nodules, is known as the phosphate-bed or coprolite-bed. Full lists of the fossils will be found in the works referred to below.

The members examined this bed more carefully, as well as the method of obtaining and preparing the phosphate nodules, in the pits near Stone Bridge, where many fossils were obtained. Here Mr. Thos. Roberts gave a sketch of the life of the period, illustrating his remarks by the specimens just found.

In the Gault itself fossils are not very common, but along some bands many species may be procured (see Price, *op. cit.*). There are in the Gault also beds of phosphate nodules from which, probably, many of the nodules in the overlying basement-bed of the Chalk were derived.

The Gault was the lowest bed visited by the Association. The Lower Greensand and the Jurassic Rocks crop out, as indicated on the section, in the country to the north and west, the features of which were pointed out from the top of the Gogmagogs.

REFERENCES.

MAPS.—Geol. Survey Map, 51, S.W., Solid Geology.

Ditto, with Drifts.

GENERAL.—Mem. Geol. Survey, Explanation of Quarter Sheet, 51, S.W.

BONNEY.—“Cambridgeshire Geology.” Deighton, 1875.

WHITAKER.—“List of Works on the Geology of Cambridgeshire.” University Press, 1873; also in Mem. Geol. Survey (see above).

SPECIAL.—JUKES-BROWNE.—“The Post-Tertiary Deposits of Cambridgeshire.” Being the Sedgwick Prize Essay for 1876.

JUKES-BROWNE.—“On the Relations of the Cambridge Gault and Greensand.” Quart. Journ. Geol. Soc., Vol. xxxi, 1875, p. 256. Supplement, *ib.* Vol. xxxiii, 1877, p. 485.

PRICE, F. G. H.—“The Gault.” Being the substance of a Lecture delivered in the Woodwardian Museum, Cambridge. Lond., 1879.

TEALL.—“The Potten and Wicken Phosphatic Deposits.” Being the Sedgwick Prize Essay for 1873. Cambridge, Deighton.

KEEPING.—"The Fossils and Palæontological Affinities of the Neocomian Deposits of Upware and Brickhill." Being the Sedgwick Prize Essay for the year 1879. Cambridge University Press.

For Jurassic Rocks consult various Papers by Professors SEELEY and BLAKE, and Mr. HUDLESTON. (See above, WHITAKER's List of Works.)

ORDINARY MEETING.

FRIDAY, JUNE 6TH, 1884.

HENRY HICKS, Esq., M.D., F.G.S., President, in the Chair.

The list of donations to the library since the last meeting was read, and the thanks of the Association were accorded to the donors.

The following were elected members of the Association :—

W. D. Carr ; Edwin Charles Harris, B.A. ; Alfred Jacobs ; Isaac Mosley ; V. Perrones Sells, jun. ; Rev. Francis Augustus Walker, D.D., F.L.S. ; A. H. Williams ; Edward Wilkinson ; William White.

The following papers were then read :—

'On some curious excavations in the Isle of Portland,' by T. V. Holmes, F.G.S.

'On the underground waters of England and Wales,' by Charles E. De Rance, F.G.S., Assoc. Inst.C.E.

Publication of the latter paper is deferred.

ON SOME CURIOUS EXCAVATIONS IN THE ISLE OF PORTLAND.

By T. V. HOLMES, F.G.S.

A short notice in the 'English Mechanic and World of Science' of the excursion of the Geologists' Association and Essex Field Club to the Deneholes of Hangman's Wood, last summer, attracted the attention of Mr. A. M. Wallis, a quarryman and fossil collector living in the Isle of Portland. He thereupon wrote to our secretary, Dr. Foulerton, describing and sending drawings of some remarkable beehive-shaped excavations recently laid bare during quarry extensions in Portland, which seemed to him somewhat akin to Deneholes. Having recently visited the Isle of Portland in order to see something of these holes, it occurred to me that a brief account of my excursion might be interesting to the Geologists' Association. There is no mention of excavations such as those to be described in Murray's 'Handbook to Dorset, Wiltshire and Somersetshire ;'