Afterwards the party broke up, most Members going home, but a very small party going on with Mr. Whitaker to Bury St. Edmunds, where they put up at the Angel, of Pickwickian fame.

Next day this select few saw some of the sections of brickearth and gravel near Bury, in which flint implements had been found, and were hospitably entertained to tea at Badwell Friary by Mr. Henry Prigg, who showed them his fine collection of worked flints from the Drift, chiefly from that neighbourhood (to the extent of some hundreds of specimens).

WORKS TO BE CONSULTED.

Geological Survey Map, Sheet 47 (Drift Edition).

Memoir on the above ('Geology of the N.W. Part of Essex,' etc., 1878), in which the Sections are described in detail. Price, 3s. 6d.

In the Memoir on the Geology of Ipswich, etc. (1884), there is a supplement on Sections at Sudbury, pp. 132, 133. Price, 2s.

MARR.—'Geol. Mag.,' June, 1887, pp. 262-270.

Members going to Bury might usefully consult Geological Survey Map, Sheet 51, S.E. (Drift Edition) and the Memoir thereon ('The Geology of Bury St. Edmunds,' etc., 1886). Price, 1s.

EXCURSION TO PLUMSTEAD AND BOSTAL HEATH.

SATURDAY, JULY 16TH, 1887.

Director : J. G. GOODCHILD, F.G.S., H.M. Geol. Survey.

(*Report by* THE DIRECTOR.)

On the arrival of the party at Plumstead Station a move was at once made to the railway-cutting adjoining, where there is a fine exposure of the beds ten or more feet each way from the junction line of the Woolwich Beds with the Thanet Sands. The Thanet Sands here consist of drab or pale fawn-coloured sands, fine in grain, generally without any very evident traces of bedding, and almost everywhere devoid of pebbles of any kind. In this part of the London Basin fossils, as a rule, are conspicuous by their absence; but on the present occasion Mr. Goodchild got out a calcareous concretionary mass from near the top of the formation here, which yielded several casts of *Cucullæa crassatina*, *Cardium semigranulatum*, *Cyprina morrisii*, and several examples of a *Modiola* seemingly different from any yet recorded from these beds in England. The Woolwich Beds (here unusually like the Thanet Sands) are distinguished by their well-defined lamination, by the presence of lines, or beds, of flint pebbles, and by their

generally more loamy character. The line of junction between the two formations is clearly defined by an irregular zone of brown clay containing pebbles, which clay here, as nearly everywhere else, is curiously splashed into the upper part of the Thanet Sands.

From Plumstead Station the party moved by way of the Griffin Road to the fine exposure of the Oldhaven and Blackheath Beds on the Park Estate, bordering upon what was formerly Plumstead Common. Here the upper half of the section showed thick lenticular and false-bedded masses of well-rolled flint pebbles, which represent the Blackheath type of this deposit. The lower part of the section consists of sharp whitey-brown sand, with sparsely scattered flint-pebbles; this part of the section reproducing almost exactly the typical features of the beds at Oldhaven Gap, Herne Bay. The Director called attention to several points of minor interest in connection with these, nearly all having been noticed long since by Mr. Whitaker and others. In the roadway immediately to the north of the section Mr. Goodchild pointed out the *Cyrena*-bed of the Woolwich Series (here less clayey than usual), which happens at this point to have been spared by the denudation of the older strata resulting from the change in physical conditions that seems in so many places to have ushered in the Blackheath and Oldhaven Beds.

After examining an extensive road-cutting in the Blackheath Beds adjoining the last section, and noting the irregularity and false-bedding of their component strata, the party visited several sections in Cage Lane, where recent excavations had left the exposures in as perfect condition as could be wished. Here much discussion arose as to the geological position of a mass of pebble-beds exposed in a deep pit close to the Mission Hall, the Director having been at first disposed to regard these beds as part of the Blackheath Beds let down by the Abbey Wood fault, but having been afterwards led to regard them as talus rolled to the foot of the hill from the pebble-beds forming its summit there. A road-cutting higher up showed the Woolwich Beds very clearly, overlying the Thanet Sands, as in the railway-cutting (eighty or more feet below) which the party had just left. Near the top of the road-cutting is the junction of the Woolwich Beds with the pebble-beds of the Blackheath series, which form the whole of the plateau of the Common above.

When the party had arrived at Plumstead Common attention was called to the origin of the plateau, which there, and elsewhere

in the neighbourhood, had resulted from the exposure by denudation of a large area of the original upper surface of the Blackheath Pebble-beds. The London Clay there had clearly been stripped back a considerable distance from the present outer edge of the sheet of pebbles it once covered; while the denuding force that effected the removal of so large a mass of the clay had left the pervious mass of pebble-beds so exposed, nearly intact. Rain, frost, and wind all seem to produce no effect whatever upon the upper surface of a stratum of this nature. The chief denudation that has affected these beds takes the form of deep, steep-sided, square-edged gullies, or "slades," as they are called. These appear to represent the modified descendants of streams whose initiation dates back at least as far as the time when the London Clay extended all over this part. Some of these slades are certainly older than the brick-earths. Springs, representing the rain-water held up by the first impervious bed below the Blackheath Beds, seem to be the chief agents now at work in undermining the edges of these strata, and several examples of their action were noted on the way.

Opposite Woolwich Cemetery the large sand-pit behind Hope Cottage was examined. Here the whole of the Lower London Tertiaries, from the top of the Blackheath Beds down to the sheet of green-coated flints on the top of the Chalk, could be examined at one view. Mr. Jacobs, the proprietor, very obligingly cleared the lowest part of the section, so that the whole could be seen. The chief feature of interest in the section is the evidence of the removal by denudation of nearly the whole of the Woolwich Beds at this point, before the deposition of the pebble-beds of the next series above. It is evident, from a study of this section and others in North Kent, that what stratigraphical break there is above the Chalk is here in the Lower London Tertiaries themselves, and is not at their base, where its existence seems to have been assumed rather than to have been proved. Mr. Whitaker has long since pointed this out. So far as the palæontological aspect of the question is concerned, the Director was disposed to regard the Thanet Sand fauna as a modified descendant of that of the Gault; less certain forms that remained elsewhere after the close of the Cretaceous period; and less certain others (such as the *Cephalopoda*) which appear to have been exterminated, or to have been driven to distant localities, by the advent of the colder climate characterizing the Thanet Sands period.

In the pit at Hope Cottage attention was directed to the "trail," the Pleistocene beds capping part of the section there being looped and crumpled, much as they are at Erith and Crayford, &c. The pit also showed good examples of intrusive sheets and veins of Pleistocene loam, which the Director regarded as having worked down into the Eocene strata through ruptures caused by the impact of floating masses of ice acting upon the frozen surface of the strata when the Thames (&c.) was dammed back by a southward extension of the Scandinavian Ice Sheet at the close of the Glacial Period.

From Hope Cottage the party wended their way past Wickham brick-pit, through the grounds of Mr. Russell, of Manor Farm, and thence, after a pleasant stroll through the shady walks of Old Park Wood, noting many features of interest by the way, to the place where an *al fresco* tea had been provided. Then, after votes of thanks had been passed to Sir Julian Goldsmid, Mr. Russell, and Mr. Jacobs, for leave granted to enter their respective properties, the party broke up and returned home.

REFERENCES.

Geological Survey Map, Sheet 1, S.W. (Drift Edition).
WHITAKER.—'Geology of the London Basin,' &c.

EXCURSION TO SHEPPEY.

MONDAY, AUGUST 1ST, 1887.

Director : W. H. SHRUBSOLE, F.G.S.

(Report by THE DIRECTOR.)

Being Bank-Holiday it need scarcely be said that the trains were behind time ; consequently Warden Point was not reached till fully an hour after the time contemplated. In the course of the seven-mile drive the ancient Abbey Church at Minster, which dates from the year 664, was passed ; and, shortly before reaching Warden, Shurland Hall, built by Sir Thomas Cheney, in the reign of Elizabeth, was a very noticeable feature in the landscape. At Warden the road terminates at what is left of the parish church-yard, the principal part having gone by degrees to lower levels.

The party then descended to the beach and commenced searching for fossils on the clayey slope, whilst travelling westward. At the eastern boundary of the cliff, the beach is generally nearly or quite destitute of shingle, as the high-level gravel which falls