

Geology and Prehistory from the Train, Oxford-Paddington

By W. J. ARKELL

DURING the years 1941-1943, 'owing to circumstances arising out of the war' it was my lot to make the double journey between Oxford and Paddington and back about 100 times. The following notes are a humble offering to my fellow-travellers, compiled in the belief that to increase sources of interest is proportionately to diminish boredom. By far the most attractive feature are the four maps specially drawn for this purpose in 1943 by Sergeant W. G. Steel, 22nd Photographic Squadron, U.S. Army, from my rough tracings of the relevant portions of eight Geological Survey 1-inch maps. (The railway-line displays an astonishing predilection for sheet-lines.)¹

The section of the journey from Oxford to Reading is described rather more sketchily than the rest because it is already covered by the late Sir Edward Poulton's account, 'The Geology of the G.W.R. journey from Oxford to Reading', published in the *Oxford Magazine*, 17 March, 1886, and reprinted in R. T. Gunther's *Oxford Country*.² To make the account more nearly complete, notes on post-palaeolithic sites have been kindly contributed by R. J. C. Atkinson, D. B. Harden, E. M. Jope, and J. N. L. Myres.

OXFORD TO DIDCOT (FIG. 1)

About 400 yards out of Oxford station the train passes a cemetery on the west side of the line. This was the site of Oseney Abbey, and its outlying buildings extended eastwards under the railway. The main branch of the Thames is crossed just under half a mile from the station. Thereafter the line runs over alluvium for two miles. In the old pit in the angle of the railway and the road leading to Hinksey Hill (right), flood plain gravel was worked for some years under water. South of this the so-called Sandford gorge is entered. The junction of the Oxford Clay and Lower Calcareous Grit sand can be clearly seen from the train on the right side, shown up by a strip of rush grass which runs gradually down to rail level a short distance south of

¹ Mr. Steel was posted back to America before he was able to complete the fourth map, which has been drawn by Miss Gabriel Sowerby. All the maps are orientated to true north.

² John Murray, London (1912), p. 282.

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the refrigerating depot near Kennington church. When the depot was building the site yielded evidence of Roman pottery-making. There were also extensive potteries in Roman days on the east side of the valley, at Littlemore, Rose Hill, Cowley, and Headington.³ Where the Thame and Aylesbury line branches off (left) it enters the opposite side of the valley by a deep cutting at Littlemore. This provides one of the best sections of the Corallian Beds in the district.⁴ The railway company work a quarry in the side of the cutting to obtain moulding sand which is sent to Swindon Works.

Between Kennington and Radley the line runs along the upper edge of the Summertown terrace of the Thames, which is well seen (left), with the Wolvercote terrace on the higher ground (right). At the back (right), 100 ft. above the river, forming a third step, runs a strip of the Hanborough terrace, on which are Radley College and the playing fields. The church stands on the Wolvercote terrace, the station on the Summertown, and the old village on the Northmoor terrace. All the terraces are cut in Kimeridge Clay and spread with limestone gravel. Half a mile west of the station, near Wick Farm, is an important group of 16 Bronze Age barrows. Some, at least, may have been visible as slight mounds when the railway was first built, but ploughing has now obliterated all surface traces.⁵

A mile south of Radley station the Thames is crossed for the second time. The junction between the alluvium and the adjacent Northmoor terrace can be clearly seen from the train (left). Beyond the river (left) the mansion and park of Nuneham stand on a steep timbered bluff formed by the Lower Greensand. On crossing the river, which swings off sharply right towards Abingdon, the line plunges into the Greensand bluff through a cutting, which gradually dies away on nearing Culham station. The cutting formerly showed a good section, to which John Phillips when Professor of Geology was accustomed to bring his students; but only a little red sand can be seen now in rabbit burrows.

From Culham to Didcot is flat Gault country for 3 miles, of which the first half is covered by low-level Thames gravel. In the middle of it the Thames is crossed again at right-angles on its return from the Abingdon loop. It now swings off left to Dorchester and Wallingford, to join the line again near South Stoke. To the left, $2\frac{1}{2}$ miles away across flat fields, the Sinodun Hills (Wittenham Clumps) are seen end-on. They are mainly formed of the Malmstone (Upper Greensand), with summits of Lower Chalk. The low ground to the north, at Wittenham and Dorchester, on both banks of the

³ Cf. *V.C.H. Oxon.*, 1 (1939), 303; and *Oxoniensia*, 1 (1936), 81, 94; vi (1941), 9.

⁴ *Phil. Trans. Royal Soc.*, CCXVI B (1927), 141, fig. 14.

⁵ Several have been excavated in recent years: *Oxoniensia*, 1 (1936), 8 ff.; III (1938), 31 ff.; and others still unpublished.

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Thames, was thickly inhabited in early times.⁶ To the right is a distant view of the Chalk downs around Wantage. The two steps formed by the Lower and Upper Chalk are plainly distinguishable.

DIDCOT TO READING (FIGS. 1 AND 2)

At Didcot the original G.W.R. main line from London to Bristol is joined nearly at right-angles. Near here is the most northerly point to which Brunel was obliged to carry his line to skirt the Berkshire Downs. Spurs from the Upper Greensand run down nearly to the track at Didcot and Steventon stations and are clipped by cuttings; but nothing higher than the Upper Gault was exposed.

On turning south-east along the up main line, the train runs on an embankment and gives a fine view both north and south. To the north the Sinodun Hills now lengthen out to a miniature range two miles long, comprising three distinct summits, each crowned by a clump of trees. The two highest, at the west end, are together called Wittenham Clumps. The most westerly summit (just over 400 ft. O.D.) is sprinkled with Northern Drift and the central one has a well-preserved Iron Age earthwork which is conspicuous from the train. The most easterly summit (Brightwell Barrow) has a patch of Northern Drift on its east slope. The view to the south extends to the downs around Blewbury and Aldworth. The nearest high point is Churn Hill, behind Blewbury, with its clump (516 ft.), which is probably planted on an ancient barrow.⁷ This was traditionally the first place where St. Birinus preached in Wessex.

A mile and a half from Didcot station a cutting a mile long, between North and South Moreton, exposes almost the whole of the Upper Greensand. The west end, which was re-excavated (left) for the installation of sidings in 1940-42, shows micaceous grey clay and marls belonging to the Upper Gault. These can be seen passing up into the Malmstone, which from the train resembles grey chalk. The lower parts consist of bands of malmstone interbedded with grey marls. It here attains its greatest thickness of about 90 ft. and is admirably exposed. Before reaching the first bridge the dip is reversed. The bridge passes over the centre of a flat anticline, marked by a band of hard yellow-stained malmstone. Beyond this the strata roll gently but the general dip to the south-east brings in higher beds of light grey siliceous stone near the second bridge.

⁶ For maps of crop-marks discovered by the late Major Allen from the air see *Oxoniensia*, III (1938), 169 ff.; V (1940), 164 ff.

⁷ *Proc. Prehist. Soc. East Anglia*, VII (1933), 222.

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On emerging from this cutting at South Moreton a splendid view of the Chilterns opens up on the left. Across the flat ground around Wallingford the double escarpment of the chalk shows off its full height. In the centre of the view, at a distance of from 5 to 6 miles, are sheets of solifluxion gravel on the lower platform, which have yielded from pits at Gould's Grove, Turner's Court, Blenheim Farm, and Rumbold's near Ewelme, an interesting assemblage of Abbevillian and Lower and Middle Acheulian implements. At least 65 specimens from these localities are preserved in the Pitt Rivers and Ashmolean Museums.⁸

Adjoining the line, also on the left, is Cholsey Hill, a bare tump of arable Lower Chalk; in skirting the hill the railway required a shallow cutting (overgrown) which exposed the soft green glauconitic sands at the top of the Upper Greensand or base of the Chloritic Marl. Cholsey Hill is the core of an abandoned meander of the Thames, which remains as a low strip of alluvium and valley gravel, crossed twice by the railway on embankments. The eye can follow the course of the old meander southwards from the train. Beyond it to the south-west is Blewburton Hill, an outlier of the downs ringed by lynchets, where traces of Iron Age occupation have been found. On the left, near the start of the branch line to Wallingford, Cholsey church stands alone in the fields, a conspicuous landmark. Late enclosure probably accounts for the open country with few hedges hereabouts.

After crossing the other side of the meander, a cutting in Lower Chalk is entered shortly after passing Cholsey and Moulsoford station. It gives a good exposure of some 20 ft. of the middle part of the Varians Zone, with abundant fossils. Soon after this the Thames is crossed for the fourth time by a viaduct. The gravel terraces to the left, between the railway and North Stoke, contain numerous traces of ancient settlement visible as crop-marks. Hereabouts the north-eastern spurs of the Berkshire Downs close in to the valley on the right at Moulsoford Downs and form the finest scenery on the journey. The ends of the spurs are above the 500 ft. contour and they are backed by land above 600 ft. The coombes are cut in Middle Chalk and the spurs consist of Chalk Rock and the hard nodular Upper Chalk of the Planus and *Cor-testudinarium* Zones. South Stoke church and village are visible close to the line on the right.

The Middle Chalk is well exposed in cuttings, up to 30 ft. deep, just before reaching Goring station. The chalk has a yellowish tinge and the lower parts are full of fragments of *Inoceramus labiatus*. The whole of the chalk exposed probably belongs to the Labiatus Zone.

At Goring the Chilterns close in from the left and the Goring gorge

⁸ *Oxoniensia*, VIII/IX (1943-44), 1.

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begins.⁹ The best part is only three miles long, for the hills break at Pangbourne on the south side, but the north bank (left) retains its picturesque features for twice this distance. The gorge shows well the usual flat flood-plain rising gradually up the spurs in the concave side of bends, and the river undercutting steep wooded banks on the convex side. Hereabouts the

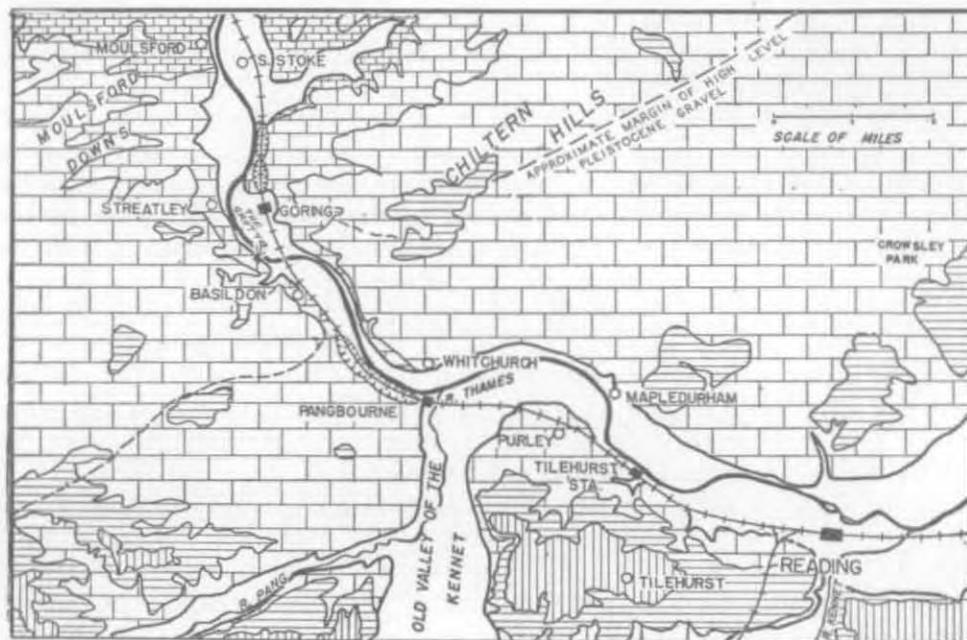


FIG. 2

GEOLOGICAL MAP OF THE THAMES VALLEY FROM MOULSFORD TO READING
 Sc. 1 inch = 2½ miles. Hatchings as in FIGS. 1 and 3.

prehistoric Icknield and Ridge Ways crossed the Thames by several routes. Streatley, on the right bank of the river opposite Goring, preserves in its name the memory of a Roman road, probably the one from Silchester to Dorchester and the north. Half way between Streatley and Upper Basildon (PL. 1), Grim's Ditch abuts on the river to the right near a conspicuous white house called The Grotto¹⁰ (built c. 1768 to 1780), but so far as we know did not

⁹ A. Strahan (1924), *Geology of the Thames valley near Goring*, (Mem. Geol. Survey). This is an excellent short account, with profiles of the Thames from source to sea.

¹⁰ Cf. S. Ireland, *Picturesque Views on the River Thames* (1792), 1, 154; J. and J. Boydell, *History of the River Thames* (1794), 1, 228. The latter book contains many beautiful coloured views by J. Farington.

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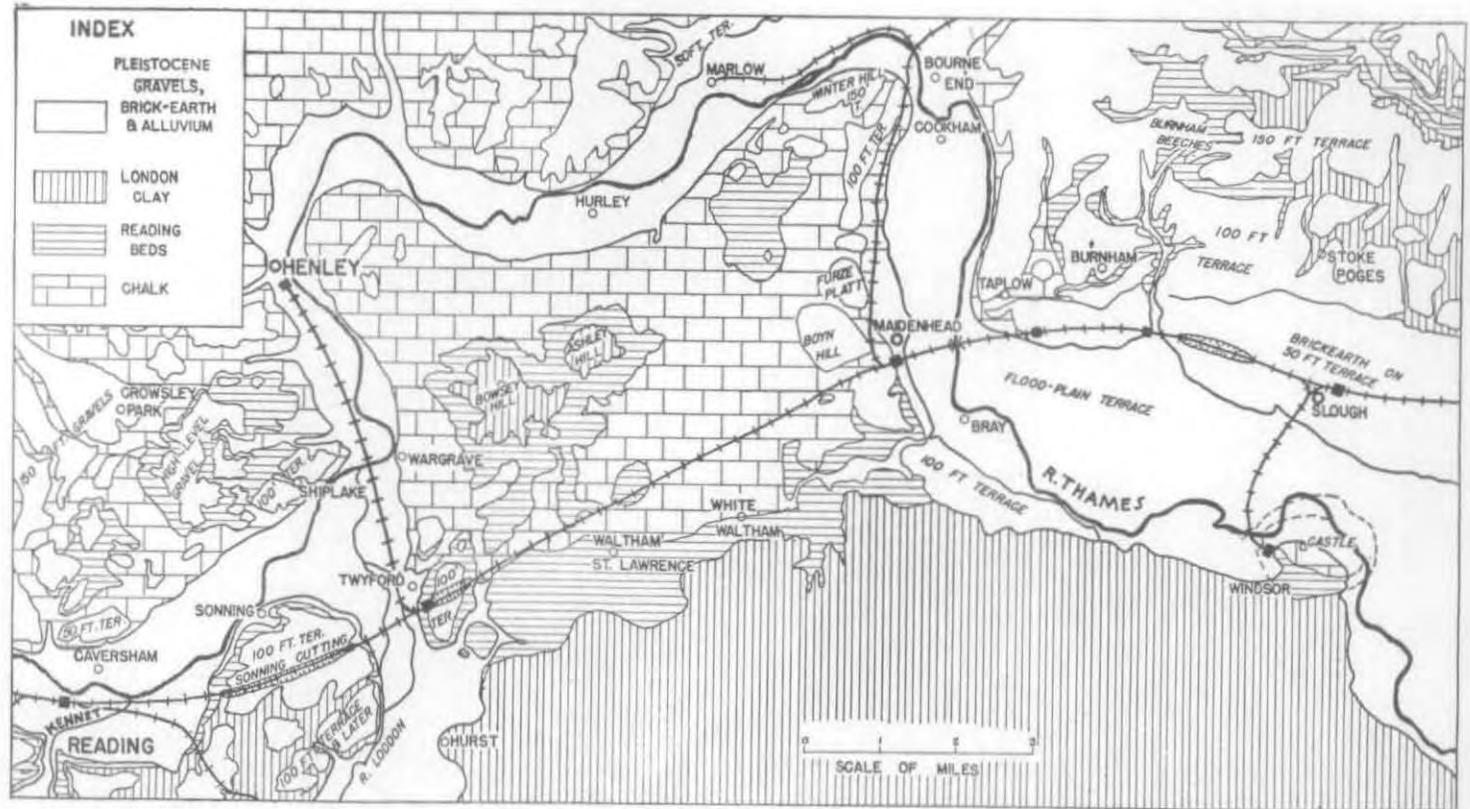
cross it, as the prehistoric ways did. Between Goring and Basildon the Thames is crossed for the fifth time. Before reaching the bridge a large circular crop-mark, indicating an ancient site, was visible in the fields by the river to the left when they were cultivated in 1943. For over a mile between Basildon and Pangbourne the line runs in a deep cutting through Upper Chalk. At the north-west end it is mainly in the Planus Zone, with some *Cortestudinarium* Zone at the top. The splendid vertical section (left) just before Pangbourne station is wholly in the higher zone. The bands of flint are clearly visible from the train, and show a gentle anticlinal flexure, with a small fault of 2 ft. throw.¹¹

At Pangbourne a transverse valley opens out on the right, with a width of nearly a mile. Through it flows the little river Pang to join the Thames, but until late in the Pleistocene it was occupied by the River Kennet, which now delays the union until Reading, five miles farther on.

The hills on both sides of the gorge from here on are thickly mantled with Pleistocene gravels, mainly belonging to the periods of the first glaciation and the first interglacial, and full of Bunter quartzite pebbles brought from the Midlands (Northern Drift). The steep gravel-capped hills on the north side are of Upper Chalk, of which the highest part preserved beneath the Tertiaries is the *Coranguinum* Zone, here about 200 ft. thick. The view across to these hills behind Mapledurham from the stretch of line that runs close beside and high above the Thames between Purley and Tilehurst station should not be missed. The high ground to the south consists of Reading Beds capped with London Clay and gravels and forms a triangular island surrounded by the alluvium of the Thames, Kennet and Pang. On this island, in a gravel terrace 60-80 ft. above the river, and about a mile south-east of Tilehurst station, was the once famous Grovelands gravel-pit, where hundreds of Palaeolithic implements were found, together with teeth and bones of mammoth, horse, deer, and other animals. Most of the implements are in the O. A. Shrubsole and G. W. Smith collections in Reading Museum. The pit is near the barracks, which is easily seen from the train. About 600 or 700 more implements were found on the opposite side of the valley, in a pit now built over, at Toots Farm, Caversham, at a height of 114 ft. above the river. Many neolithic celts have also been found at Tilehurst in the Thames alluvium.¹²

¹¹ C. P. Chatwin and T. H. Withers (1908), 'The Zones of the Chalk in the Thames valley between Goring and Shiplake', *Proc. Geol. Assoc.*, xx, 39; and (1916) *ibid.*, xxvii, 105; A. J. Jukes-Browne, (1900-04), *Cretaceous Rocks of Britain*, vols. 1-3 (Mem. Geol. Survey).

¹² J. H. Blake (1903), *Geology of Reading* (Mem. Geol. Survey), pp. 69-70, with earlier references; Lt. Treacher, *Man*, 1904, 17-19.



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READING TO LONDON (FIGS. 3 AND 4)

Just east of Reading station on the right can be seen some remains of the mediaeval abbey. Dedicated in 1164, it once covered about thirty acres and was one of the most important in England, but little now remains but the restored inner gateway.¹³ A little farther on, where the River Kennet runs under the railway and flows into the Thames, there was an Anglo-Saxon cemetery. For two miles after the train leaves the station it runs on an embankment beside the Thames and gives a good view across the valley to the hills about Caversham on the north bank, and up the beginning of the Henley loop towards Wargrave and Shiplake. The mansion of Caversham Park and to the right of it a big chalk-pit in the Coranguinum Zone are conspicuous. The hills at the back of Caversham are thickly mantled in Pleistocene river gravels. The Thames of the 150 ft. stage (Winter Hill or Silchester Stage) here started on the big northward loop by Henley and Marlow a couple of miles farther north-west than the modern river. Its gravels line an abandoned valley behind Caversham, called the Crowsley Park channel, about 6 miles long and separated from the present river valley by the higher ground of Binfield Heath.¹⁴ From gravel-pits in this ancient channel, chiefly at Farthingworth Green and Kennylands, but also at Caversham Heights and Hernes pit near Henley, Mr. and Mrs. Llewellyn Treacher of Twyford collected over 250 palaeolithic implements, which are among their great collection presented in 1946 by Mrs. Treacher to the University Museum at Oxford. The assemblage of implements from these pits, from gravels in the old channel upwards of 150 ft. above the present river, are of exceptional interest and importance. They give for the first time an idea of the range of Abbevillian and Early Acheulian artifacts that were being made hereabouts at this early stage, presumed to coincide with the first (Günz-Mindel) interglacial period.

The flat in front of Caversham Park and close behind Caversham town is the Taplow terrace, 30-50 ft. above the river. It becomes a conspicuous feature along the sides of the valley from Reading to London, but few implements are known from it and its date is uncertain, though it is provisionally assigned to the third interglacial. At intermediate heights, 70-100 ft. above the river, is the Boyn Hill group of terraces, which from their abundant implements and fauna are proved to have been formed during the second or

¹³ For a sketch of the history of the abbey see *V.C.H. Berks.*, III (1923), 339 ff.

¹⁴ Ll. Treacher (1926), *Proc. Geol. Assoc.*, xxxvii, 440; H. L. Hawkins (1936), *Proc. Geol. Assoc.*, XLVII, 32, with map; S. W. Wooldridge (1938), 'Glaciation of the London basin and evolution of the Lower Thames drainage system', *Quart. Journ. Geol. Soc.*, xciv, 633.

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Great Interglacial (Mindel-Riss). The gravels of this stage (generalized as '100 ft. terrace' on the map, FIG. 3), already met with at Grovelands pit, Reading, cover extensive areas of plateau about Sonning and Twyford and again near Maidenhead. From their home at Twyford Mr. and Mrs. Treacher collected thousands of palaeoliths in the vicinity, especially at Furze Platt near Maidenhead (see below) and at Ruscombe brickyard near Twyford.¹⁵ The size and technique of many of the specimens, of advanced Middle-Acheulian workmanship, are wonderful, and provide a strong contrast with the earlier assemblage from the Crowsley Park channel.

A spur of the 70-100 ft. plateau separating the valleys of the Thames and Loddon is cut through by Sonning cutting which the train enters two miles out of Reading station. It exposed the whole of the Reading Beds, 66 ft. thick, overlain in places by about 10 ft. of London Clay,¹⁶ the whole planed off and overspread by up to 12 ft. of flint gravel belonging to the Boyn Hill stage. The gravel and some of the underlying clays can still be seen here and there when the embankment has slipped. From the gravels Treacher collected several fine palaeoliths when the cutting was being widened in 1891-2.

The making of Sonning cutting was one of the major engineering feats of the original Great Western Railway (PL. II, B). Brunel at first planned to tunnel farther north, but changed his mind. The cutting, completed in 1840, is two miles long and in places 60 ft. deep. It was dug entirely by hand and involved the removal of 700,000 cubic yards of material (as compared with 247,000 cubic yards excavated from Box Tunnel, near Bath). At one time, 1,220 men and 196 horses were employed simultaneously.

After crossing the little valley of the Loddon, which flows north from the heathlands beyond Wokingham to join the Thames at Wargrave, the line enters another cutting at Twyford station, likewise in Reading Beds capped with implementiferous river gravel. This begins an unusually long stretch of 7 miles without a station. It lies mainly over the highest beds of the Chalk (still Coranguinum Zone), but several patches of Reading Beds are crossed, and the cuttings show piping of the chalk at the junction. On the right, in the distance, the Reading Beds and London Clay make a subdued escarpment by Shottesbrook and White Waltham, and on the left outliers form high wooded ground capped with older pleistocene gravels with Bunter quartzite (Bowsey Hill, 454 ft., and Ashley Hill, 475 ft., each about 2 miles north of the railway).¹⁷ The wide spacing of the stations reflects an original

¹⁵ Ll. Treacher (1896), 'Palaeolithic Man in East Berks.', *Berks., Bucks. and Oxon. Arch. Journ.*, new ser. II, 16-18, 39-43; and *Man*, 1904, 17-19 and pl. B. The brickyard cannot be seen from the train but is close to the line on the north side.

¹⁶ J. Prestwich (1848), *Quart. Journ. Geol. Soc.*, VI, 266; and (1854), *ibid.*, X, 88.

¹⁷ Ll. Treacher (1911), *Proc. Geol. Assoc.*, XXII, 287; and (1919), *ibid.*, XXX, 187.

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and still surviving sparsity of population, for this was until lately forest land. The woodlands and heaths about Wokingham merged eastwards into Windsor Forest and northwards into Maidenhead Thicket, a notorious haunt of highwaymen.

At Maidenhead is entered a classic region for the study of Lower Palaeolithic man and the Thames terraces contemporary with him. Boyn Hill, the type locality of the 100 ft. Middle Acheulian terrace, lies on the left of the railway just before the station is reached. It is now covered with buildings. The Wycombe and Marlow branch line can be seen passing into a cutting through the eastern corner of the hill. Behind and adjoining Boyn Hill (but out of sight) is the little plateau of Furze Platt, the type locality for the Palaeolithic terrace intermediate in height between the Boyn Hill and the Taplow.¹⁸ It has yielded many hundreds of palaeoliths at Furze Platt and Cannoncourt Farm gravel-pits (about 75 ft. above the river). The Ashmolean Museum acquired a good series from Cannoncourt Farm in 1941 in the Campbell Thompson collection.¹⁹ The old river gravels rest upon a planed surface of the Upper Chalk. Adjoining the line on the south (right) is an old chalk-pit with Boyn Hill gravel at the top. On this side of the line the terrace forms another plateau nearly a mile long, now mainly occupied by Maidenhead golf-course.

Beyond Maidenhead station the Thames is crossed, for the sixth and last time, by means of one of Brunel's masterpieces, a two-arch bridge with the longest and flattest arches up to that time ever attempted in brickwork (PL. II, A). Each arch spans 128 ft. The river is 100 yards wide, but a gravel shoal in the middle made it possible to build a central pier. The geological map has since shown the reason for the unusual presence of the gravel shoal: the river here has abandoned its old alluvium and carved for itself a new bed in the more ancient Flood Plain gravels on the east side of the valley. To the north may be seen the fine stone road bridge, designed by Sir Robert Taylor and opened in 1777 (PL. II, A).

From the top of Maidenhead bridge can be caught the first glimpse of Windsor Castle, 5 miles to the south-east. At Slough the line passes within little more than 2 miles of it, and the castle, perched on its surprisingly abrupt hill, forms a picturesque feature of the landscape to the south for some miles. The hill is of Upper Chalk and forms an inlier believed to be due to the crossing of two folds, one pre-Eocene, the other post-Eocene, but in any case a small dome of mainly post-Eocene and pre-Pleistocene (probably early-Miocene)

¹⁸ Ll. Treacher, *Man*, 1904, 17-19; and A. D. Lacaille (1940), 'The Palaeoliths from the gravels of the Lower Boyn Hill terrace round Maidenhead', *Antiq. Journ.*, xx, 245.

¹⁹ *Oxoniensia*, vii (1942), 104; Ll. Treacher (1909), *Proc. Geol. Assoc.*, xxi, 201.

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date. The steep slope of the north side, below the castle, is due to undercutting by the river, enhanced by quarrying. An old drawing of the 17th century shows big chalk quarries in the Home Park close to the castle, then still unsloped, but they are now completely grassed over. Half the inlier has been cut away by the river and lies below the Flood Plain gravel. The round tower of the castle is built of squared sarsen stones from the Chilterns, and much of the rest was originally of Oxfordshire stone from Wheatley and Taynton.²⁰

A mile east of Maidenhead bridge is Taplow station, which served as the station for Maidenhead for some months after the opening of the first stretch of the line from Paddington to Taplow on 4 June, 1838, while the cement of Maidenhead bridge was setting. The celebrated pits in the Taplow terrace adjoin the line on the north, close to the station, and the gravel face and some underlying chalk can be seen from the train. Here the Rev. Charles Kingsley and Sir John Lubbock, later Lord Avebury, found a skull of a musk-ox which was figured in 1856 by Owen, and in later years the pit has been visited and figured by the Abbé Breuil as showing typical features of solifluxion. The chalk on which the terrace gravel rests has been sludged by surface thawing on deeply-frozen subsoil and forms the reconstructed paste known as Coombe Rock. Taplow owes its name to a prominent Anglo-Saxon barrow (*hlaew*) which contained a rich burial of the 7th century A.D., no doubt that of a man called Taepa; the finds from it are now in the British Museum.

From Taplow eastwards for a dozen miles the line keeps to the level surface of the Taplow terrace, which is, however, for the most part covered with brickearths 10 ft. or more in thickness, presumably the equivalents of the Crayford brickearths. The country is here arranged in a series of great gravel steps like those at Radley but on a vastly bigger scale, each step representing a southward migration of the river. For many miles to the north the Tertiary rocks and Chalk are planed off and mantled in the early Pleistocene high-level gravels of pre-Palaeolithic dates. At the lower edge of the series, at Burnham Beeches, about 2½ miles north of the line is a strip of the 150 ft. terrace; south of this is a strip of the Boyn Hill and Furze Platt terraces, about a mile wide (the famous palaeolithic gravels of Lent Rise are worked only half a mile north of the line);²¹ then comes the Taplow terrace and its brickearths, on which the railway runs; and finally to the south a wide belt of Flood Plain gravels partly covered by alluvium, where the river swings away south-east past Windsor and Staines to Chertsey and Weybridge. The total extent of the lateral migration is 8 to 12 miles.

²⁰ H. Dewey and C. E. N. Bromehead (1915), *Geology of Windsor and Chertsey* (Mem. Geol. Survey); W. H. St. John Hope (1913), *Windsor Castle* (2 vols.).

²¹ A. D. Lacaille (1939), 'The Palaeolithic contents of the gravels at East Burnham, Bucks.', *Antiq. Journ.*, xix, 166.

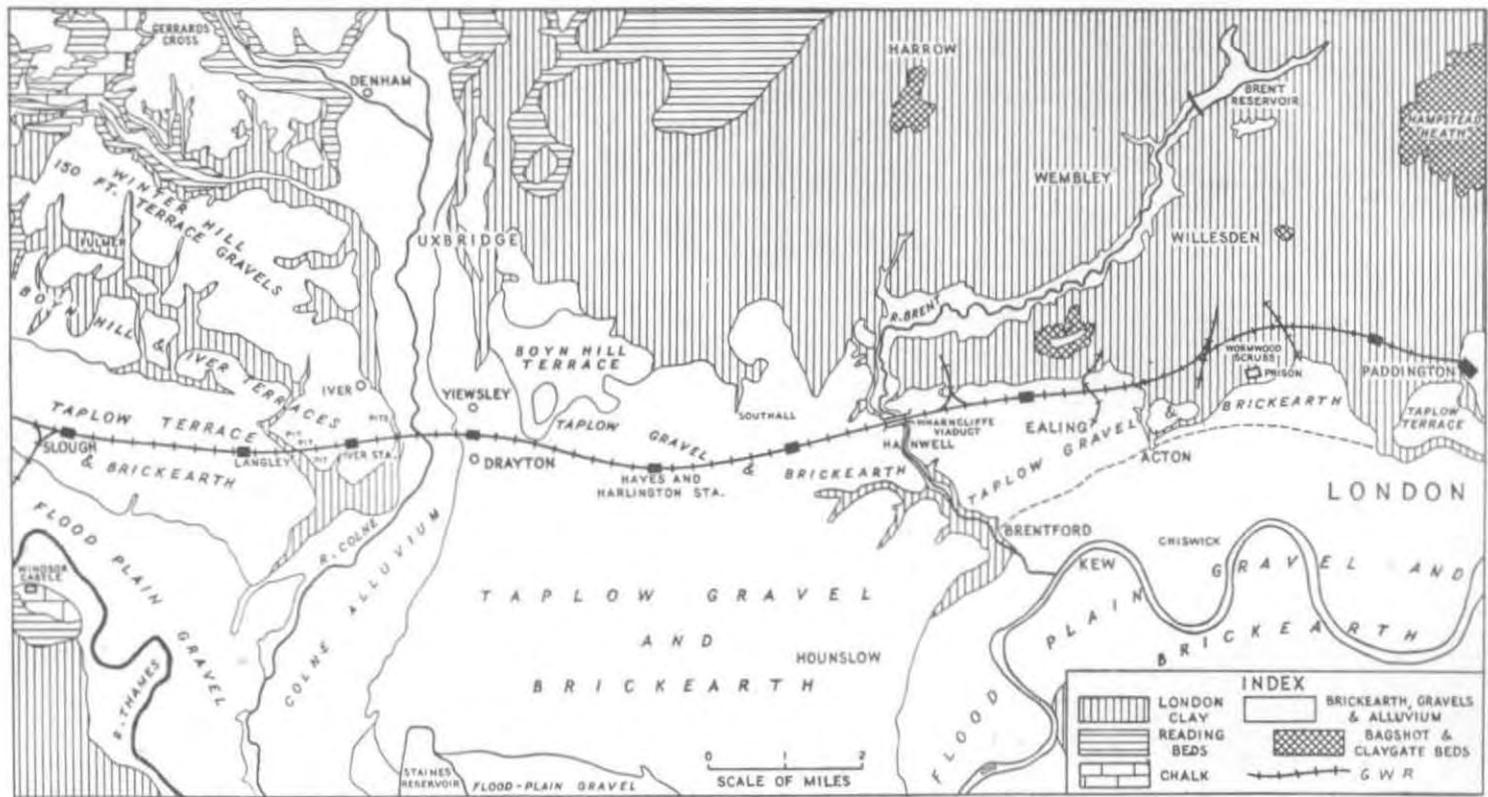


FIG. 4
 GEOLOGICAL MAP OF THE THAMES VALLEY FROM SLOUGH TO LONDON
 Sc. 1 inch = 2½ miles.

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The brickearths, which are very fertile for market gardening, are sectioned to 8-10 ft. in the cuttings at Slough, where the line to Windsor branches off, and are worked for bricks north of the main line at Slough and adjoining and south of the line near Langley (the train gives a view into the brickyard). They consist of structureless loam resembling London Clay, from which they are probably in the main derived. They are of several ages and may be partly subaerial (especially those that overlap the Boyn Hill terrace), though probably formed chiefly in slack-water beside the river in times of flood, probably following a rise of base-level.²² Eton College set up its own brickyard and kilns at Slough in 1442.²³

Close to the railway 3-4 miles east of Slough, near Iver station, is a group of pits opened in the brickearth and underlying gravel of a terrace mapped with the Boyn Hill series, but younger and resting on a bench shelving from 80 ft. to only 40 ft. above the river. These pits have yielded many palaeoliths and much information to the researches of Mr. A. D. Lacaille and Dr. K. P. Oakley. From the Iver terrace gravel they obtained early Levallois flakes and derived artifacts of late-Middle Acheul date, and in the base of the overlying brickearths they collected Middle Levallois artifacts like some found previously in the Taplow terrace. The Iver terrace is overlain by a solifluxion gravel correlated with the Coombe Rock below the Taplow terrace.²⁴

Between 4 and 5 miles east of Slough, just before reaching West Drayton, the line crosses the River Colne, which with its tributaries drains the Chiltern dip-slopes and flows south to join the Thames at Staines. Down the Colne valley also comes the Grand Junction Canal, built about 1805 to link London with the Midlands and North. The line runs beside it (left) from West Drayton to near Hayes and Harlington station.

Beyond the Colne valley the Taplow gravels and Crayford brickearths attain an enormous development, the railway running over them for the next 6 miles to beyond Ealing. The width from north to south is as much as 7 miles. At Ealing a nearly complete skeleton of mammoth was found in the Taplow gravels. In this stretch there is little to be seen except where the line crosses the valley of the little River Brent by the Wharncliffe viaduct, from the top of which a good view opens up to the north to Harrow hill (the name of which is derived from Old English *hearg*, a pagan Saxon holy place). The hill is composed of an outlier of Claygate Beds and Bagshot Beds surrounded by gravel-free London Clay. The viaduct (named after Lord Wharncliffe,

²² W. B. R. King and K. P. Oakley (1936), 'The Pleistocene succession in the lower parts of the Thames valley', *Proc. Prehist. Soc.*, new ser. II, 52.

²³ R. Willis and J. W. Clark, *Architect. Hist. Univ. Camb.*, 1, 384.

²⁴ A. D. Lacaille and K. P. Oakley (1936), 'The Palaeolithic sequence at Iver, Bucks.', *Antiq. Journ.*, xvi, 420.

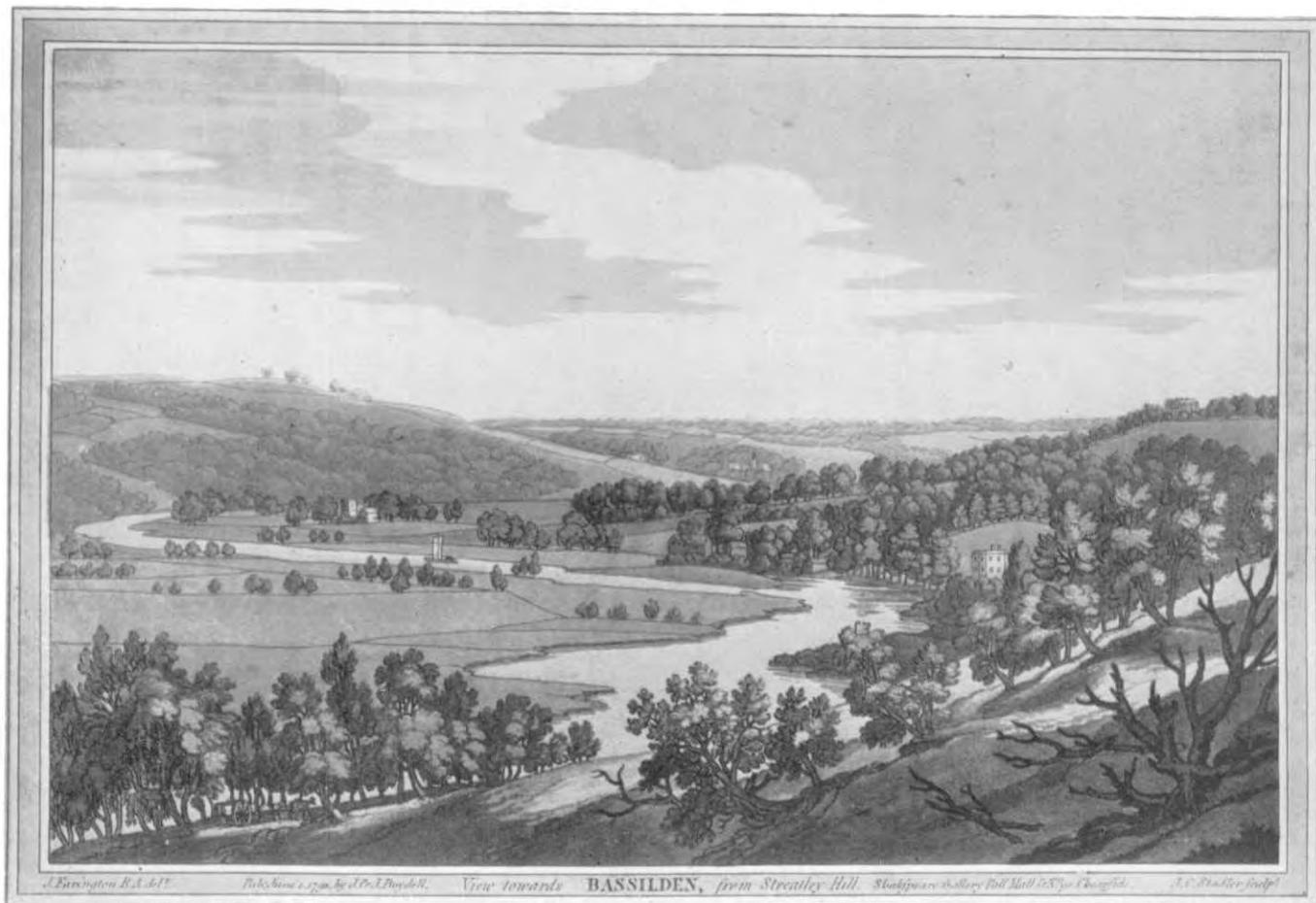
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chairman of the committee that passed the Great Western Railway bill through the House of Lords), is the earliest of Brunel's great works, completed in 1837. It has since been doubled in width and still carries the heavy main-line traffic. It consists of 8 arches resting on twin hollow piers which penetrate through the gravel and 3 feet into the London Clay. The height of the rails is 65 ft. above the valley and the length of the viaduct is 900 ft., with a mile and a half of embankment at the approaches.

For the last 4 miles of the journey, from Acton to Paddington, the line runs over bare London Clay. Between the third and second last mile a good view opens out to the south over Wormwood Scrubbs (also on London Clay) and across the Thames valley to distant Richmond and Putney Heath.

Paddington Station stands on London Clay, but the arrival and departure ramps lead up on to the Taplow terrace gravels, on the surface of which are built Praed Street and all that part of London between Regents Park and Westminster, and again most of the City. The tube railway at Praed Street Station is excavated in the Taplow deposits, consisting of 10 ft. of sand and gravel, resting on the London Clay, and overlain by up to 6½ ft. of loam. Along Praed Street the tube runs in 13-15 ft. of sand, clay, and gravel of the Taplow terrace, unbottomed, under 3 to 8 ft. of made ground.²⁵

²⁵ For the London district see W. Whitaker (1889), *Geology of London* (2 vols.; Mem. Geol. Survey); C. E. N. Bromehead (1922), *Geology of the London district*, 2nd ed. (*ibid.*; an excellent summary, with references to all the previous literature); and H. Dewey and C. E. N. Bromehead (1921), *Geology of South London*, (*ibid.*). For the history of the railway line, see E. T. MacDermot (1927), *History of the Great Western Railway*, 1, part 1.

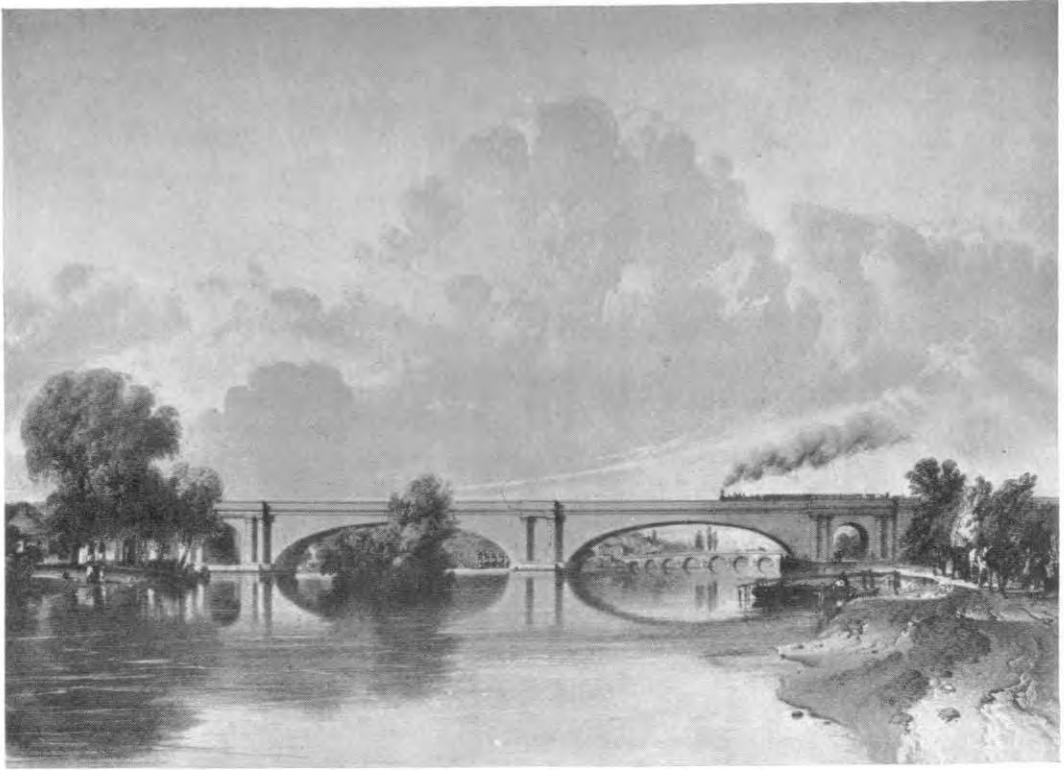


VIEW OF THE THAMES VALLEY TOWARDS BASILDON FROM STREATLEY HILL

The white house called The Grotto is visible in the foreground on the right (p. 6)

After the coloured view by J. Farington reproduced in J. and J. Boydell, Hist. of R. Thames, I, facing p. 228.

PLATE II



A



B

- A. THE GREAT WESTERN RAILWAY BRIDGE AT MAIDENHEAD, BUILT BY BRUNEL (p. 11)
B. THE CUTTING ON THE GREAT WESTERN RAILWAY AT SONNING, BERKS. (p. 10)

From views taken about 1840, by courtesy of the Great Western Railway Company.