Notes on the Gravel Terraces of the Bristol Avon

By J. A. Davies, B.Sc. and T. R. Fry.

Mr. Hughes of Shirehampton has put the Society deeply into his debt by presenting to its museum the very interesting series of Palæolithic implements, in flint and chert, found by him in the gravel deposits near his home. While describing Mr. Hughes's implements and the deposit to which they belong, we are taking the opportunity of putting on record a few observations upon other accumulations of river drift in the Avon valley in the hope that they may eventually prove of use to members who happen to be interested in the history of the Avon valley subsequent to the first appearance of man.

It is unfortunate that the Shirehampton implements came from the surface and not from a stratified deposit; but notwithstanding this deficiency in geological provenance we hope to be able to show beyond all shadow of doubt that they belong to the 100-ft. terrace near which they were found, and with this end in view we will consider first of all the evidence from St. Anne's Park. Implements in Greensand chert, of the same Mousterian type as the Shirehampton ones had already been found in 1926 by one of us (T.R.F.) on the surface of St. Anne's Park, among the remains of a partly dispersed gravel deposit at the same elevation above the Avon. All the implements from both localities are fresh and unrolled and look as if they had not been washed far from their beds in the drift.

It is perhaps surprising to hear of a gravel terrace of late Acheulean or Mousterian date at an elevation as great as 100-ft. above the Avon. Let us consider the faunistic evidence of the terrace. Unfortunately no Pleistocene fossils are available for study from St. Anne's Park or Shirehampton, and we are compelled to go to the gravel pits at Twerton, Bath and Freshford, higher up the river; which are all at about the same elevation above the Avon as the Shirehampton and St. Anne's Park deposits. In these localities the characteristic large mammals are Mammoth, Woolly rhinoceros and Horse. (Little or nothing is known about the variety of the horse.) Two molars of *Elephas antiquus* have been found in the Victoria Gravel Pit at Twerton in association with abundant remains of *Elephas primigenius*. Musk Ox was found at Freshford. Now a

very similar fauna was found in the Late Middle Terrace deposits of the Thames at Crayford and Erith, where an Acheulean culture was giving way to a Mousterian one.[1] The 80–120-ft. terrace of the Bristol Avon may therefore be correlated with the 50–60-ft. terrace of the Thames.

In regard to the Low Terrace. One fact about it stands out, and that is that the nodules from this low drift are often fairly large, so large in fact that it is probable that when the containing gravel was brought down the Avon was doing rather more work than it does at present. It might have been as active, say, as the existing streams of the Wye, Usk or Taff. After Low Terrace times the Avon cut down its bed to a depth of 40-50-ft. below O.D., or 60-70-ft. below the level of the Low Terrace.[2] In subsequent times this channel became silted up, and it has been only partially scoured out again by tidal action in comparatively recent times.

Most of the gravel described below is found in the Avon valley, and is probably due entirely to the action of this river. Near Bristol, owing to the restriction of the Conham and Clifton gorges gravel is almost entirely absent; but towards the estuary, owing to the denudation of the softer underlying rock gravel deposits become more abundant. This is also the case between Hanham Mills and Bath, where the Avon has excavated a wide valley in the underlying Liassic rocks. Near Bath there are many remaining elements of terraces clinging to the hillsides at various levels, while between Bradford-on-Avon and Malmesbury, where the river meanders in broad open country, deposits of gravel are more frequent still.

We have very great pleasure in expressing our thanks, first and foremost to Mr. Hughes, whose long search of the Shirehampton gravels has resulted in discoveries of first-rate importance. We are indebted to Mr. J. W. Tutcher for the identification of the derived fossils. We also wish to thank Mrs. D. P. Dobson and Messrs. M. C. Burkitt, R. Fitz-James, M. A. C. Hinton, P. Glover, J. Summerhill and Dr. Wallis for assistance in various ways.

Owing to the fragmentary nature and rolled condition of many derived fossils the specific determinations must be regarded in many instances as approximate only.

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1 For a review of the situation in the Thames Valley, see M. A. C. Hinton, "Pleistocene Mammalia of the British Isles," *Proc. Yorkshire Geological Soc.*, N.S., (1926), pp. 338–340.

2 H. Gaythorne, *Proc. Bath Field Club and Antiquarian Soc.*, Vol. VIII (1901,) p. 294.

PLATEAU GRAVELS.

FAILAND RIDGE.

Gravel of flint and Greensand chert is scattered over the land surface between the Abbot's Pond and Failand Inn (350–500-ft., O.D.). Many of the flint nodules are very fresh and unworn, while others, notably those of Greensand chert, are shattered by frost, and abraded by the action of water.

NEAR BATH.

On Farleigh Down, at heights of 550-ft. O.D., and above, gravel, mostly flint, occurs in pockets, and on the surface.[3] Gravel, mostly surface material, occurs also on the dissected Oolitic plateau South-east of Bath. A section showing a thickness of 3-ft. was exposed near Hinton Abbey in 1920 at 350–400-ft. O.D., and similar material is scattered over the fields at Pipe House, near Freshford (about 450-ft. O.D.) and on Bathampton Down.

While the plateau gravels are composed almost entirely of flint, chert predominates over flint in the 100-ft. terrace. In the 20-ft. terrace the process has been carried on still further ; flint has become rather rare and is replaced by Greensand chert.

SUGGESTED HIGH TERRACE.

At present it is impossible to make out a case for a high terrace corresponding in date with the 100-ft. terrace of the Thames valley, but there are indications that the remains of a terrace exist at a height of 250-300-ft. above the existing stream. At any rate, a list of the localities is worth recording :—

WALTON DOWN.

Near Clevedon, on the summit of the down, a few yards South-west of the Neolithic earthen circles and avenues, the rabbits have thrown up a quantity of very fine flint gravel. 250–270-ft. O.D.

ABBOTS LEIGH.

On either side of the Portishead road, 400 yards north-west of the George Inn, is a gravel of flint and chert which can be traced along the lane towards Glen House. 250-ft. O.D.

AVON GORGE.

Leigh Woods near Stokeleigh Camp, and Black Rocks Quarry (Sea Walls). Rolled, river-worn flint predominates. 250–300-ft. O.D.

3 Prof. Prestwich, *Q.J.G.S.*, 46 (1890) 143. Rev. B. Oriel, "The Avon and its Gravels," *Proc. Bristol Naturalists' Soc.* N.S. 10, pp. 233–240. W. D. Varney, "The Geological History of the Bristol Avon Valley," *Proc. Geologists' Assn.*, 32 (1921), pp. 189–205.

CONHAM.

Surface gravels, seldom showing any thickness, are found lying on the rock terraces on both sides of the Conham Gorge, between 200–300-ft. O.D. These gravels, which are probably the decalcified remains of greater deposits, consist mainly of flint and Greensand chert ; limonite is abundant.

ELSTON.

The presence of a band of coarse, semi-waterworn flint and chert pebbles running across the surface of the ploughed fields west of the church at about 250-ft. O.D. seems to indicate the existence of a gravel terrace.

MIDDLE TERRACE.

SHIREHAMPTON.

A section observed by one of us (T.R.F.) in the Burial Ground this year, at a height of about 110-ft. O.D. is as follows :—

Red loam with broken flint and chert nodules	2-ft.
Red sandy clay, with large semi-rounded blocks of Millstone Grit, Carboniferous limestone and Greensand chert	3-ft.
Interbedded seams of red and white quartzose sand ...	1-ft.
Fine limestone gravel, mainly of Jurassic origin, with a number of Carboniferous pebbles, quartzite and flint	3-ft.

The following derived fossils were found in the gravel here : Inferior Oolite : *Gryphæa incurva*, Sow. ; *Terebratula globata*, Auct., Grt. Ool—*Isastrae sp.* ; *Diastopora michelini*, Haime ; Carb. Lst.—*Michelinia megastoma*, Phill. ; *Lithostrotion martini*, E. and H.

Gravel deposits, containing much flint and chert, which appear to be the results of the degradation of the terrace may be seen whenever excavation permits along Portway, and the roads on either side of it at a height of 70 or 80-ft. O.D. Gravel is scattered all over the lower ground extending down to H.W.M. The Greensand chert is beeswax coloured and resembles in appearance chert from the ballast pits at Broom in Dorset. When the pebbles are unfractured their surfaces are very smooth, as if they had been rolled in loam or brick earth. Hæmatite pebbles are also found frequently.

No fossils of definite Pleistocene date have been found in the deposits in recent years. A hundred years ago John Rutter referred in unequivocal terms to the discovery of elephant bones in the Shirehampton gravel beds.[4]

[4] J. Rutter, *Delineations of North-West Somerset*, 1829, p. 315.

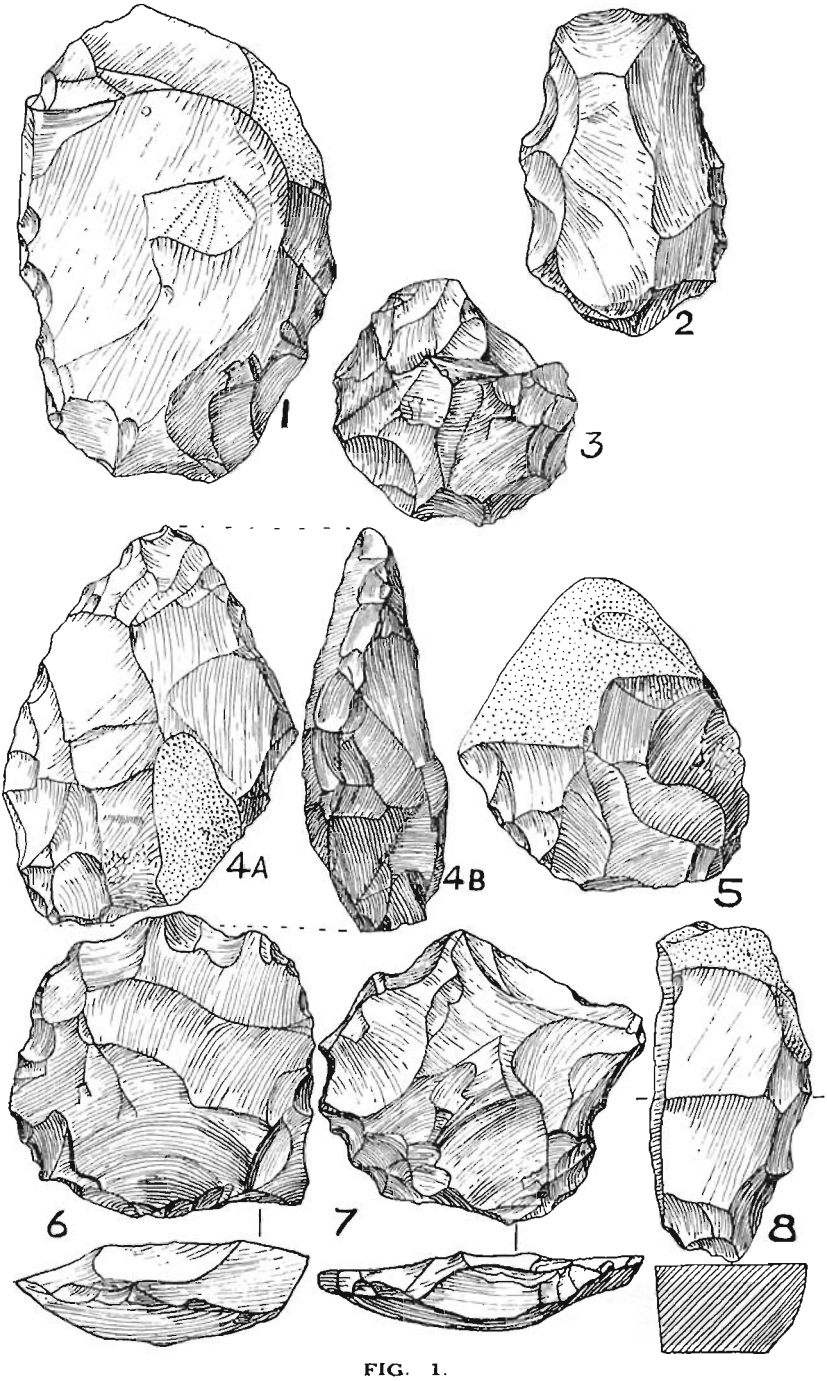

FIG. 1.

Mr. Hughes first discovered Palæolithic implements on the site in 1927. Last November Mr. M. C. Burkitt examined his small but very interesting collection and decided that it was of definite Mousterian date. The few specimens chosen for illustration (see Fig. 1) all came from near the 100-ft. level, with the exception of (5) and (7). Nos. (2) and (8) are *racloirs* or side scrapers. (5) is a small chopper; (4) is the broken half of a very beautiful almond-shaped *coup de poing*. (3) is a small disc broken in manufacture. (6) and (7) are Levallois flakes. Mr. Hughes has also found several cores and a hammerstone. Several points fashioned out of pebbles, with the unchipped skin of the nodule left at the butt to be gripped by the hand have been found on the site. This implement is curiously similar to the characteristic implements of the Mesolithic Asturiansis culture of Portugal. All the implements are unrolled. A slightly rolled hand-axe, which may be Acheulean in date, (1) was found by one of us (T.R.F.) on an allotment next to the burial ground. All of these implements came from the surface.

It is interesting to find that Roman pot-sherds and Bronze-Age flints are abundantly scattered over the surface above the gravels. Mr. Hughes has also discovered a large number of small implements in gravel flint which may possibly be Tardenoisian in date.

HAM GREEN.

A considerable tract of gravel exists here, extending to the South and East of the Hospital. It covers fairly level ground at a height of 100–120-ft. above the river. A thickness of several feet was exposed by the side of the Bristol road at Ham Green, and also in the railway cutting one mile to the North-east. The constituent pebbles are mainly of small Jurassic materials beneath, with a surface of Greensand chert and quartzite pebbles. In spite of a long and careful search no implements have been found.

ST. ANNE'S PARK.

The Bristol Municipal Housing Estate is now rapidly covering this site. Remains of the dispersed terrace occur at an elevation of 60–140-ft. above the Avon. Surface gravel only has been found, scattered very thinly; the pebbles are mostly of Greensand chert with a little limonite and flint. In 1926, after a search of many years, five Mousterian implements were discovered here by one of us (T.R.F.). Fig. 2 (4), is a splendid example of a small chopper or hand-axe. The section is rather fat, the edge is fairly even, the surface is patinated grey and the ridges between the flake scars are iron-stained. From the lower (North) end of Guildford Road, about 60-ft. above

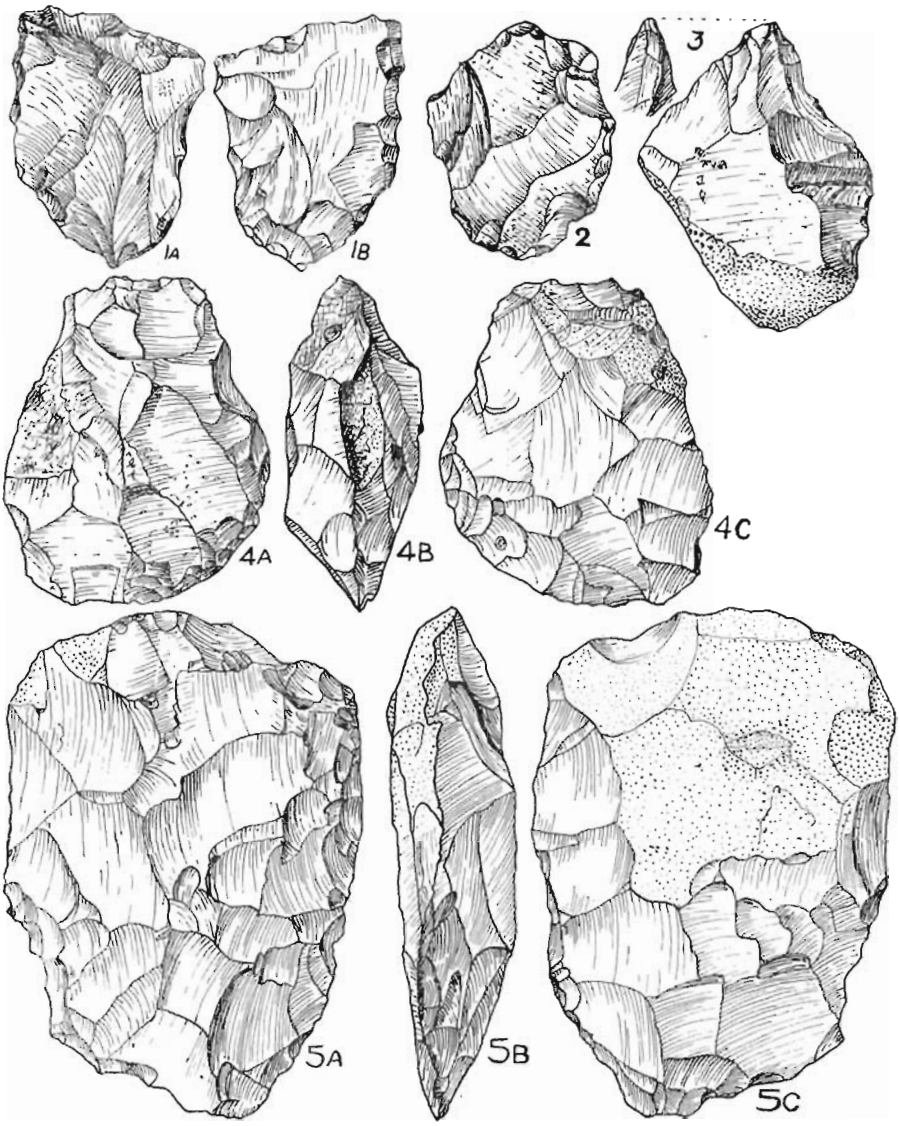

FIG. 2

the Avon. (5) Perfect hand-axe of Acheulean or Mousterian type. A good deal of the skin of the nodule remains near the butt on one face. The other face is patinated. The cross-section is plano-convex. From the slope overlooking the ravine of St. Anne's Wood, at an elevation of about 100-ft. above the Avon. A triangular point with ochreous patina (1), a small worked flake (2) and a point with un-

trimmed butt (3), similar to less elegant examples from the Shirehampton gravels, were all found near the upper end of Guildford Road, about 120-ft. above the Avon.

VICTORIA GRAVEL PIT AND CLAUDE AVENUE PIT, TWERTON.

149-ft. and 152-ft. O.D. respectively; and 100-ft. and 103-ft. above the Avon. Remains of Mammoth, *Elephas antiquus* (very rare), Woolly rhinoceros, Bison and Horse have been found in these pits.[5] The section in the former pit is now the only one available near Bath. Here a varying thickness of gravel and quartzose sand rests on an eroded surface of Lias clay. Local Jurassic rocks are predominant among the included pebbles and O.R.S., Conglomerate and Carboniferous materials occur sparingly, along with a little flint and Greensand chert. *Syringopora reticulata*, Goldf.; and *Lithostrotion martini*, E. and H., were obtained.

LOXBROOK, BATH.

Described by Rev. H. H. Winswood, contained remains of Lion, Irish deer, Reindeer, *Bos primigenius*, Bison, Horse, Woolly rhinoceros and Mammoth.[6]

LARKHALL, BATH.

These gravel beds are said to have been as much as 30-ft. thick. Reindeer, Bison, Horse, Woolly Rhinoceros and Mammoth were found in them.[7]

HARTLIP, BATH.

Lion, Horse, Woolly rhinoceros and Mammoth.[8]

FRESHFORD.

Reindeer, *Ovibos moschatus*, Bison, Horse and Mammoth.[9 10]

STIDHAM FARM, SALTFORD.

A large gravel pit is being excavated West of the farm, about 70-ft. O.D. and 40–50-ft. above the river. These gravels are therefore lower than those described above and probably represent another terrace. The following section has been observed:—

Medium limestone gravel, mostly Jurassic, with some Carboniferous do., Millstone and Pennant grits, flint and chert, in a matrix of quartzose sand. Iron-staining in basal portion ... ... 6-ft.

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5 Rev. B. Oriel, *Loc. cit.*
6 W. Boyd Dawkins, *Proc. Geological Soc.*, 1869, pp. 196–198.
7 *Ibid.* & C. Moore, *Bath Field Club Proc.* Vol 2, p. 44
8 *Ibid.*
9 *Ibid.*
10 See also Charles Moore, F.G.S., *Proc. Bath Natural Hist. and Antiquarian Field Club*, Vol. 2, 1869, pp. 37–55.

Large angular blocks of local limestone and derived lumps of clay ... ... 1-ft.

Base of Lias clay.

The following derived fossils were found : Lower Lias—*Echioceras raricostatoides*, Vadasz. ; *Coroniceras* sp. ; *Asteroceras* cf. *obtusum*, Sow. ; *Promicroceras planicosta*, Sow. ; *P. capricornoides*, Quen. ; *Vermiceras* sp. ; *Polymorphytes* sp. ; *Androgynoceras* sp. ; *Arietites turneri*, Sow. ; *Xipheroceras dudressieri*, d'Orb. Upper Lias—*Grammoceras* sp. ; *Hildoceras hildense*, Y. and B. Greensand—*Exogyra columba*, Lamk. ; *E. conica*, Sow. ; Carboniferous—*Lithostrotion martini*, E. and H. ; *Caninia cylindrica*, Scouler.

HANHAM MILLS.

Similar materials to those in the Stidham Farm Pit also occur in a small element of gravel terrace at Hanham Mills, 200-yds. South-east of the Chequers Inn at a height of 60-ft. above the Avon. The exposure shows that the terrace rests on the Pennant sandstone.

LOW TERRACES.

PORTBURY.

Extensive sheets of gravel occupy the low ground in this neighbourhood, encircling the reclaimed mud flats between Pill and Portishead, and forming a considerable terrace at Sheepway, from which it extends North-east and South-west at an elevation of 20-25-ft. O.D. Many of the pebbles have been smoothed by rolling in sandy loam, but others are found, especially on higher ground, in a round wave-worn condition, and from this latter circumstance it might be supposed that the deposits were laid down by the river in a shallow tidal estuary. Sections are uncommon, but during the laying of a cable, 1927–29 the gravel was exposed to a thickness of 4-ft., consisting mainly of Lias and Oolite pebbles of small size, with many very large pieces of Mountain limestone, O.R.S., Pennant grit and Dolomitic conglomerate. In many places flint and chert pebbles predominated. *Anadacia* sp. and *Gryphoea incurva*, Sow. were found.

SEA MILLS..

Large semi-rounded pebbles of flint and Greensand chert were turned out in 1921, during the digging of a culvert under the path on the West side of the ramp up to the Portway bridge on the South bank of the Trym. A good many horse bones came up with the chert. Judging from their condition they did not belong to the Roman occupation of the site. The top of the terrace would be about 10-ft. above H.W.M. The same terrace appears to exist, paired, at Shirehampton and Ham Green, but in the absence of definite sections in these two localities the fact is not quite certain.

CORONATION ROAD, BRISTOL.

During excavations for a pipe-line, January and February, 1929, gravel, consisting mainly of Jurassic limestone, with some flint and chert, was exposed below about 6-ft. of made ground between Clift House and the shipbuilding yard. Another exposure is to be seen near Bath Bridge. About 20-ft. O.D.

KEYNSHAM, SOMERDALE.

Similar gravel to that at Saltford was exposed here during the building of Messrs. J. S. Fry's factories. No mammal remains or implements have so far come to light. The bed is about 38-ft. above the present mean level of the river. Several species of *Ammonites* derived from the Callovian rocks in the neighbourhood of Trowbridge, 14 miles South-east of Keynsham were obtained from the deposit by Mr. G. Usher.[11] A similar exposure, at the same elevation, can be seen by the side of the road, half a mile north of the White Hart Inn.

BITTON.

A gravel pit is being worked at the present time at the lower end of Holm Mead Lane, South-west of Bitton. Part of the pit lies below the flood level of the Avon. Although carefully examined no included bones have been found. The majority of the pebbles are of Jurassic rocks, usually of a similar type to those found on the South slopes of Lansdown. Large 9-in. blocks of Carboniferous limestone are sometimes found which, together with large sub-angular fragments of grit, sandstone and conglomerate have been derived from the drainage area of the Boyd Brook. The following derived fossils have been found: Carboniferous—*Spirifer clathratus*, Mc. Coy.; *Michelinia fasora*, Goldf.; *Lithostrotion martini*; *Caninia cylindrica*, Scouler; *Calamites* sp. Low. Lias—*Androgynoceras* sp.; *Echioceras* sp., Inf. Oolite—*Emelia* sp.; *Montlivaltia trochoides*, E. and H.; Fuller's Earth—*Ornithella triquetra*, Quenst; *Terebratula fullonensis*, Buck.; *Rhynconella curvivarians*, Buck.; Great Oolite—*Ostrea costata*, Sow.; *Anabacia* sp.; *Isocardia* sp.; *Lucina* sp. Greensand—*Exogyra columba*. Tertiary—*Carcharodon* sp. Neolithic flint implements are found in the subsoil over the gravel.

BELLOT'S ROAD PIT, TWERTON.

88-ft. O.D. and 39-ft. above the Avon. Pleistocene mammal remains were found in this pit. We have been unable to discover a precise list of the species.[12]

11 J. W. Tutcher, *Proc. Bristol Naturalists' Soc.*, 4th Series, Vol. 5, p. 277.
12 Rev. B. Oriel, *Loc. cit.*

MELKSHAM.

Large areas of gravel occupy the low ground on the banks of the Avon between Staverton and Melksham. Of the numerous pits which have been worked in the gravel the best to choose for examination at the present time lies on the Staverton road, about 2 miles from Melksham, and is known as the Monckton Gravel Pit. Section, about 20-ft. above the Avon :—

Flood loam, brown, sandy and earthy ... ... 1 to 3-ft.
Fine gravel, with much sand, composed of small pebbles of flint, fossil fragments, limestone, limonite, etc., with a few angular flints ... ... 4-ft.
Bed rock of Oxford Clay ... ... 2-ft.

Characteristic derived fossils of all the Melksham gravels are *Gryphæa dilatata*, Sow., and *Belemnites owenii*, Pratt, Quenst.

MALMESBURY.

Various sections of fine limestone gravel may be seen in this neighbourhood, particularly near Brokenborough and on the Sherston road, 1 mile West of Malmesbury, where a thickness of 3 or 4-ft. occurs overlying Forest Marble rock. The gravel caps low tracts of rising ground about 40-ft. above the Avon. There is a total absence of fossils and siliceous materials.

NOTE. Since going to press a number of important discoveries have been made in the Avon Valley, or have been brought to our notice for the first time. Perhaps the most important of these is the discovery (by T.R.F.) of a perfect hand-axe of Acheulean type, in the gravel at the base of the cemetery bed at Shirehampton. A description of this implement, which was found in June, will shortly be issued.

In the Museum of the Bath Philosophical and Literary Society are two hand axes in flint, possibly of Chellean date, which were discovered by the Rev. J. O. Kendall on the slopes of Little Salisbury Hill, Bath, in 1913.

The Description of the Fossil Scull of an Ox, discovered in Melksham, by Henry Woods, A.L.S., London, 1839, gives a lucid account of a bed of oolite gravel of considerable thickness, resting on the Oxford Clay under the town of Melksham, in which Pleistocene fossils were occasionally found, and in which the Avon has cut its present channel. In the same monograph a low rounded hill, 40ft. high, which is the site of the Roman Villa at Newton St. Loe, and which consists entirely of gravel, is described. Bones of elephant, etc., were found in beds at the base of the hill.

Mr. P. E. Martineau informs us that Pleistocene mammal remains are turned out nearly every day during excavations in Bath.