

Exposures at the back of Avon No. 2 terrace at Pershore, Worcestershire

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During August 2014 exposures were opened up in Pershore at the back of Avon No. 2 terrace (now synonymised as the Wasperton Sand and Gravel Member) which forms a conspicuous feature in the Warwickshire-Worcestershire River Avon terrace sequence. The excavations were to develop a large drain-fed sump and extended over an area of some 0.8 ha. This account discusses and illustrates

the Devensian sedimentology of northern and eastern sections and dates the underlying early Jurassic bedrock. The site forms part of what is commonly known as Keytec East Business Park, Pershore, owned by Crown House Developments; in Map 01 the location (52°12'N 02° 06'W) is marked by a red cross.



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Map 01. Extent of Avon No. 2 terrace at Pershore delineated by the black line, the location of the site described here marked by a red cross. The white cross marks the position of a tooth of Woolly Rhinoceros (*Coelodonta antiquitatis* Blumenbach, 1807) (Vince & Whitehead, 1978), the only confirmatory evidence in Pershore parish of the climate of deposition of these terrace sediments.

Discussion

Avon No. 2 terrace forms large topographical flats up to 1.6 km wide elevated up to 7 m above the modern floodplain (Tomlinson, 1925 who mapped their upstream extent into Warwickshire) or, according to Clayton (1977), up to 10 m above it. The sediments and their tributary correlatives were laid down in a cold periglacial or full glacial climate supported by finite radiocarbon dates BP of 38000 (Fladbury), 36600 (Twynning), 32200 (Charlecote) and 26000 (Aston Mill) and are well developed in the lower Avon valley. Fig. 01 provides an approximation of the extent of Avon No. 2 terrace sediments in Pershore Civil Parish following Tomlinson (1925). The hydrological regime that created the terrace bore no resemblance to that of the modern river. The Devensian river valleys were subject to seasonal ingress of sediment especially on south facing slopes. Late spring thaws in a nival regime increased flow rates of the principle rivers; aggraded sediments were resorted by tributaries and ramifying braids. These events are relevant to the sedimentary sequences visible in the sections figured here. Situated on the northern boundary of Pershore Civil Parish they evidently mark the extreme back of Avon No. 2 terrace and its relationship to the Charmouth Mudstone solid geology of the valley side.

The sections

The eastern boundary running north to south at SO95724761

The land surface here is at about 26 m a.s.l. with alluvium at 17 m. The terrace surface is therefore approximately 9 m above alluvium agreeing with published height ascriptions of this terrace. Evidently the flow rate of the river at this spot was reduced and impeded both by altimetry (i.e. the limit of its lateral development) and by a range of processes including the inwash or seasonal mass movement of bedrock clay from the valley side and above. This is reflected in the visible and unconformable admixture of widely varying sediment types (01, 02). Relatively fine sands containing small particle gravel extend downwards for up to 1.7 m from the terrace surface where they rest on and sometimes underlie (02) irregular beds of this clay (02). The surface of the underlying Charmouth Mudstone is extensively weathered suggesting its episodic exposure. Seams of finely-graded quartzose sand with a few small flint and quartz pebbles can be observed filling shallow channels in the bedrock (02). No traces of contemporary Devensian biology or organic sediments were located and there was no entrained Jurassic limestone gravel which characterises the terrace downstream and in some tributaries.



01. The north to south orientated section of the eastern boundary face at Pershore SO95714761 on 17 August 2014 showing machine-cut incision in the Charmouth Mudstone. Paul Whitehead.



02. The north to south orientated section of the eastern boundary face at Pershore SO95714761 on 17 August 2014 as 02 but in greater detail. Paul Whitehead.

The northern boundary running west to east at SO95674764

The sediments exposed in the northern boundary (03) are 60 m north-west of the sections shown as 01, 02. The flow rate was evidently so reduced at times as to be scarcely evident. The underlying Charmouth Mudstone bedrock has been subject to deep weathering and desiccation in which channel fills of quartzose sand limited in lateral extent are no more than 60 cms thick. These sands were sealed by clay derived from the solid geology presumably

introduced from upslope. They mark the retreat of fluvial activity and the development of lacustrine conditions indicating that the terrace surface was brought up to its present height by a range of processes including the episodic introduction of viscid clay; there are hints of seasonal lamination in these sediments. Infill and consolidation may have continued in post-glacial time. No contemporary organic material was visible in this section.



03. The west to east orientated section of the northern boundary face at Pershore SO95674764 on 17 August 2014. Paul Whitehead.

These back of terrace impacts contrast greatly with same situation at Twyning, Gloucestershire (Whitehead, 1992) where sediments of Avon No. 2 terrace had been upturned by gravitational tectonics due to downward pressure on the river-cut bedrock escarpment from higher level Avon No. 4 terrace sediments. At Pershore there was no such loading and the angle of land surface slope was insignificant.

The biota of the early Jurassic Charmouth Mudstone at Pershore

Numerous fragments of marine organisms were found *in situ* in the Charmouth Mudstone solid geology comprising ammonites, molluscs (*Bathrotomaria* sp.) and crinoids together with occasional

septarian nodules. The ammonite casts, which are all fragmented and in some cases weathered, were retained in an attempt to zone the fauna; some of these were submitted to Dr M. J. Simms of the Belfast Museum for comment. They comprised *Asteroceras* sp., *Xipheroceras* sp., *Paracoronoceras* sp., *Caenisites cf turneri* Buckman, 1825 (04) and *Microderoceras birchi* Hyatt, 1871 (05). The last two species mark the Turner Zone of the Sinemurian Stage while the others represent the lower Obtusum Zone above it. The age of this fauna from close to the boundary of the two stages is *c*195 million years in the mid-Sinemurian. Simms (2003) found that regional exposures of this age were rather few in number.



04. Internal cast of the ammonite *Caenisites cf. turneri* Buckman, 1825. Turner Zone of the Sinemurian, Charmouth Mudstone, Pershore, Worcestershire, 17 August 2014. Paul Whitehead.



05. The ammonite *Microderoceras birchi* Hyatt, 1871. Turner Zone of the Sinemurian, Charmouth Mudstone, Pershore, Worcestershire, 17 August 2014. Paul Whitehead.

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Images

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