
THE ENVIRONMENTAL CONDITIONS AND DEPOSITION OF QUATERNARY SEDIMENTS AT ASTON MILL GRAVEL PITS, KEMERTON, WORCESTERSHIRE

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Aston Mill Pits, at Kemerton, Worcestershire, lie in the valley of the River Avon, along its tributary, Carrant Brook, 7.5 km ENE of its confluence with the River Severn at Tewkesbury. Three kilometres to the north is the Jurassic outlier of Bredon Hill while the Cotswold Hills are 10 km to the south east. To the west, the Severn Vale extends to the high ground at the southern end of the Malvern Hills.

The area of the Quaternary sand and gravel pits at Aston Mill are underlain by Lower Lias clays temporarily exposed in the southern portion of the pit by removal of the sands and gravels. To the west of a north/south line through Tewkesbury, the Severn Valley deposits are underlain by Mercia Mudstone, with these beds passing north through Worcestershire into Warwickshire and the Birmingham area. Further north still, the Bunter Pebble Beds form the solid geology with typical rounded quartzite pebbles and cobbles.

The Bredon Hill outlier of Middle Lias/Inferior Oolite beds lies just north of the pits while the same formations exist in the Cotswold Hills.

On the day of the excursion, the exposed face showed from 2 metres at the western end to 7 metres at the eastern extremity. The faces clearly showed the two-tiered system of deposition. The lower part of the Avon System, of which only about 2 metres was exposed, consists of quartz sand with thin discontinuous lenses of limestone, sandstone and, rarely, flint gravels. Many of these lie at the top of thicker cross-bedded sandy members, with waterworn Jurassic invertebrate fossils being present. The top of the Lower System is characterised by thin lenses of silty quartz sand and clays which have been found to contain plant, and, importantly, beetle remains. Beetles exist in

very restricted ecological niches, being very sensitive to climatic temperature changes. Thus, using knowledge of the ecology of extant species, conditions in the Quaternary can be determined from the identification of the species found as fossils in the sediments. At the top, the junction with the Upper System is an obvious, uneven erosion surface.

The Upper System, the Fan Gravels, is formed by up to 4 metres of quartz sand with large numbers of oolitic limestone clasts which, due to their rough nature, were derived locally from the Lower Oolite of Bredon Hill and the Cotswolds. Also present, and seeming to predominate at the base of the bed, are well-rounded cobbles and pebbles of quartzitic sandstone from the Triassic Bunter Beds well to the north of the area. A few clasts of grey limestone, possibly Carboniferous, are also found, while at the base, flattened clasts of Mercia Mudstone are quite common. Throughout, water-worn Jurassic invertebrate fossils are common with many in a fragmentary condition.

Found on the day of the excursion were two bone fragments of Quaternary mammals, one being identified as the upper part of a leg bone. Near the top of the system, thin discontinuous layers of cryoturbation could be seen, showing that the temperature was, typically, around minus 8°C.

The deposits were laid down in two episodes during the Mid-Devensian Glacial period, as the Late Upton Warren Interstadial Complex. (Glacials are periods when the average July temperature was about 5°C, with ice caps extending well away from the poles. Stadials are short periods within glacials when temperatures rose, causing melting and temporary delay of the advance of the ice caps).

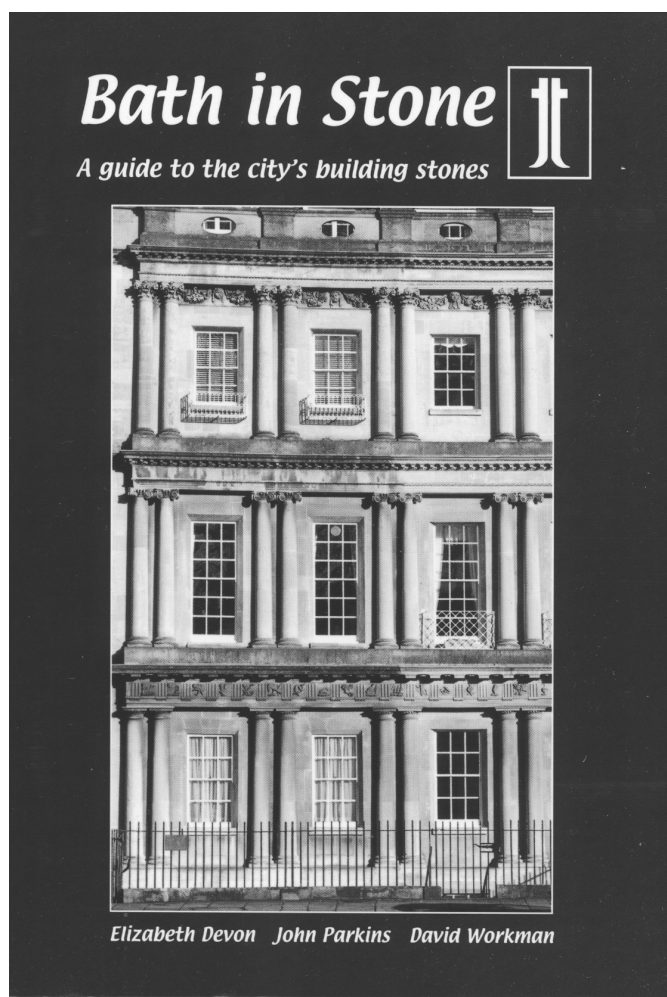
The sandy lower system was formed when the climate was cold and dry, with wind-blown sand being laid down in the river valley by slow moving water. The top of the Lower System shows silts and clays laid down from periods of still, or very slowly moving, water. The Upper System indicates high energy conditions with much water carrying off cobbles and pebbles of limestone loosened by erosion during periglacial conditions, from

Bredon Hill and the Cotswold Hills. Some of the clasts have been brought in from greater distances while all the sediments in both systems show in the cross-bedding, that sedimentation was from the east.

The day excursion was led by Dr. Nick Chidlaw and was arranged by the Department of Continuing Education at the University of Bristol.

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