SHORT COMMUNICATION

An interglacial fauna from Avon No. 3 Terrace at Eckington, Worcestershire

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1. INTRODUCTION

The occurrence of rich faunal assemblages from the terraces of the Warwickshire–Worcestershire Avon were noted widely in the last century (Strickland, 1858; Lloyd, 1870; Winnington-Ingram, 1879) and revised by Kennard (in Tomlinson, 1925). No modern reports of interglacial faunas have been published although Mid-Devensian faunas, principally Coleoptera, from No. 2 Terrace have been described in the last twenty-five years, from Fladbury and Brandon (Coope, 1962, 1968).

Most of the sites described in the literature, usually small pits for sand or road metal, are now either lost or totally overgrown. Larger sections, like the road cutting at Cropthorne (Strickland, 1858), can be identified but no clear faces are available for study. Few other sections can be recognised now, although those at Bengeworth, Evesham noted by Tomlinson (1925) are still identifiable as gravel pits despite the fact that they have houses and factories built in them.

Of the sections noted by Tomlinson only the railway cutting at Eckington proved to be readily accessible by spring of 1984. It was not possible to re-examine the sides of the cutting itself as the railway is still in use, but at its northern end, on the western side, the cutting extends beyond the railway into private land, and was possibly the site of a former siding or lineside quarry. A section here (SO 919417) was cleaned in May 1984 as part of the site assessment programme of the Geological Conservation Review Unit. The re-excavation cut through the Quaternary deposits to bedrock (Lower Liassic calcareous mudstones) and thus exposed the full thickness of the gravels and sands of Avon terrace No. 3 (Fig. 1).

2. DEPOSITS AND STRATIGRAPHY

The general distribution of the terraces in the Lower Avon can be seen in Plate X of Tomlinson (1925). The Eckington site lies in a small patch of No. 3 Terrace forming the core of a present meander of the river. The cleaned section showed a fairly constant thickness (*c.* 1.5–1.6 m) of sandy gravel with its base at a height of 23.20 m above O.D. (Fig. 1) resting on the Lower Lias. The gravel was crudely planar bedded and more sandy in its lower levels, with discrete sandy lenses intermittently visible in the lowest 60 cm. Patches of the basal gravel were weakly cemented by calcium carbonate forming a soft conglomerate. The clasts in the gravel comprised largely rounded quartz and quartzite derived ultimately from the Midlands Triassic formations. The mean pebble size was 2–3 cm long axis.

Accompanying these quartzites were small quantities of flint, derived via the Upper Avon from the Wolston series, and oolitic limestone from the local Middle Jurassic outcrops. With this fine gravel were a few cobbles, also of quartzite from Triassic sources, with a long axis up to 15 cm. With the pebbles in the gravel were a range of derived fossils from the Lias. These were chiefly fragments of the bivalve *Gryphaea* sp., but also included fragments of turriculate gastropods and pieces of ammonites, both too worn for positive identification. The limited section exposed was thought to be insufficient for more detailed sedimentological analysis to be conducted.

3. MOLLUSCA

(a) Sampling

Sampling of the gravel for molluscan analysis was undertaken by excavating two bulk samples (A, D) of *c.* 10 kg in weight from the most shelly parts of the gravel. Further samples (B, C, D) were taken from less obviously shelly gravel near the base of the section. Of these three samples C and D both yielded Mollusca, B was barren. In addition to the bulk samples a few individual shells were collected from the face of the section during excavation, and later, by the authors and Mr. P. F. Whitehead. These are also noted in Table 1.

The samples taken were oven dried and then washed through sieves of 2 cm and 0.5 mm aperture. These collected the gravel and then all the identifiable shell remains. The samples were then re-dried and sorted under a 10–40× binocular microscope.

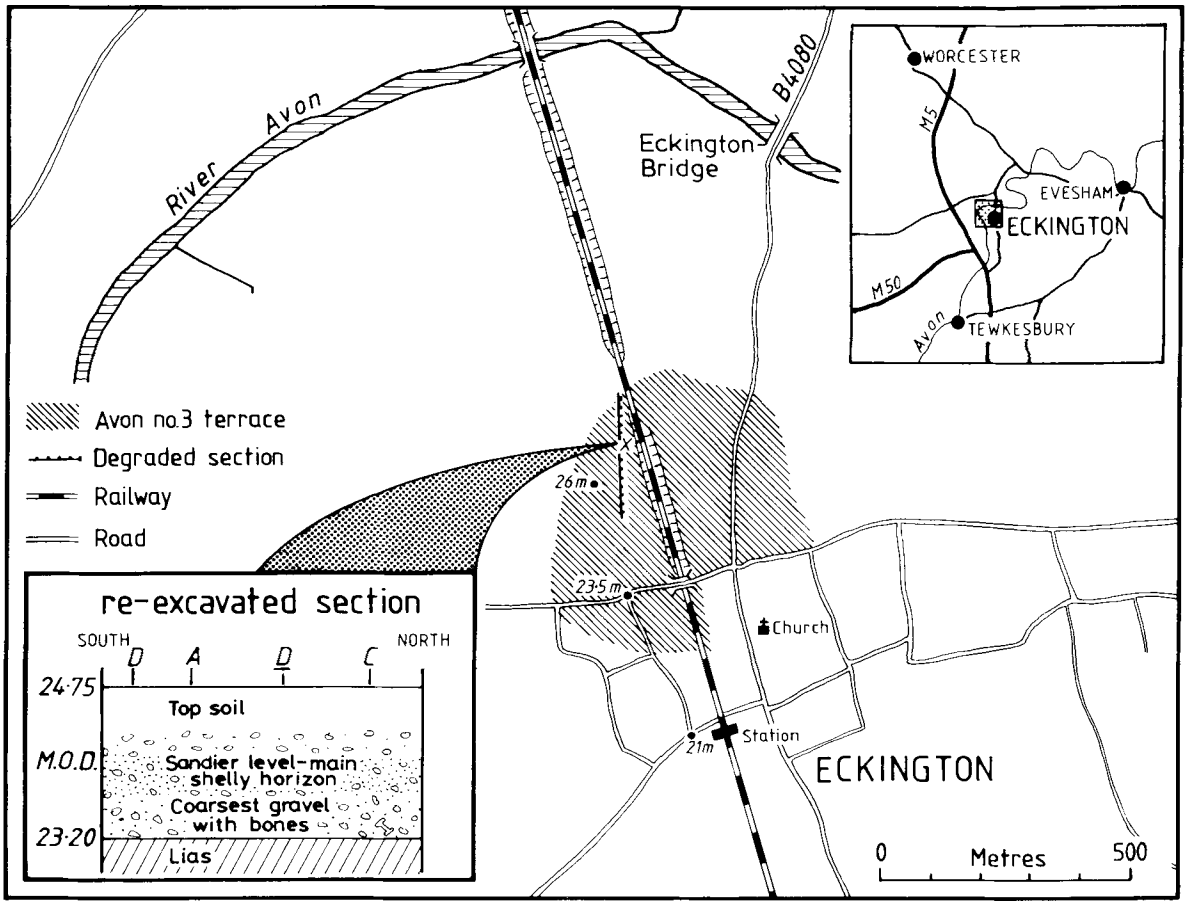

Fig. 1. Location map for the Eckington site showing the outcrop of the deposits of Avon No. 3 terrace. Inset: Section through the deposits of Avon No. 3 terrace at Eckington showing sample points.

(b) Identification of the Mollusca

All the Mollusca recovered from the samples were abraded and broken. Very few intact specimens of any gastropods were found, and many bivalves were reduced to their hinge plates, although complete, but worn, bivalve shells also occurred for the main species collected. The usual procedure of counting Mollusca was adopted (see Sparks, 1961), where each gastropod apex counts as one individual, and all bivalve fragments complete with cardinal dentition counts as half an individual. In addition, because of the damaged state of much of the fauna some gastroped taxa were represented not by the shell apex, but by other fragments. Two species in particular were counted on the basis of shell fragments other than the apex, while a further three species were noted as being present, although not counted, on the basis of distinctive ornamentation of the shell.

In the first class are *Belgrandia marginata* (Michaud) and *Bithynia tentaculata* (Linné). *B. marginata* is represented only by shell apertures and the basal section the columella. No complete shells were found. In this species the aperture is given special strength by the occurrence of a rib or thickening on the palatal lip, thus allowing the remnant of the shell to be preserved as a ring of calcium carbonate.

In the case of *B. tentaculata,* no adult shells were found. The shell material was represented by a few juvenile shells (Table 1) and a number of both adult and juvenile operculae. The maximum counts (Table 1) of *B. tentaculata* are therefore of operculae rather than shells.

Neither the juvenile shells nor the operculae could be conclusively identified to species level. The operculae were most like those of modern *B. tentaculata* from the Avon, but this is not a sure guide to specific identification (Sparks, West, Williams & Ransom, 1969). As *B. tentaculata* is the most common Upper Pleistocene *Bithynia* it is most likely that the shells and operculae are of this species, but the

TABLE 1. **Eckington Avon Terrace No. 3—Mollusca**

	A	C	D	D	*
Valvata piscinalis (Müller)	63	2	17	3	/
Belgrandia marginata (Michaud)	24	1	11	2	/
Bithynia tentaculata (Linné) shells	31		12	4	/
operculae	222	4	108	28	
Lymnaea truncatula (Müller)	1		2		
Lymnaea peregra (Müller)	3		1		
Bathyomphalus contortus (Linné)			1		/
Gyraulus laevis (Alder)	1		1		
Armiger crista (Linné)	2				
Ancylus fluviatilis (Müller)	17		6	3	
Unio sp	†		†	†	
Sphaerium corneum (Linné)	160	3	92	11	/
Sphaerium lacustre (Müller)	4		2	2	
Pisidium amnicum (Müller)	9		9	2	/
Pisidium casertanum (Poli)	179	5	29	7	/
Pisidium personatum Malm	7		1		/
Pisidium obtusale (Lamarck)	1				
Pisidium milium Held	1		1		
Pisidium subtruncatum Malm	118	2	62	9	/
Pisidium henslowanum (Sheppard)	7		3		/
Pisidium nitidum Jenyns	93	4	25	1	/
Pisidium moitessierianum Paladhilhe	2	1	3	4	/
Pisidium sp			14		
Succinea oblonga Draparnaud					/
Oxyloma pfeifferi Rossmässler	1		1		
Cochlicopa lubrica (Müller)	3		2	1	
Vertigo angustior Jeffreys	1				
Vertigo sp (not *V. angustior*)	1		2		
Pupilla muscorum (Linné)	2		1		
Vallonia costata (Müller)	3		3		/
Vallonia pulchella (Müller)	15		5	2	
Vallonia enniensis (Gredler)	19	1	5	1	
Vallonia sp	21		10		
Punctum pygmaeum (Drapernaud)	1				
Discus rotundatus (Müller)	1		1		
Oxychilus cf cellarius (Müller)	2				
Oxychilus sp	1				
Milax sp	1				
Limax (*Deroceras*) sp	4		2	1	/
Clausilia sp	1		1		
cf *Candidula crayfordensis* Jackson	24		1		
Trichia hispida (Linné)	4		5	1	
Cepaea or *Arianta*	2		4		
	1021	23	432	83	

Total 1559.
39 species.

† fragments; all bivalve counts of individuals.
* specimens collected from the surface of the excavation by D. H. Keen and P. F. Whitehead.

presence of other species of *Bithynia* cannot be ruled out.

Three other taxa of gastropods were identified on the basis of their distinctive shell colour or ornament. These have not been treated quantitively as non-unique shell fragments (neither apertures nor apices) were involved. Two taxa were identified by their shell ribbing, *Discus rotundatus* (Müller) and *Clausilia* sp., while a further taxon represented only by tiny colour banded shell fragments, was identified as being either *Cepaea* or *Arianta*.

Even with complete gastropod shells difficulties of identification occurred. This was particularly the case in the genus *Vallonia* where three species were present. Although several intact *Vallonia* shells were recovered, most individuals were represented by worn and broken fragments. The division of this material into three species, *Vallonia costata* (Müller), *Vallonia enniensis* (Gredler) and *Vallonia pulchella* (Müller) was on the basis of the shell ornamentation preserved in the shell umbilicus. The difference in rib spacing shows clearly that both *V. costata* and *V. enniensis* are present at Eckington and the absence of ribs, coupled with the characteristic shell shape, confirms the presence of *V. pulchella*. Despite these positive identifications, a large number of *Vallonia* shells could only be identified to specific level due to their damaged state.

The bivalve shells were also broken and worn. Large fragments of nacre too thick to belong either to *Sphaerium* or *Anodonta* sp. were referred to the genus *Unio* although specific determination proved impossible. Three species of Unionid have been recorded previously in the Avon terrace sediments, *Unio tumidus* Philipsson, *Unio pictorum* (Linné) and *Potomida littoralis* (Cuvier) (Strickland, 1858; Kennard, in Tomlinson, 1925). It is possible that the fragments may belong to any of these species, although *P. littoralis* is probably the most common fossil species of Unionid recorded in the Avon valley.

The small bivalves of the genus *Pisidium* are all identified to species level except for twenty-eight fragments in sample D. Many of these specific identifications of *Pisidium* are tentative because of the abrasion which has all but destroyed detail on which such determination may be based. In particular *Pisidium henslowanum* (Sheppard) may have been mis-identified due to the removal of the umbonal appendicular diagnostic of this species, so that this bivalve is under-represented in Table 1. Similar problems of wear of bivalve shells may have led Strickland (1858) to incorrectly identify the abundance of *Pisidium amnicum* (Müller) ("*Cyclas amnica*") which is noted as the most numerous mollusc, along with *Sphaerium corneum* (Linné) ("*Cyclas cornea*"). In the present study *P. amnicum* represents only a small percentage of the bivalves (Table 1).

4. INTERPRETATION OF THE MOLLUSCA

Both of the bulk samples A and D show a similar fauna, and the smaller samples show elements of the same assemblage.

The total number of taxa represented is thirty-nine, of which twenty-one are freshwater, and eighteen,

land taxa. The dominant freshwater elements are in Sparks' (1961) moving water group (*Valvata piscinalis* (Müller) and *B. tentaculata*). Accompanying these are *Ancylus fluviatilis* (Müller) which is regarded by Kerney (1971) as a prime indicator of fully fluviatile conditions. The other gastropods are either in Sparks catholic group [*Bathyomphalus contortus* (Linné)] or unclassified by him but known to live in clear water ponds (e.g. *Gyraulus laevis* (Alder)). Only one species in the freshwater fauna is not now found in Britain, *B. marginata,* which is currently restricted to Catalonia and Southern France, but is a typical interglacial form in Britain (Kerney, 1977).

The bivalve assemblage is a little more difficult to interpret. Despite the evidence of well oxygenated moving water from the Gastropoda, the bivalves are dominated by *Sphaerium corneum* (Linné) and *Pisidium casertanum* (Poli) which are usually pond species, indeed the latter is firmly in Sparks (1961) slum class. By contrast the usual bivalves of large rivers, *P. henslowanum* and *Pisidium moitessierianum* Paladhilhe, are present in low numbers, and *Corbicula fluminalis* (Müller) a typical interglacial form (Kerney, 1977) is absent entirely despite its thick, durable shell, and the abundance of its relative *S. corneum.*

The high numbers of bivalves of undemanding habitat requirements is difficult to explain in view of the evidence from the Gastropoda and sedimentology of the deposit, that the sandy gravels were laid down by the moving water of a large river. *S. corneum* and *P. casertanum* are tolerant species and will live in better conditions than their most extreme limits, so it may be that at the time of deposition that the Avon was rich in these species at the expense of the more usual moving water species of bivalves. The relative lack of such species as *P. amnicum, P. henslowanum* and *P. moitessieranum* cannot be conclusively explained.

The terrestrial fauna is largely that of grassland and marsh as would be expected on the banks of a large-sized river. Such species as *Oxyloma pfeifferi* (Rossmässler), *Succinea oblonga* Draparnaud, *Vertigo angustior* Jeffreys and *V. pulchella* exemplify the marsh component, and *V. costata, Pupilla muscorum* (Linné) and the helicellid tentatively identified as *Candidula crayfordensis* Jackson, the grassland component.

The occurence of the shade-loving *Discus rotudnatus* (Müller) and *Clausilia* sp. suggest that away from the river floodplain more shaded habitats of scrub, if not woodland were present. The exact nature of this environment is difficult to suggest in view of the small number of shell fragments of these taxa preserved.

5. MAMMALIA

[identified by A. P. Currant, B.M. (N.H.)]

Sample A, in addition to yielding Mollusca, also contained a range of fragments of bone and tooth. The former were identifiable as part of the pelvic girdle of either *Bos* or *Bison* sp. The latter were reconstructed into an incisor tooth ("tusk") of *Hippopotamus amphibius* Linné.

Both *H. amphibius* and *Bos* sp. ("*Bos urus*") were recorded as being present at Eckington by Strickland (1858).

6. REGIONAL ENVIRONMENT

There is little doubt that the deposits and fauna from Eckington are those of an interglacial. The occurrence of such species as *B. marginata, P. moitessierianum, V. angustior* and *D. rotundatus* is a clear indication of this. With the exceptions of the extinct form *C. crayfordensis,* the southern species *B. marginata,* and the central European *V. enniensis,* all the species from Eckington occur in lowland Britain at present.

The presence of *B. marginata,* together with *Hippopotamus* almost certainly indicates a climate a little warmer than now. Nothing in the fauna suggests an environment with any degree of cold. The habitats represented by the Mollusca, large river, marsh, grassland and scrub or woods are those to be expected in an interglacial in a Midlands river valley.

7. CORRELATIONS

The Eckington fauna is the richest molluscan assemblage so far recorded in the Avon Valley. Only the site at Cropthorne 30 km up stream of Eckington has a comparably rich fauna, although Birlingham (below Pershore) and Ailstone (near Stratford) have also yielded restricted warm assemblages (Kennard, in Tomlinson, 1925).

Cropthorne and Eckington are clearly closely similar in faunal content (Strickland, 1858). Both occur at the base of Avon Terrace No. 3 (Tomlinson, 1925) and are thus almost certainly of same age. General consideration of the Avon terraces by Tomlinson (1925) led her to divide the sequence into five, on an altitudinal basis. The highest, Terrace No. 5, was of indeterminate age and environment of formation, Terraces 4 and 3 were of interglacial origin, and 2 and 1 of cold climate deposition. Examination of the Avon terraces by Shotton (1953) as part of his wider work on all the Pleistocene formations in the Avon Valley, led him to conclude that Avon Terrace No. 3 was of last (Ipswichian) interglacial age.

The fauna from Eckington confirms this Ipswichian date for Avon Terrace No. 3. The main evidence for this is the occurrence of *Hippopotamus.* This species is only known in Britain in the Cromerian and Ipswichian interglacials. (Stuart, 1982). A date in the former must be ruled out by the Mollusca, which contain none of the characteristic Cromerian species (e.g. *Nematurella runtoniana,* Sandburger, *Valvata goldfussiana* Wüst), thus only allowing an age in the Ipswichian Interglacial for the deposits of Avon

terrace No 3. The presence at Eckington of *B. marginata, G. laevis* and *V. enniensis* also indicates such an age, as these three species are especially common in this interglacial (Sparks, 1964).

8. CONCLUSION

The fauna from the deposits of Avon No. 3 Terrace at Eckington lived in conditions a little warmer than the present, in and beside a river comparable to the present Avon. Elements of the fauna confirm that the terrace sands and gravels are of Ipswichian interglacial age.

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