

An insect fauna of Roman date from Stourport, Worcestershire, U.K., and its environmental implications

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Summary

An extensive insect fauna comprising chiefly beetles and caddis flies from a rural deposit of Roman age close to the River Severn at Stourport, Worcestershire is described. The terrestrial environment depicted is very similar to that of present day Worcestershire, consisting primarily of open grazing land with scattered trees and bushes. The aquatic insects appear, however, to show a River Severn running over a clean stony or sandy bed, rather than the silt- and mud-covered bottom we see today.

Introduction

Although insect-bearing deposits of Roman age are fairly common, most are associated with human occupation and reflect a rather stereotyped synanthropic environment. When the present site was discovered, having no apparent connection with human occupation, it was welcomed for the opportunity it provided to see what the insects could show of the rural environment of the time.

The deposit came to light in late 1982 when excavations were in progress for a marina to be constructed alongside the River Severn at Stourport, Worcestershire (National Grid Ref. SO 818 698). The attention of the late Professor Shotton was drawn to these excavations when Mr Ivor Gough, the man in charge of building operations, reported the discovery of an antler protruding from the gravel face. In consequence of this discovery Professor Shotton, accompanied by the present author, paid a visit to the site to see the situation at first hand. The antler, and a scapula which had also been found, were seen and identified as red deer (*Cervus elaphus* (L.)). Of more interest, however, was the discovery, above the gravel from which the antler came, of a bed of organic silt rich in fragments of stick and many hazel (*Corylus avellana* L.) nuts, which looked as if it might contain contemporaneous insect remains. A trial sample was taken which, suitably processed in the laboratory, did indeed show the presence of a large insect fauna, so a second visit was paid to the pit to collect samples and stratigraphic data more precisely.

The lithology of the sampled face is shown in Fig. 53. Samples were taken at approximately 5 cm intervals through the brown organic silt to detect any environmental changes which might have occurred during the period of deposition. No significant differences between the layers were detected so that finally the silt was regarded as a single entity, possibly all laid down in one flooding episode. The insects listed below, therefore, were all obtained from a bulk sample traversing the entire deposit. However, although each 5 cm sample contained essentially the same fauna, a few species were noted which were not recorded from the bulk sample. These appear at the end of the main list (Table 82) for, although they do not alter the environmental picture, some are interesting occurrences. Plant macrofossils noticed during sorting for insect remains are also recorded, although this list claims neither to be complete nor expertly compiled.

Some of the larger pieces of wood were submitted to Mr. R. E. G. Williams of the School of Earth Sciences, University of Birmingham, for radiocarbon dating and the result was a date of 1770 ± 60 years BP (Birm 1167), roughly 200 A.D.—about the middle of the Roman period in England. This date applies to the entire thickness of the organic silt (see Fig. 53) so if, as is suspected, the deposit was laid down by a single flood it would have been around this time. If, however, the material was laid down over a period of time, clearly the base and top might be considerably older and younger respectively.

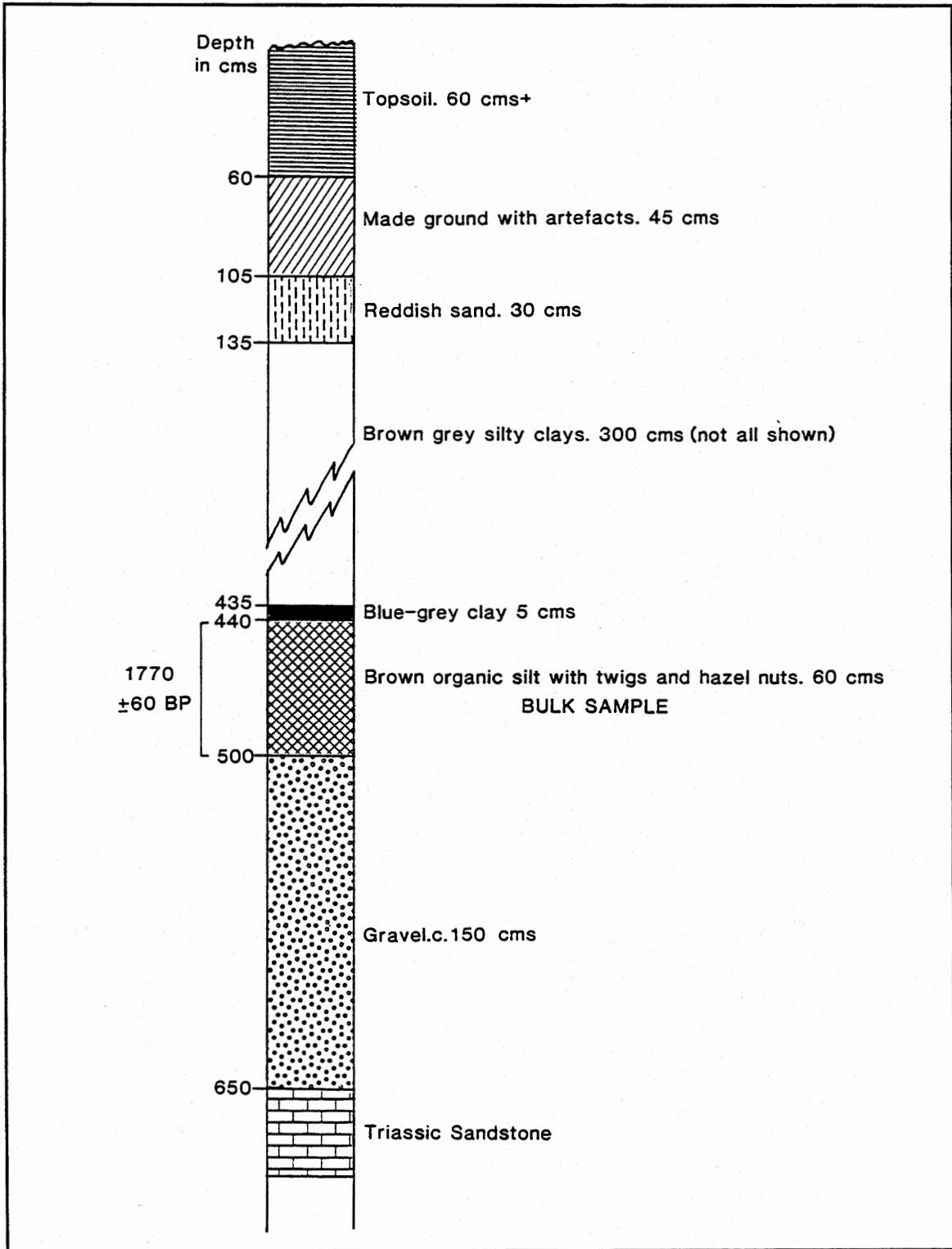


Figure 53. Lithology of the section at Stourport with sampled horizon marked. Since the material was collected some years ago, before the use of metric measurements was de rigueur, all the measurements were taken in imperial units. To comply with today's usage these have been converted to metric but rather than introduce a spurious impression of impossibly accurate measuring by taking one inch to equal 2.54 centimetres, the less precise one foot to thirty centimetres has been used as pinpoint accuracy was unnecessary here and in practice impossible to achieve.

Methods

The matrix was a coarse silt containing a mixture of twigs, fragments of wood, and complete hazel nuts. It broke down readily in warm water and, after washing over a 300 micron sieve to dispose of the fine mineral portion, the residue was subjected to paraffin flotation to concentrate any insect remains present. All insect fragments which appeared to be identifiable were picked out, together with any plant macrofossils which were noticed (see above).

The caddis fly larvae (Trichoptera) in the list in Table 82 were kindly named by Miss Bridget Wilkinson. Since these records are based on larval sclerites which may be repeated at each instar, numbers of individuals are difficult to estimate so they are entered as present only. The list follows the classification of Hickin (1967). In the list of beetles the minimum number of individuals needed to produce the skeletal parts identified is provided and the classification used is that of Lucht (1987).

The local environment depicted by the insects

For the purposes of this discussion the fauna may be conveniently looked at in two parts, the terrestrial and the aquatic.

The terrestrial environment

A cursory glance through the list suggests a mixture of habitats making up a landscape very similar to that of rural Worcestershire today. The carabid ground beetles illustrate this well. Such species as *Patrobus atrorufus*, *Pterostichus oblongopunctatus*, *Platynus affinis* and *P. obscurus* all live in damp, shady places, woodland for preference, while *Trechus quadristriatus/obtusus* and *Bembidion quadrimaculatum* inhabit dry, open country with short vegetation. Between these two extremes *Bembidion lunatum* and *B. harpaloides* live on damp, clayey soil, *Trechus rivularis* prefers swampy ground with *Sphagnum* and sedges (*Carex* spp.) and *Stomis pumicatus* lives in gardens and meadowland. Most of the remaining Carabidae are eurytopic and will live happily in a range of habitats. Other sections of the terrestrial fauna tend to follow a similar pattern. Thus, of the Elateridae identified, *Agriotes pallidulus* and *Adelocera murina* both live in grassland where their larvae live at the roots

of grass, while *Denticollis linearis* develops in rotten wood. *Cerylon histeroideus* is found beneath the bark of dead logs and *Grynobius planus* lives in dead branches. Both species of *Scolytus* named attack trees and *Acalles parvulus* is found in dead sticks on the ground in woodland. *Rhynchaenus quercus* is a leaf miner on oak (*Quercus*) and *Rhyncolus lignarius* inhabits dead wood of various sorts. In contrast to these, as well as the elaterids mentioned above, the dung beetles *Aphodius* and *Geotrupes* suggest pastureland with grazing animals, while the two chafers, *Phyllopertha horticola* and *Hoplia philanthus* both live in meadowland where their larvae attack grass roots. Amongst the phytophagous Chrysomelidae and Curculionidae many are polyphagous but the few with specific host plants e.g. *Galeruca tanacetii* (tansy, *Tanacetum vulgare* L.), *Chaetocnema concinna* (knotgrasses, etc., *Polygonum*) and *Notaris acridulus* (sweet-grass, *Glyceria*), suggest the presence of open ground. The scolytid *Phloeophthorus rhododactylus* lives in the stems of broom (*Cytisus (Sarthamnus) scoparius* (L.) Link) and related plants, all inhabitants of open country.

In addition to these two groups which represent woodland and open grassland there are a number of species present, chiefly amongst the Staphylinidae and Pselaphidae, which inhabit moss, leaf litter, grass tussocks or other accumulations of vegetable material.

It is felt that a collection of beetles from flood refuse scoured from the banks of a few kilometres of the present day River Severn would be very similar in make-up to this list of nearly two thousand years ago.

Two species not recorded from the bulk sample, but noticed in some of the smaller serial samples, are worthy of note. The first, *Ernoporus caucasicus* lives on lime (*Tilia* spp.) and, although apparently widespread in England during the latter half of the Flandrian, is now known as British from only a single locality which was not discovered until the late 1940s (Allen 1969). The Stourport record is the most recent known occurrence of the species in Britain until its rediscovery around 1948, but it adds little to our knowledge of the beetle's distribution as the modern record is from Herefordshire, only a few kilometres from Stourport. The other species, *Bembidion stomoides*, is rather more widespread in Britain today although still a rare beetle. It is a river-bank species with a predominantly northern distribution in England at present.

INSECTA		COLEOPTERA	
ODONATA		Carabidae	
Zygoptera		<i>Nebria brevicollis</i> (F.)	1
<i>Agrion</i> sp.	1	<i>Loricera pilicornis</i> (F.)	1
MEGALOPTERA		<i>Clivina ?fossor</i> (L.)	1
<i>Sialis</i> sp. (larval mandibles)	16	<i>Dyschirius globosus</i> (Hbst.)	1
HEMIPTERA		<i>Trechus secalis</i> (Payk.)	3
Gerridae		<i>T. rivularis</i> (Gyll.)	1
<i>Gerris</i> sp.	3	<i>T. quadristriatus</i> (Schr.) or <i>obtusus</i> Er.	3
TRICHOPTERA (det. B. Wilkinson)		<i>Bembidion lunatum</i> (Dufts.)	3
Glossosomatidae		<i>B. quadrimaculatum</i> (L.)	1
<i>Glossosoma</i> sp.		<i>B. harpaloides</i> Serv.	2
<i>Agapetus</i> sp.		<i>B. unicolor</i> Chaud. or <i>guttula</i> (F.)	2
Philopotamidae		<i>Patrobis atrorufus</i> (Strom.)	1
<i>Philopotamus montanus</i> (Don.)		<i>Stomis pumicatus</i> (Pz.)	1
Polycentropidae		<i>Pterostichus oblongopunctatus</i> (F.)	1
<i>Polycentropus flavomaculatus</i> (Pictet)		<i>Platynus assimilis</i> (Payk.)	2
Psychomiidae		<i>P. obscurus</i> (Hbst.)	2
<i>Tinodes</i> sp.		Gyrinidae	
<i>Lype reducta</i> (Hagen)		<i>Orectochilus villosus</i> (Mull.)	2
<i>Psychomyia pusilla</i> (F.)		Hydraenidae	
Hydropsychidae		<i>Hydraena riparia</i> Kug.	12
<i>Hydropsyche contubernalis</i> McL.		<i>H. rufipes</i> Curt.	4
<i>H. instabilis</i> (Curtis)		<i>H. gracilis</i> Germ.	1
<i>H. pellucidula</i> (Curtis)		<i>H. minutissima</i> Steph.	1
<i>H. siltalai</i> Döhler		<i>Ochthebius bicolon</i> Germ.	9
<i>Cheumatopsyche lepida</i> (Pictet)		<i>O. minimus</i> (F.)	3
Odontoceridae		<i>Limnebius truncatellus</i> (Thunb.)	5
<i>Odontocerum albicorne</i> (Scop.)		<i>Helophorus</i> cf. <i>brevipalpis</i> Bedel	6
Limnephilidae		Hydrophilidae	
<i>Drusus annulata</i> Steph.		<i>Megasternum boletophagum</i> (Marsh.)	7
<i>Limnephilus</i> sp.		<i>Hydrobius fuscipes</i> (L.)	1
<i>Anabolia nervosa</i> (Curtis)		<i>Chaetarthria seminulum</i> (Hbst.)	1
<i>Potamophylax latipennis</i> (Curtis)		Silphidae	
<i>Halesus</i> sp.		<i>Phosphuga atrata</i> (L.)	1
<i>Chaetopteryx villosa</i> (F.)		Ptiliidae	
<i>Micropterna sequax</i> (McL.)		<i>Acrotrichis</i> sp.	3
Sericostomatidae		Staphylinidae	
<i>Sericostoma personatum</i> (Spence)		<i>Micropeplus</i> sp.	1
<i>Goera pilosa</i> (F.)		<i>Metopsia clypeata</i> (Mull.)	1
<i>Silo pallipes</i> (F.)		<i>Olophrum piceum</i> (Gyll.)	2
<i>Brachycentrus subnubilus</i> Curtis		<i>Acidota cruentata</i> (Mannh.)	1
<i>Lepidostoma hirtum</i> F.		<i>Lesteva punctata</i> Er.	1
<i>Lasiocephala basalis</i> (Kol.)		<i>Trogophloeus arcuatus</i> (Steph.)	3
		<i>Trogophloeus</i> sp.	4
		<i>Oxytelus rugosus</i> (F.)	4
		<i>Bledius</i> sp.	2
		<i>Stenus</i> sp.	4

Table 82. (above and opposite). Insect taxa recorded from deposits at Stourport. *indicates a species not on present day British List. Plant remains noticed during sorting: *Ranunculus* Subgenus *Batrachium*; *Rubus* sp.; *Betula* sp.; *Alnus glutinosa* (L.) Gaertner; *Corylus avellana* L.; *Sambucus* sp.; and *Zannichellia* sp.

<i>Lathrobium</i> sp.	2	Anobiidae	
<i>Xantholinus linearis</i> (Ol.) or <i>longiventris</i> Heer	4	<i>Grynobius planus</i> (F.)	1
<i>Philonthus</i> sp.	1	Scarabaeidae	
<i>Tachinus rufipes</i> (Degeer)	1	<i>Geotrupes</i> sp.	1
<i>Drusilla canaliculata</i> (F.)	1	<i>Aphodius</i> spp.	6
Aleocharinae indet.	8	<i>Phyllopertha horticola</i> (L.)	1
		<i>Hoplia philanthus</i> (Fuess.)	1
Pselaphidae		Chrysomelidae	
<i>Bythinus</i> sp.	5	<i>Timarcha tenebricosa</i> (F.)	1
<i>Tychus niger</i> (Payk.)	1	<i>Galeruca tanacetii</i> (L.)	1
<i>Rybaxis</i> sp.	1	<i>Haltica</i> sp.	1
<i>Brachygluta</i> sp.	3	<i>Chaetocnema concinna</i> (Marsh.)	1
Cantharidae		Scolytidae	
<i>Podabrus alpinus</i> (Payk.)	1	<i>Scolytus ?mali</i> (Bechst.)	1
Elateridae		<i>S. scolytus</i> (F.)	1
<i>Agriotes pallidulus</i> (Ill.)	1	<i>Phloeophthorus rhododactylus</i> (Marsh.)	4
<i>Adelocera murina</i> (L.)	1	Curculionidae	
<i>Denticollis linearis</i> (L.)	1	<i>Rhynchites</i> sp.	2
Throscidae		<i>Apion</i> spp.	5
<i>Throscus dermestoides</i> (L.)	2	<i>Otiorhynchus ovatus</i> (L.)	1
Buprestidae		<i>Phyllobius parvulus</i> (Ol.)	
<i>Trachys pumilus</i> Ill.	1	or <i>viridaearis</i> (Laitch.)	2
Helodidae		<i>P. calcaratus</i> (F.)	5
gen. et sp. indet.	2	<i>Polydrusus pterygomalis</i> Boh.	2
Dryopidae		<i>Sciaphilus asperatus</i> (Bonsd.)	3
<i>Helichus substriatus</i> (Mull.)	2	<i>Brachysomus echinatus</i> (Bonsd.)	3
<i>Dryops</i> sp.	3	<i>Barypeithes araneiformis</i> (Schr.)	3
<i>Elmis aenea</i> (Mull.)	18	<i>Strophosomus</i> sp.	6
<i>Esolus parallelepipedus</i> (Mull.)	30	<i>Barynotus obscurus</i> (F.)	1
<i>Oulimnius tuberculatus</i> (Mull.)	16	<i>Rhyncholus lignarius</i> (Marsh.)	1
<i>O. troglodytes</i> (Gyll.)	13	<i>Bagous</i> sp.	4
<i>Limnius volckmarii</i> (Panz.)	23	<i>Notaris acridulus</i> (L.)	1
<i>Normandia nitens</i> (Mull.)	20	<i>Thryogenes</i> sp.	1
<i>Macronychus quadrituberculatus</i> (Mull.)	10	<i>Anthonomus pomorum</i> (L.)	2
Heteroceridae		<i>Curculio villosus</i> F.	1
<i>Heterocerus</i> sp.	1	<i>C. pyrrhoceras</i> Marsh.	1
Byrrhidae		<i>Curculio</i> sp.	2
<i>Simplocaria semistriata</i> (F.)	2	<i>Magdalis armigera</i> (Fourc.)	1
Rhizophagidae		<i>Acalles parvulus</i> Boh.	1
<i>Rhizophagus</i> sp.	1	<i>Micrelus ericae</i> (Gyll.)	1
Cucujidae		<i>Rhynchaenus quercus</i> (L.)	1
* <i>Airaphilus elongatus</i> (Gyll.)	1	Coleoptera recorded from other samples but not from bulk sample:	
Colydiidae		<i>Bembidion stomoides</i> Dej.	
<i>Cerylon histeroideis</i> (F.)	1	<i>Dianous coerulescens</i> (Gyll.)	
Coccinellidae		<i>Serica brunnea</i> (L.)	
<i>Exochomus quadripustulatus</i> (L.)	1	<i>Hylesinus crenatus</i> (F.)	
		<i>Ernoporus caucasicus</i> Lind.	

The aquatic environment

If, as seems reasonable from its very close proximity, the water beetles in this fauna inhabited the contemporaneous River Severn, conditions in the aquatic environment seem to have changed more noticeably than those indicated by the terrestrial fauna. Aquatic insects are represented by members of several orders including the alder fly, *Sialis*, a damselfly, *Agrion* and *Gerris*, the pond skater. More profusely represented are the caddisflies (Trichoptera), identified by Miss Bridget Wilkinson, and the beetles, some of which were recovered in large numbers.

The first three of these, *Sialis*, *Agrion* and *Gerris*, all tend to live in or on slowly moving or still water and all could be found in the Worcestershire Severn today. The Trichoptera, however, suggest a different facies for, apart from *Brachycentropus nubilus*, whose larvae tend to live mostly in rivers with only a slow current, most of the caddis recognised by Miss Wilkinson spend their larval lives in small, running streams with clean stony, gravelly or sandy bottoms. In addition, of those species which construct portable larval cases, the great majority make them of sand grains. The remainder utilise silk to make tunnels, tubes or traps attached to stones (Hickin 1967, Lepneva 1964; 1966).

Amongst the beetles there is a substantial group whose members are today found in slowly moving or still water. These include *Hydraena riparia*, *H. rufipes*, *H. minutissima*, *Ochthebius bicolon*, *O. minimus*, and members of the genera *Limnebius*, *Helophorus*, *Hydrobius* and *Chaetarthria*, totalling just over 40 individuals. In addition, however, a number of species were found which today live principally in running streams with clean, stony beds. These species, mostly Dryopidae and Helmididae were represented by more than 130 individuals. Most of these beetles would be difficult to find in the Worcestershire Severn today and in fact some, e.g. *Helichus substriatus* and *Macronychus quadrituberculatus*, have very restricted distributions in Britain. This phenomenon, of aquatic insect remains typical of, on the one hand, slowly moving or stagnant water and on the other of rapidly flowing streams, occurring together has been noted in a number of sites of pre-Roman age (Osborne 1988), Stourport being the most recent described to date. The cause of this phenomenon has been tentatively interpreted as the deposition in recent times of a layer of mud or silt on the bottoms of our larger rivers as a result of tree-felling and deep ploughing with consequent massive outwash of

topsoil into the rivers (Osborne, *op. cit.*) Furthermore, evidence is accruing to suggest that this effect, of species such as *Macronychus quadrituberculatus* and *Stenelmis canaliculatus* occurring in slowly flowing Midlands rivers well away from their present day known localities, may be seen up till industrial revolution times (Osborne, in prep.).

Evidence supplied by the caddisflies (above) reinforces that of the beetles in this supposition. Most of those recorded build larval cases of sand grains or spend their larval existence in tubes constructed on the surface of submerged stones. Neither of these habitat requirements would be satisfied by a substantial deposit of mud on the river bottom.

Climate

There is little in this fauna to suggest a thermal environment differing significantly from that of today. Virtually all the species recognised are still on the British List and most would be at home in Worcestershire now. The only species not known to be living in Britain at present is the cucujid *Airaphilus elongatus*, a species apparently found in marshy meadowland. It has been found in a number of Late Glacial and Flandrian sites in Britain, with Stourport as its last known occurrence here to date. There are several possible reasons for its absence today (though it may still be living here unnoticed). Precedents for this situation include *Ernoporus caucasicus*, first noted as 'British' during the 1940s (Allen, *op. cit.*) but subsequently found to have been widespread during Neolithic and Bronze Age (and now Roman) times and *Stenelmis canaliculata*, discovered in Lake Windermere in 1956 (Claridge and Staddon 1961), which again has proved to have been quite generally distributed until fairly recently. On the other hand *Airaphilus* may have become extinct with the disappearance of some unrecognised but vital part of its habitat as a result of man's activities. An analogous situation is provided by beetles dependent on dead wood. Many species are known to have disappeared from this country over the last few thousand years as the forests have declined because of the growth of agriculture, and the pitiful remnants have been cleaned up, first by such agencies as firewood collecting and rooting by pigs and (more lately) in the interests of forestry (e.g. Osborne 1972).

The other possibility is that *A. elongatus* was a victim of the so called 'Little Ice Age'. Precedents for this are very few, probably

because little research has been carried out on faunas which lived close either side of this event. The most likely candidates, hitherto, were *Gyrinus colymbus* (Girling 1984) a whirligig beetle found in medieval Leicestershire but now found no nearer than the eastern seaboard of France or southern Norway, *Aphodius quadrimaculatus*, a French species recorded here from a Bronze Age deposit (Osborne, 1969) and the widespread European ladybird *Coccinula quattuordecimpustulata*. It is possible that a number of species were eliminated from Britain by this cold spell but the effect may be to some extent hidden by the existence of exotic beetles imported from the continent to 'improve' the cabinets of collectors in Victorian times (see Allan 1943). Many specimens now reside in old British collections which are no longer found here but which still find a place in the British List, but it is noticeable that many of these are large or brightly coloured or otherwise collectable, whereas those which are now very rare or extinct but which can be proved from fossil evidence to have been living in this country prior to the rise of the Victorian collector, such as *Ernoporus*, *Stenelmis*, *Gyrinus colymbus* and now possibly *Airaphilus*, are small, dowdy and obscure.

Further research will probably clarify the status of *Airaphilus* in Britain. Its presence, however, in a fauna otherwise notable for its ordinariness is not enough to justify any conclusions about the contemporaneous climate. The overwhelming majority of those insects identified suggest climatic conditions very like those of today.

Conclusions

The environmental picture presented by the Stourport insect fauna of rural midland Britain is one of mixed open and wooded country, much like present day Worcestershire but probably with a much cleaner River Severn running over a bed of sand, gravel and stones rather than the mud and silt seen today.

Acknowledgments

My thanks are chiefly due to Mr Ivor Gough who brought the site to our notice and allowed sampling to go on despite the work on the marina. I would also like to thank Miss Bridget Wilkinson for her great contribution in identifying the caddis fly remains, without which any conclusions reached would have been much diminished in value.

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