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Norton Mill , Cleveland .

In autumn 1978 the site of a water mill at Norton-on-Tees was excavated . The mill ceased operation in 1920 , was damaged by a bomb in 1940 and subsequently dynamited in 1947 .

During the excavation three samples were taken for biological analysis . Two were samples taken from water-lain sediments in the culvert between walls 17 and 25 in the northern section of the excavation (see Bennett et al , 1979) , the channel for water from the upper mill pond into the mill ; the third sample was collected from deposits in what was assumed to be a lower mill pond . The stratigraphy within this latter feature , a depression below and south of the mill , showed a 20 cm. depth of muddy deposits with many building debris , overlying 'undisturbed' sands .

The samples were washed in water through a 150 um sieve and the identifiable remains extracted by parafin flotation (Kenward , 1974) . The samples were subsequently dried and sorted under the microscope and the floats were likewise sorted for identifiable plant and animal remains . The fauna and flora that have been identified from these samples are listed in the table .

The deposits from the culvert produced no evidence of open water from the botanical remains . Therrushes and ragged robin do grow in damp or fen areas , often near water , but there are no truly aquatic plants present . The remaining species are frequently found on waste ground and around settlements and buildings .

Norton Mill , 1978 .

Table of identified biological remains .

SPECIES	C1	C1C2	C2	M-P	
Plants					
Atriplex patula/hastata (Orache)		1		3	seeds
Chenopodium album (Fat Hen)		77		52	seeds
Crataegus sp. (Hawthorn)				4	fruitstones
Cirsium sp. (Thistle)				9	achenes
Hypericum sp. (St.John's Wort)			1		seed
Juncus effusus/conglomeratus (Rushes)		26	9		seeds
Juncus articulatus/acutiflorus (Rushes)			4		seeds
Lychnis flos-cuculi (Ragged Robin)			1		seed
Papaver sp. (Poppy)			1		seed
Potentilla sp. (Tormentil)				1	achene
Ranunculus acris type (Buttercup)				14	achenes
Rubus idaeus (Raspberry)				1	achene
Rumex sp. , crispus type (Docks)				110	nutlets
Sambucus nigra (Elder)				2 s	seeds
Stellaria alsine (Bog Stitchwort)				3	seeds
Urtica dioica (Nettle)		8	11	87	seeds
Urtica urens (Small Nettle)				1	seed
Animals					
Annelida , Lumbricidae		x	x	x	egg case
Crustacea, Cladocera		x	x		ephippia
Ostracoda		x	x		carapaces
Diplopoda		x			segment
Insecta , Trichoptera		x			Larval parts
Diptera , Chironomidae		x			Larval heads
Coleoptera , Helophorus sp.		x	x	x	
Curculionidae		x	x	x	
?Tachinus sp.		x			
Oxytelus sp.				x	
Cercyon sp.				x	
Bembidion sp.				x	
Carabidae				x	
Hymenoptera , Formicidae		x			

Table (contd)

Mollusca , Gastropoda :-Pulmonata:	C1	C2	M-P
Limnaea peregra O.F.M.	1	3	
Planorbis cf. parinatus (O.F.M.)	5	2	
Planorbis sp.	1		
Carychium tridentatum (Risso)	1		
Discus rotundatus (Mullef)	1		
Operculata:-			
Valvata piscinalis (O.F.M.)	7	3	
V. cristata O.F.M.	4	4	
Bithynia tentaculata (Linn.)	1	1	
Lamellibranchiata :-			
Sphaerium lacustre (Muller)	5		
Pisidium sp.	1		

x - present but uncounted .

A large number of coleopteran remains were found but no attempt has been made to identify these besides noting the genera mentioned above .

In contrast to the botanical evidence the animal remains found within these two samples show a definitely aquatic habitat consistent with the sedimentary nature of the deposit . A number of freshwater mollusc species were identified and the undamaged condition of the periostracum and the more fragile specimens suggests that the fauna is a biocoenosis . Further evidence of the aquatic habitat is indicated by the presence of Ostracoda and Cladocera (freshwater crustaceans), and the larvae of Chironomidae and Trichoptera . Specimens of the coleopteran genus Helophorus are also present , but since not all members of this genus are facultative aquatics little weight can be attached to these specimens without specific identification . Many other groups of coleoptera and other invertebrates are also represented but the expenditure of further time on the identification to species

level of this material would appear to be unnecessary .

The depression south of the mill was surrounded by hawthorn trees. The plant remains identified from the sample of mud by no means indicate open water , and at best suggest a damp hollow receiving nutrient-rich surface drainage , possibly from the mill buildings , a habitat very similar to that of the present day . The invertebrate fauna in contrast to the samples from the culvert is lacking aquatic indicators although there is a member of the genus Helophorus present.

An aspect of particular interest in the examination of the biological remains from the culvert samples is the contradictory nature of the botanical and zoological evidence. Possibly colonisation by plants of the sides and banks of this brick walled culvert and upstream reaches of the mill race was difficult . The documentary evidence for the mill details the repeated cleaning of the Northmeadowburn and the Millburn in the fifteenth and sixteenth centuries and it may be assumed that this continued for as long as the mill race was in use ; the removal of vegetation and accumulating silt would no doubt have been regular . The presence in the top sample (C2) of the culvert of a plastic comb tooth indicates that these deposits are twentieth century and certainly post-date the cessation of milling . It seems unaccountable that a deposit which contains a fauna of freshwater molluscs and was laid down after the mill ceased to function does not include botanical remains of aquatic habit .

The biological evidence in no way supports the suggestion

that the hollow to the south was a mill pond (see Bennett et al, 1979) , neither does the stratigraphy . Since the deposition of the organic mud is likely to be relatively recent and the flora and fauna is consistent with the present state of the depression it may be that the hollow , or its damp nature are of recent origin . In neither plate II or plate III (see Bennett et al) is a mill pond visible in the position of the present hollow , although in the latter a slight hollow is present though of a more pastoral nature than the present habitat . The conclusion must be that waste water was channelled directly from the wheel-pit to the still visible tail-race .

The results of this analysis serve to illustrate the importance of utilising more than one line of evidence when assessing the environmental implications of the data from a sample .

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D.J.Rackham Oct. 79

Bennett,J and Vyner,B.E. (eds) 1979 , The water-mill at Norton-on-Tees , Cleveland County Council , Education Dept.