Ancient Monuments Laboratory
Report 49/86

PLANT MICROFOSSIL REMAINS FROM THE 1984-85 EXCAVATIONS AT FLAG FEN, CAMBS.

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Summary

A pilot survey of the plant microfossil remains from 59 samples of wood or sandy detritus peat, associated with a Late Bronze Age timber platform at Flag Fen, Cambs., was undertaken to study the environmental setting of the platform and to look for evidence of human activity- in particular for the plants used by the inhabitants. Not surprisingly, the assemblages were dominated by aquatic and waterside taxa with a few weeds of cultivated and waste ground. Most of the weeds were found in samples from within a 'structure', but since some, at least of the seeds were clearly modern contaminants, probably from water used to spray the waterlogged wood or from cultivated soil above the Bronze Age Levels, no very useful conclusions can be drawn from the evidence obtained. It is suggested that future sampling policy take account of the problems of contamination, but it is also emphasised that routine, large-scale analyses of deposits of this kind may yield rather little useful archaeobotanical information.

Author's address:

Environmental Archaeology Unit
University of York
Heslington
York YO1 5DD

0904 430000 x5531

Plant macrofossil remains from the 1984-5 excavations at Flag Fen, Cambridgeshire

Introduction

Samples from the 1984-5 excavations of a Late Bronze Age unenclosed timber platform site at Flag Fen, near Peterborough, Cambridgeshire, were analysed by the authors as a pilot study to check on the nature of the plant macrofossil assemblages present and to ascertain the likely value of further archaeobotanical work at this site.

A total of 59 samples was examined from areas of the excavation interpeted as a 'structure', 'yards' to north and south of it, and a revetment to the south.

Materials and methods

Lithologically, the samples fell into two basic types: well-humified herbaceous detritus peat, with a variable content of wood fragments, and woody detritus peat with a modest content of sand (Table 1). The samples of sandy peat all came from layers interpreted as having formed inside the structure identified as standing on the platform, the sand having presumably been strewn on the platform to make a drier floor. The sand-free peats came from inside and outside the structures (for example, from the areas interpreted as 'yards').

The extent of analysis for each sample is given in Table 1. Sub-samples of 200 g were taken for the sandy peats, and of 100 g for the remainder. All sub-samples were disaggregated initially in water (for the unconsolidated sandy peats) or dilute sodium hydroxide (for the herbaceous peats) and then washed through a bank of sieves (smallest mesh size 300 um).

It was apparent at quite an early stage that some of the seeds present were modern contaminants, for seedlings were observed in some sample bags and seeds were found to have started germinating during processing. Rather than abandon the entire project, however, it was felt that it would still be useful to examine all the available material, but that detailed work on every sample was not justified..

Thus for the non-sandy detritus peats, all material from each fraction was examined and counts made of all taxa, though not all the macrofossils were extracted from every sample. For the sandy peats, the finest (less than 1 mm) fraction was only half-sorted; generally speaking, the material from this fraction that was examined proved to contain very few identifiable plant macrofossils.

Results and interpretation

In the results presented here, a three-point scale has been used to indicate the abundance of the taxa. This has been adopted in part because not all samples were sorted completely, and in part because differences in numbers of individuals of taxa between samples do not necessarily reflect meaningful variations in the vegetation from which they came. It is a way of reducing 'noise' and thereby of limiting the way in which the data can be examined to a search for gross patterns,

rather than fine details.

Table 2 shows the results of the analyses; nomenclature follows Tutin et al. (1964-80), and Clapham et al. (1962) for section and subgenus taxa. The abundance scores are approximately as follows: '1' represents one or a few individuals per kilogramme, '2' a modest number (tens per kg), and '3' a large component of the assemblage (hundreds per kg). The plant taxa have been grouped according to their phytosociological affinities, the classes 'Lemnetea', 'Potamogetonetea' etc., following authors like Oberdorfer (1983) in lieu of a phytosociologically-based British flora. The group in which each taxon has been placed is the one in which in the authors' opinion it is most likely in nature in the context of lowland British peatland. It could be argued that other groupings or arrangements are equally valid. These plant groups are designated by arabic numerals.

The sums of taxa and of abundance scores for the various plant taxon groups in Table 2 are presented in Table 3, together with the sums for each taxon group and for all groups taken together.

For purposes of cross-site and inter-context comparisons, the samples have been divided into a series of groups (designated by Roman numerals) based on the archaeological data available concerning their provenance (Table 1). Thus Group I comprises 16 samples from the 'yard' to the north of the structure, and so on. Table 4 presents the mean values for the sums of taxa for taxon Group 1 and the means sums of abundance scores for all taxon groups for these sample groups, as well as two larger groups comprising all 'indoor' samples and all 'outdoor' samples from the south side of the 'structure'.

It is clear from these tables that many taxa are represented by a score of '1' (often only one individual) from one or a few samples only; this is the case for all taxa in Groups 2-4. Several of the wetland taxa are present in small or more significant numbers in almost every sample, however. They must represent the local background rain of propagules from plants in the vegetation at and around the site - the plants that contributed to peat formation. Although mostly well-preserved, none of the remains of plants in this category were considered to be modern contaminants, though this possibility should not be ruled out. Some, like Lemna, represent standing open water, whilst others would probably have come from stands of tall emergent vegetation at the water's edge. The records of caddis fly larval cases and Daphnia ephippia point to the presence of standing or even flowing water at some point in the formation of the peats.

There is an increase in the number and abundance of wetland taxa in almost all sub-groups within taxon group 1 across the sampled area from the 'yard' to the north of the 'structure' (sample Group I) to the 'yard' and 'perimeter revetment' to the south (Groups IV and V resepctively), which may reflect the location of the vegetation supplying the remains. This gradient is reflected also in the means for the abundance scores for the whole assemblages summed for each sample group (bottom line of Table 4); it can be seen that it is the wetland taxa alone which account for this.

Plants of disturbed habitats (for this purpose plants classified in Bidentetea (Group 2A) have been included with 'weeds' rather than 'wetland' taxa) show a somewhat different pattern, being more abundant in samples from within the structure than outside. At face value, this might suggest the carriage of weed taxa indoors with plants used by the

inhabitants for some purpose. However, if weeds were present in the yards, their seeds should surely figure as clearly in the 'outdoor' samples. Moreover, the fact that many of the seeds in this category appeared very fresh and, more convincingly, that some Chenopodium ficifolium seeds began to germinate during processing, means that no great importance can be attached to the pattern seen in the results. These modern weed contaminants may have been introduced with water pumped from a nearby dike and sprayed onto the timbers to prevent desiccation, or they may perhaps have been brought down by earthworms (whose egg capsules were present in many samples, see Table 2) from agricultural soil above the archaeological layers. At such an open site as this, the possibility of contamination from wind-blown propagules cannot be ruled out.

The other categories of plant taxa are relatively uninformative. The slightly higher values for 'woodland' plants in 'indoor' samples are mostly accounted for by occasional seeds of plants with edible fruits (blackberry, sloe and elderberry), and these might have been food for the inhabitants of the structure, but the evidence is at best rather tenuous (cf. Table 2). It is difficult to assess the significance of taxa in group 4. These are unplaced because they could not be identified more closely or because of wide ecological amplitude. They are rather more abundant in one of the groups of 'indoor' samples than elsewhere, but the taxa concerned cannot be interpreted as a natural grouping in any way. The spikelet fragments of Gramineae included one charred glume of a cereal flower from sample M30 (marked + in Table 2); although very fresh, it could have been a fossil (Dr G. E. M. Jones, pers. comm.), but in view of the known contamination by live seeds, the status of this cereal fragment must remain in doubt.

Concluding Remarks

This modest survey of peats associated with a prehistoric structure in a waterlogged environment has provided rather limited information of value to the archaeologist or archaeobotanist. The range of taxa recorded primarily gives evidence of the surrounding wetland vegetation which could, in broad terms at least, have been predicted from the context of the site and the nature of the deposits. It has yielded only ambiguous evidence for human activity, probably because of an unfortunate practical exigency (the use of water from a nearby ditch to limit damage through the drying out of the excavated surfaces), or a function of the proximity to the archaeological layers of a living soil.

For the future, it may be most useful to examine a few samples in the same way as described here, to keep a check on the nature of the peat and the plant assemblages preserved within it, but to sample in detail only those layers which appear different from the basic 'matrix' by virtue of their texture or colour. Large-scale sieving of the easily-disaggregated sandy 'indoor' deposits (using clean water!) might yield more useful information, though on the basis of this survey the prospects seem slim. (With hindsight, and had there been no contamination, it might have been profitable to bulk-sieve the sandy peats to check further for plants indicative of human activity). Naturally, 'spot' finds of plant remains visible during excavation will be an important priority.

Acknowledgements

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Appendix

Identifications of 'spot' finds

of nutshell from Flag Fen, 1984-5

The following 'spot' finds have been identified as hazel nut, Corylus avellana L.:

Area 1/Level 4 2712/8890

Area 2/Level 1 2716/8889

Area 3/Level 3 2715/8889, 'by W5246'

Hazel is perhaps unlikely to have grown in the very wet environment indicated by the bulk of the other plant macrofossil remains and may perhaps be considered to have been brought by the inhabitants of the site for food.

Table 1. Data concerning the location and nature of the samples analysed and details of the method of analysis employed

Sample	Area	Level	Location (1)	Sand	%Wood (2)	Sample size (g)	Extent of sorting (3)
Group I							
M1	1	1	OSNY	–	50	100	A
M2	1	1	OSNY	–	40	100	A
M3	1	2	OSNY	–	40	100	A
M4	1	3	OSNY	–	45	100	A
M5	1	3	OSNY	–	50	100	A
M6	1	3	OSNY	–	50	100	A
M7	1	3	OSNY	–	50+	100	A
M8	1	3	OSNY	–	50+	100	A
M16	1	4	YN	–	30	100	A
M17	1	4	YN	–	50	100	A
M18	1	4	YN	–	20	100	B
M19	1	4	YN	–	30	100	A
M20	1	4	YN	–	50	100	A
M21	1	4	YN	–	50	100	A
M22	1	4	YN	Sample not received			
M23	1	4	YN	–	10	100	A
M24	1	4	YN	–	60	100	A
Group II							
M9	2	2	ISNY	+	50+	200	C
M10	2	3	ISNY	+	50+	200	C
M11	3	2	ISNY	+	30	200	C
M12	3	2	ISNY	–	30	100	A
M13	3	2	ISNY	–	30	100	A
M14	3	2	ISNY	+	30	200	C
M15	3	2	ISNY	–	30	100	A
Group III							
M27	2	3	HI	–	40	100	B
M28	2	3	HI	–	40	100	A
M29	2	3	HI	+	20	200	C
M30	2	3	HI	+	30	200	C
M31	2	3	HI	+	30	200	C
M32	2	3	HI	+	50+	200	C
M33	2	3	HI	+	30	200	C
M34	3	3	HI	+	30	200	C
M35	3	3	HI	+	40	200	C
M36	3	3	HI	+	40	200	C
M37	3	3	HI	+	40	200	C
M38	3	3	HI	+	40	200	C
M39	3	3	HI	–	–	100	B
M40	3	3	HIID	–	–	100	B
M41	3	3	HIID	–	–	100	B
Group IV							
M42	3	3	OH	–	–	100	B
M25	4	2	YS	–	40	100	A
M43	4	3	YS	–	40	100	A

contd.

Table 1 contd.

M44	4	3	YS	-	-	100	B
M45	4	3	YS	-	-	100	B
M46	4	3	YS	-	-	100	B
M54	9	1	YS	-	5	100	B
M55	9	1	YS	-	50	100	A
M56	9	1	YS	-	-	100	B
M57	9	1	YS	-	10	100	B
M58	9	1	YS	-	10	100	B
M59	9	1	YS	-	10	100	B
M60	9	1	YS	-	30	100	B
M26	9	1	PR	-	40	100	B
Group V							
M47	10	1	PR/YS	-	-	100	B
M48	10	1	PR/YS	-	-	100	B
M49	10	1	PR/YS	-	-	100	B
M50	10	1	PR/YS	-	2	100	B
M51	10	1	PR/YS	-	-	100	B
M52	10	1	PR/YS	-	40	100	A
M53	10	1	PR/YS	-	-	100	B

Notes:

(1) Areas of site from which samples came are abbreviated as follows (using terminology of excavators); OSNY and YN can probably be regarded as the same:

HI - house interior
HIID - house interior (just inside 'doorway')
ISNY - inside structure in north 'yard'
OH - outside house
OSNY - outside structure in north 'yard'
PR - perimeter revetment
YN - 'yard' to north of structure
YS - 'yard' to south of structure

(2) The content of wood fragments is an approximate estimate by volume. Where no figure is given, it is likely that at least traces of wood were present.

(3) The degrees of sorting and scoring were as follows:

A - whole residue sorted; all macrofossils counted and retained

B - whole residue sorted; all macrofossils counted but not all retained

C - residue smaller than 1 mm half-sorted only; macrofossils not retained

Table 2. Results of the analyses. This large table consists of 16 separate sheets arranged in the following pattern:

1	2	3	4
5	6	7	8
9	10	11	12

It has proved impossible to produce a legible photo-reduced single-sheet version of this table in the time available.

Key to types of remains: a - achene(s); car - caryopsis/es; fca - female cone axes; fl - flower(s); fr - fruit(s); fst - fruitstone(s); m - mericarp(s); n - nut(let)(s); pf - pod fragments; pyr - pyrene(s); s - seed(s); sht - shoot(s); * - certainly or probably modern contaminant (g - seeds germinated during processing); + - charred cereal glume

Sheet 1

Taxon and type of remains	Sample	M1	M2	M3	M4	M5	M6	M7	M8
Group 1: Plants of wetland habitats									
A. LEMNETEA (free-floating duckweed mats of eutrophic waters)									
Lemna sp(p). (s)		2	1	2	2	3	2	1	1
B. POTAMOGETONETEA (perennial rooted aquatic vegetation)									
Hippuris vulgaris L. (s)		-	-	-	-	-	-	-	-
Nymphaea alba L. (s)		-	-	-	-	-	-	1	-
Potamogeton sp(p). (pyr)		-	1	-	-	-	-	-	-
Ranunculus Subg. *Batrachium* (DC) A. Gray (a)		2	2	2	3	2	2	2	2
C. PHRAGMITETEA (emergent marginal aquatic tall sedge, grass and herb vegetation)									
Alisma sp(p). (fr)		3	2	2	3	2	2	2	2
Berula erecta (Huds.) Coville (m)		-	-	-	-	-	-	1	-
Cicuta virosa L. (m)		-	-	-	-	-	-	-	-
Lycopus europaeus L. (n)		-	-	-	-	-	-	-	-
Ranunculus cf. *lingua* L. (a)		-	-	-	-	-	-	-	-
Sparganium sp(p). (fr)		-	-	-	-	-	-	-	-
D. UNPLACED (probably wetland)									
Carex sp(p). (n)		-	2	1	1	-	2	2	2
Eleocharis sp(p). (n)		-	-	-	-	-	-	-	-
Glyceria sp(p). (car)		-	-	-	-	-	-	-	-
Oenanthe sp(p). (m)		1	2	-	2	1	2	2	1
E. SCHEUCHZERIO-CARICETEA FUSCAE (meso-trophic peatland)									
Hydrocotyle vulgaris L. (m)		-	-	-	-	-	-	-	-
Ranunculus flammula L. (a)		-	-	-	-	1	-	-	1
F. ALNETEA (fen carr)									
Alnus glutinosa (L.) Gaertn. (fr)(fca present, not counted)		-	-	-	2	-	1	1	1

Sheet 2

M16	M17	M18	M19	M20	M21	M23	M24	M9	M10	M11	M12	M13	M14	M15	M27	M28
-	1	1	-	2	1	1	1	1	1	1	2	2	1	2	2	1
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1
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2	2	2	3	2	3	1	3	1	1	2	-	1	1	-	2	-

Sheet 3

M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M25	M43	M44	M45
1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	2	1	2
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	2	1	1	1	1	1	1	1	1	1	2	3	1	2	2	2

Sheet 4

M46	M54	M55	M56	M57	M58	M59	M60	M26	M47	M48	M49	M50	M51	M52	M53
1	2	3	3	2	2	2	2	2	3	3	2	2	3	2	2
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
2	1	2	1	1	2	2	1	2	1	1	1	1	2	1	-

Group 2: Plants of disturbed habitats								
A. BIDENTETEA (weed communities of damp, nutrient-rich soils)								
Bidens sp(p). (a)	-	-	-	-	-	-	-	-
Chenopodium ficifolium Sm. (s)	-	-	1*	-	-	-	-	-
Polygonum lapathifolium L. (n)	-	-	-	-	-	-	-	-
Rumex cf. *maritimus* L. (fl)	-	-	-	-	-	-	-	-
B. ARTEMISIETEA (biennial to perennial weed communities of waste places, waysides, woodland-margins and river banks)								
Aegopodium podagraria L. (m)	-	-	-	-	-	-	-	-
Lapsana communis L. (a)	-	-	-	-	-	-	-	-
Solanum dulcamara L. (s)	-	-	-	-	-	-	-	1
Urtica dioica (a)	-	-	-	-	-	-	-	-
C. CHENOPODIETEA (annual and biennial weed communities of cultivated and waste places)								
Aethusa cynapium L. (m)	-	-	-	-	-	-	-	-
Atriplex sp(p). (s)	-	-	-	-	-	-	-	-
Brassica rapa L. (s)	-	-	-	-	-	-	-	-
Capsella bursa-pastoris (L.) Medic. (s)	-	-	-	-	-	-	-	-
Chenopodium album L. (s)	-	-	-	-	-	-	-	-
Solanum nigrum L. (s)	-	-	-	-	-	1	-	-
Sonchus asper (L.) Hill (a)	-	-	-	-	-	-	-	-
Stellaria media (L.) Vill. (s)	-	-	-	-	-	-	-	-
Tripleurospermum inodorum s.l. (a)	-	-	-	-	-	-	-	-
D. SECALINETEA (weeds of cereal fields)								
Aphanes microcarpa Boiss. & Reut. (a)	-	-	-	-	-	-	-	-
Bilderdykia convolvulus L. (n)	-	-	-	-	-	-	-	-
Raphanus raphanistrum L. (pf)	-	-	-	-	-	-	-	-
E. PLANTAGINETEA (communities of trampled places)								
Polygonum aviculare agg. (n)	-	-	-	-	-	-	-	-

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Group 3: Plants of drier woodland and scrub								
A. EPILOBIETEA (communities of woodland clearings and scrub)								
R. idaeus L. (s)	-	-	-	-	-	-	-	1
B. QUERCO-FAGETEA (deciduous woodland of drier soils)								
Mercurialis perennis L. (fr)	-	-	-	-	-	-	-	-
Prunus spinosa L. (fst)	-	-	-	-	-	-	-	-
Rubus fruticosus agg. (s)	-	-	1	-	-	-	-	-
Sambucus nigra L. (s)	-	-	-	-	-	-	-	-
Group 4: UNPLACED (no habitat assigned)								
Cerealia/Gramineae (charred spikelet fragments)	-	-	-	-	-	-	-	-
Lamium Section *Lamiopsis* (n)	-	-	-	-	-	-	-	-
Mentha sp(p). (n)	-	-	-	-	-	-	-	-
Myosotis sp(p). (n)	-	-	-	-	-	-	-	-
Ranunculus sp. (a)	-	-	-	1	-	-	-	-
R. Section *Ranunculus* L. (a)	-	-	-	-	-	-	-	-
Rubus fruticosus/idaeus (s)	-	-	-	-	-	-	-	-
Rumex sp(p). (n)	-	-	-	-	-	-	-	-
Salix sp(p). (buds)	-	-	-	-	-	-	-	-
Senecio sp. (a)	-	-	-	-	-	-	-	-
Viola sp(p). (s)	-	-	-	-	-	-	-	-
OTHER REMAINS								
indet. moss (sht)	-	1	-	-	-	-	-	-
caddis (larval cases)	-	-	-	-	-	-	1	1
Daphnia (ephippia)	2	1	-	1	2	2	2	2
earthworm (egg capsules)	1	-	1	-	-	-	-	-

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Table 3. Sums of taxa and abundance scores calculated from data in Table 2. This large table is arranged on the following sheets in this way:

1	2	3	4
5	6	7	8

Sheet 1

Sample	M1	M2	M3	M4	M5	M6	M7	M8	M16	M17	M18	M19	M20	M21	M23
Group 1A															
Sum T	1	1	1	1	1	1	1	1	–	1	1	–	1	1	1
Sum A	2	1	2	2	3	2	1	1	–	1	1	–	2	1	1
Group 1B															
Sum T	1	2	1	1	1	1	2	1	1	–	1	–	1	–	–
Sum A	2	3	2	3	2	2	3	2	1	–	2	–	1	–	–
Group 1C															
Sum T	1	1	1	1	1	1	2	1	1	–	2	1	1	5	2
Sum A	3	2	2	3	2	2	3	2	1	–	3	1	1	5	2
Group 1D															
Sum T	1	2	1	2	1	2	2	2	1	–	1	–	2	1	1
Sum A	1	4	1	3	1	4	4	3	1	–	1	–	2	1	1
Group 1E															
Sum T	–	–	–	–	1	–	–	1	–	1	–	–	–	–	–
Sum A	–	–	–	–	1	–	–	1	–	1	–	–	–	–	–
Group 1F															
Sum T	–	–	–	1	–	1	1	1	1	1	1	1	1	1	1
Sum A	–	–	–	2	–	1	1	1	2	2	2	3	2	3	1
Totals for Group 1															
Sum T	4	6	4	6	5	6	8	7	4	3	6	2	6	8	5
Sum A	8	10	7	13	9	11	12	10	5	4	9	4	8	10	5
Group 2A															
Sum T	–	–	1	–	–	–	–	–	1	–	–	–	–	1	–
Sum A	–	–	1	–	–	–	–	–	1	–	–	–	–	1	–
Group 2B															
Sum T	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Sum A	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Group 2C															
Sum T	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
Sum A	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–

Sheet 2

M24	M9	M10	M11	M12	M13	M14	M15	M27	M28	M29	M30	M31	M32	M33
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	2	2	1	2	2	1	1	1	1	1	1
1	2	3	1	1	1	2	1	1	3	2	1	2	2	1
1	3	4	2	2	3	2	1	1	4	2	1	3	3	2
1	1	1	1	1	2	1	1	1	2	1	2	2	2	2
1	2	1	1	2	4	1	2	2	3	1	2	2	2	2
–	2	2	2	3	2	2	2	2	2	2	1	2	3	1
–	2	4	3	4	4	2	4	2	3	2	2	2	3	1
–	–	–	–	1	–	–	1	–	–	–	–	–	–	–
–	–	–	–	1	–	–	2	–	–	–	–	–	–	–
1	1	1	1	–	1	1	–	1	–	1	1	1	1	1
3	1	1	2	–	1	1	–	2	–	2	2	2	1	1
4	7	8	6	7	7	7	6	6	8	7	6	8	9	6
6	9	11	9	11	14	7	11	9	11	8	8	10	10	7
–	1	–	–	–	2	–	–	1	–	1	2*?	1*	1	2*
–	1	–	–	–	2	–	–	1	–	1	2*?	1*	1	2*
–	1*	–	–	–	1	1	–	1	–	–	1	–	–	1
–	1*	–	–	–	1	1	–	1	–	–	1	–	–	1
–	–	–	–	–	–	–	–	–	1*	–	–	–	–	2*
–	–	–	–	–	–	–	–	–	1*	–	–	–	–	2*

Sheet 3

M34	M35	M36	M37	M38	M39	M40	M41	M42	M25	M43	M44	M45	M46	M54
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	2	2	3	2	1	2	1	2
3	1	2	2	2	1	1	1	1	1	1	1	1	2	1
4	2	3	4	4	2	3	2	2	3	3	3	3	3	3
1	2	2	2	2	1	2	1	1	1	2	2	1	2	1
2	3	3	3	4	2	4	2	2	3	4	3	3	3	3
3	2	1	2	2	3	1	2	2	2	2	2	2	1	1
4	2	1	2	2	3	2	4	2	4	4	3	4	2	1
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	2	3	1	2	2	2	2	1
10	7	7	8	8	7	6	6	6	6	7	7	6	7	5
13	9	9	11	12	9	11	12	11	14	15	12	14	11	10
1*	1	1*	2*	1	1*	1	–	–	–	–	–	–	–	–
1*	1	1*	2*	1	1*	1	–	–	–	–	–	–	–	–
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–	–	–	–	–	1	–	–	–	–	–	–	–	–	1
–	1	–	2*	–	–	2	–	–	–	2	1	1	–	–
–	1	–	2*	–	–	2	–	–	–	2	1	1	–	–

Sheet 4

M55	M56	M57	M58	M59	M60	M26	M47	M48	M49	M50	M51	M52	M53
1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3	2	2	2	2	2	3	3	2	2	3	2	2
1	1	2	1	1	1	1	1	1	1	1	2	1	1
3	3	4	3	3	2	2	3	3	3	3	4	3	3
2	1	2	3	1	1	1	1	2	2	1	2	2	1
4	3	4	5	3	3	2	3	4	4	2	4	4	2
2	2	2	2	2	2	2	2	1	2	2	2	2	2
3	3	3	4	3	2	2	2	3	5	3	2	2	2
–	–	–	–	–	–	–	2	–	1	–	1	–	–
–	–	–	–	–	–	–	2	–	1	–	1	–	–
1	1	1	1	1	1	1	1	1	1	1	1	1	–
2	1	1	2	2	1	2	1	1	1	1	2	1	–
7	6	8	8	6	6	6	8	6	8	6	9	7	5
15	13	14	16	13	10	10	14	14	16	11	16	12	9
–	2*?	1	1	1	1	–	–	–	1	2	–	–	–
–	2*?	1	2	1	1	–	–	–	1	2	–	–	–
–	2	–	–	–	–	–	–	–	–	1	1	–	–
–	2	–	–	–	–	–	–	–	–	1	1	–	–
1*?	1*?	–	1	–	–	–	–	–	–	–	–	–	2*
1*?	1*?	–	1	–	–	–	–	–	–	–	–	–	2*

Sheet 5

Group 2D

Sum T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sum A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Group 2E

Sum T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sum A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total for Group 2

Sum T	-	-	1	-	-	1	-	1	1	-	-	-	-	1	-
Sum A	-	-	1	-	-	1	-	1	1	-	-	-	-	1	-

Group 3A

Sum T	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Sum A	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-

Group 3B

Sum T	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-
Sum A	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-

Totals for Group 3

Sum T	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-
Sum A	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-

Group 4

Sum T	-	-	-	1	-	-	-	-	3*?	-	2	-	1	-	-
Sum A	-	-	-	1	-	-	-	-	3*?	-	2	-	1	-	-

Total no. T	4	6	6	7	5	7	8	9	8	3	9	2	7	9	5
Total Score A	8	10	9	14	9	12	12	12	9	4	12	4	9	11	5

-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	1

-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-

-	2	-	-	-	4	1	-	2	1	1	3	2	1	6	
-	2	-	-	-	4	1	-	2	1	1	3	2	1	6	

-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-

1	-	-	1	-	-	-	-	-	-	-	3	1	1	-	
1	-	-	1	-	-	-	-	-	-	-	3	1	1	-	

1	1	-	1	1	-	-	-	-	-	-	3	1	1	-	
1	1	-	1	1	-	-	-	-	-	-	3	1	1	-	

-	1	1	-	-	1	-	-	-	2	1	4	2*	3*	3	
-	1	1	-	-	1	-	-	-	2	1	4	2*	3*	3	

5	11	9	7	8	11	8	6	8	11	9	16	13	14	15	

7	13	12	10	12	18	8	11	11	14	10	18	15	15	16	

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–	–	–	1	2	–	–	–	1	–	–	–	–	–	1
–	–	–	1	3	–	–	–	1	–	–	–	–	–	1
–	–	–	1	3	–	–	–	1	–	–	–	–	–	1
3*	–	3	–	–	1	2	1	2	1	2	2	3	–	–
3*	–	3	–	–	1	2	1	2	1	2	2	3	–	–
14	9	11	13	13	10	11	7	10	7	12	10	10	7	7
17	11	13	16	17	12	16	13	15	15	20	15	18	11	12

-	1	-	-	-	-	-	-	-	-	-	-	-	-
-	1	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	6	1	2	1	1	-	-	-	1	3	1	-	2
1	6	1	2	1	1	-	-	-	1	3	1	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	1	-	1	-	-	-
1	-	-	-	-	-	-	-	1	-	1	-	-	-
1	-	-	-	-	-	-	-	1	-	1	-	-	-
1	-	-	-	-	-	-	-	1	-	1	-	-	-
1	-	-	1	1	-	2	1	-	-	1	1	3	2
1	-	-	1	1	-	2	1	-	-	1	1	3	2
10	12	9	11	8	7	8	9	7	9	11	11	10	9
18	18	15	20	15	11	12	14	15	17	16	18	15	13

Table 4. Mean values of sums of taxa (taxon Group 1 only) and sums of abundance scores (all groups), calculated to one place of decimals, for sample groups I to V (see Table 1) and for two pairs of groups taken together. Group II+III represents all 'indoor' samples, IV+V all samples from outside and to the south of the structure. Since all abundance scores for taxa in Groups 2-4 were '1', the values for sums of taxa are the same as for sums of abundance scores.

Sample Group	I	II	III	IV	V	II+III	IV+V	Total
No. samples	16	7	15	13	8	22	21	59
Mean sums of taxa								
Taxon group 1								
Total	5.3	6.9	7.3	6.5	6.9	7.1	6.7	6.5
Mean sums of abundance								
Taxon group								
1A	1.3	1.4	1.1	2.1	2.4	1.2	2.2	1.6
1B	1.5	2.4	2.7	2.9	3.0	2.6	3.0	2.4
1C	2.1	1.9	2.5	3.3	3.1	2.3	3.2	2.6
1D	1.7	3.3	2.3	2.9	2.6	2.6	2.8	2.4
1E	0.2	0.4	0.1	0.0	0.5	0.2	0.2	0.2
1F	1.4	0.1	1.3	1.7	1.1	1.1	1.5	1.3
Total	8.2	10.3	9.9	12.9	12.8	10.0	12.9	10.6
2A	0.2	0.4	1.1	0.5	0.4	0.9	0.5	0.5
2B	0.1	0.4	0.3	0.2	0.3	0.3	0.2	0.2
2C	0.0	0.0	0.5	0.5	0.3	0.4	0.4	0.3
2D	0.0	0.0	0.2	0.2	0.0	0.1	0.1	0.1
2E	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.02
Total	0.3	1.0	2.1	1.5	0.9	1.7	1.3	1.2
3A	0.1	0.3	0.1	0.2	0.3	0.5	0.2	0.3
3B	0.2	0.1	0.5	0.0	0.0	0.4	0.0	0.2
Total	0.3	0.4	0.6	0.2	0.3	0.6	0.2	0.5
4	0.4	0.4	1.7	1.0	1.3	1.3	1.1	1.0
Total for all groups	9.2	12.1	14.3	15.7	15.1	13.6	15.5	13.1