

Pollen Analysis of Four Samples from the River Annan, Dumfriesshire

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Four samples, G5, G7, G8, and G10, collected by Dr W. W. Bishop from an exposed section in the bank of the River Annan, at Roberthill Farm, Dumfriesshire (S35, 110794) were submitted for pollen analysis (Table I.). The samples, with the exception of the uppermost, were from thin peat layers that lie in the middle of a series of water-laid sands, silts and clays several feet in thickness and now rather strongly arched. The lowermost sample, G5, was taken from an organic layer about $\frac{1}{8}$ in. thick overlying fine sand and underlying some $2\frac{1}{2}$ in. of grey, silty fine sand. A narrow layer of sandy peat immediately above the silty, fine sand yielded sample G7, and G8 was collected from a similar peaty layer separated from G7 by more sandy-silty peat. The uppermost sample, G10, was taken from light grey clay 13 in. above sample G8.

The pollen analyses show low values of tree pollen and an assemblage of the pollen of herbaceous and aquatic types of plants (Table I.). Birch (*Betula*) pollen, which is relatively abundant appears on analysis of the ratio of pore-depth to grain-diameter to resemble that of *Betula nana* L. (Walker, 1955), so that the presence of tree birches cannot be inferred. Whereas the occasional grains of pine (*Pinus*) and elm (*Ulmus*) pollen may have been transported from a distance by wind currents or derived from older sediments, there is no reason to doubt that the pollen of willow (*Salix*), juniper (*Juniperus*) and sea buckthorn (*Hippophæ*) was produced locally.

The picture that is presented by the pollen spectrum is therefore that of a landscape of open character, with dwarf birch, willow and juniper stands, and communities intolerant to shading and typical of soils with fairly high base status. Such vegetation is characteristic of the peri-

glacial conditions that are found throughout Britain in the Late-glacial period (Godwin, 1960) and it is to be noted that sea buckthorn (*Hippophæ*), thrift (*Armeria*), rockrose (*Helianthemum*) meadow rue (*Thalictrum*) and nettle (*Urtica*) are habitually found in deposits of this time.

The low values for tree pollen are in accord with analyses from known Scottish Late-glacial sites. The presence of mildly thermophilous plants together with the occurrence of crowberry (*Empetrum nigrum*) and shoreweed (*Littorella lacustris*), both plants with oceanic affinities, is not out of accord with British records for this period, and although the pollen spectrum from each of the four samples may be compared with pollen diagrams of known Allerod sites in Scotland, the pollen analyses from Roberthill do not necessarily indicate an Allerod age for the site. The radiocarbon date of 12940 years B.P. (Q-643) from this site suggests deposition at a time somewhat earlier than the Allerod interstadial itself and it is entirely possible that deposits of the kind described here should have been formed within Zone 1 (Older Dryas time).

REFERENCES

- Godwin, H., 1960. Radiocarbon dating and Quaternary History in Britain. Proc. Roy. Soc. 153B: 287-320.
- Walker, D., 1955. Studies in the Post-glacial History of the British Vegetation XIV. Skelsmergh Tarn and Kentmere, Westmorland. New Phyt. 54: 222-254.
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TABLE I.

Results of the pollen analysis of four samples from the bank of the River Annan, Roberthill Farm, Dumfriesshire. The results are presented as percentages of total pollen.

Plants Recorded	G5	G7	G8	G10
Betula	19	14	24	6
Pinus	tr	1	tr	3
Populus	tr	1	1	
Ulmus	tr			
Hippophæ			tr	
Juniperus	10	11	7	5
Salix	1	2	3	5
Armeria A	x			
Armeria B	tr			
Artemisia	2	4	2	
Caryophyllaceæ			tr	3
Chenopodiaceæ	x		x	
Compositæ	3	1	1	2
Cruciferae	x			
Cyperaceæ	6	12	11	34
Empetrum	2	3	3	1
Epilobium	1			1
Ericaceæ	tr	tr		
Filipendula	1	2	9	2
Gramineæ	43	39	28	44
Helianthemum		tr	tr	1
Leguminosæ			tr	1
Lotus of corniculatus	tr			
Littorella		x	tr	
Potentilla	tr	tr	tr	
Ranunculaceæ	tr	tr	x	
Rubiaceæ	1	1	1	
Rumex	5	4	4	2
Thalictrum	2	1	1	2
Umbelliferae	1	1	1	
Urtica	1			
Valeriana			x	
Myriophyllum alterniflorum	4	3	2	23
M. spicatum	tr	1	tr	
Potamogeton	3	1	2	1
Sparganium		tr	tr	
Equisetum	x		x	1
Filicales			1	1
Polypodium				2
Selaginella				x
Sphagnum			1	

tr=less than one per cent.

x=recorded after the detailed pollen count was completed.