# Appendix 5 – Pollen

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# APPENDIX 5: CONTENTS

# LIST OF ILLUSTRATIONS

# 1 INTRODUCTION

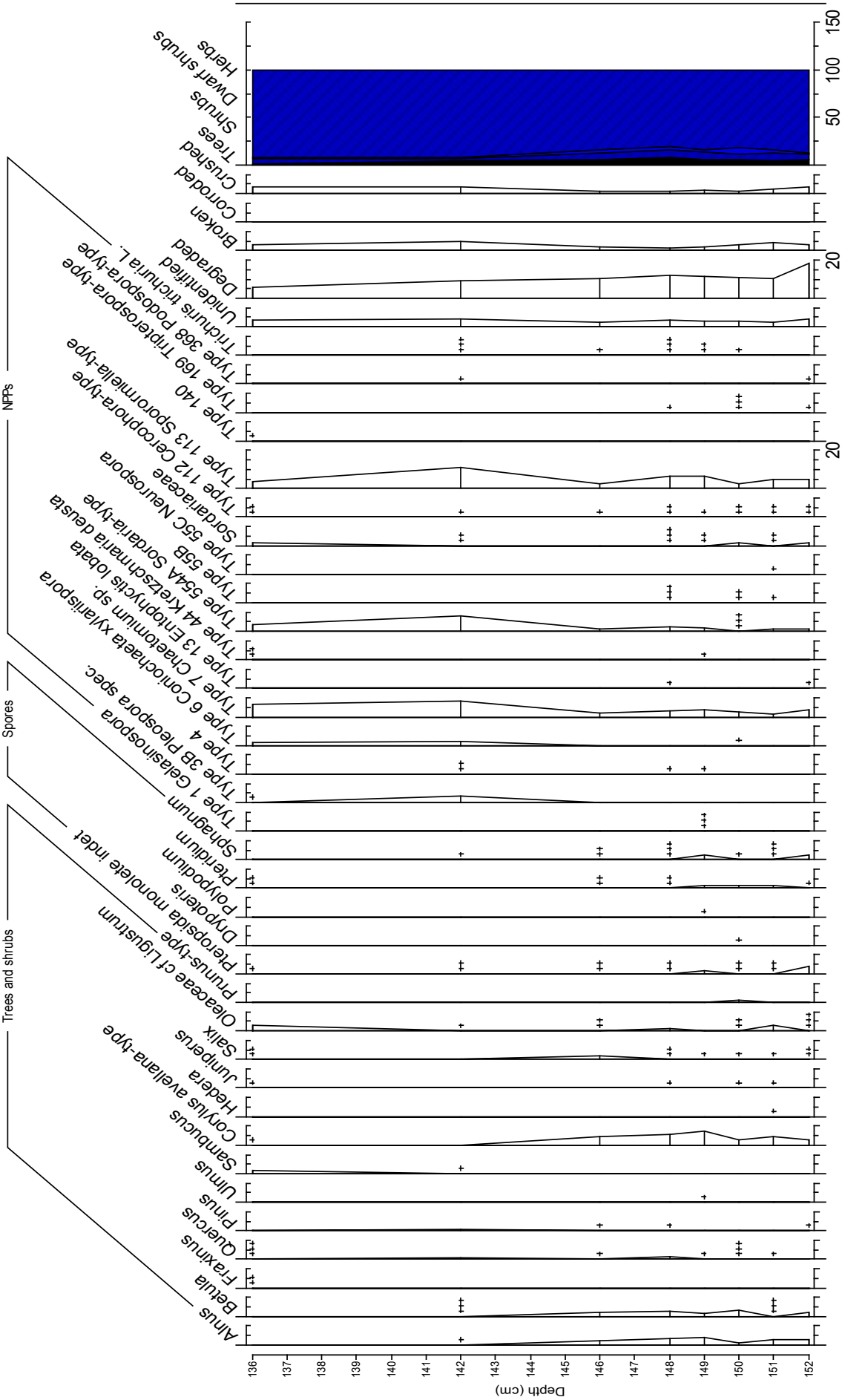
Twenty-four samples from contexts [098] and [090] from a ditch thought to represent an early medieval town boundary were sent to the palaeoecology laboratory, Department of Geography & Environment, University of Aberdeen for pollen analysis.

# 2 METHOD

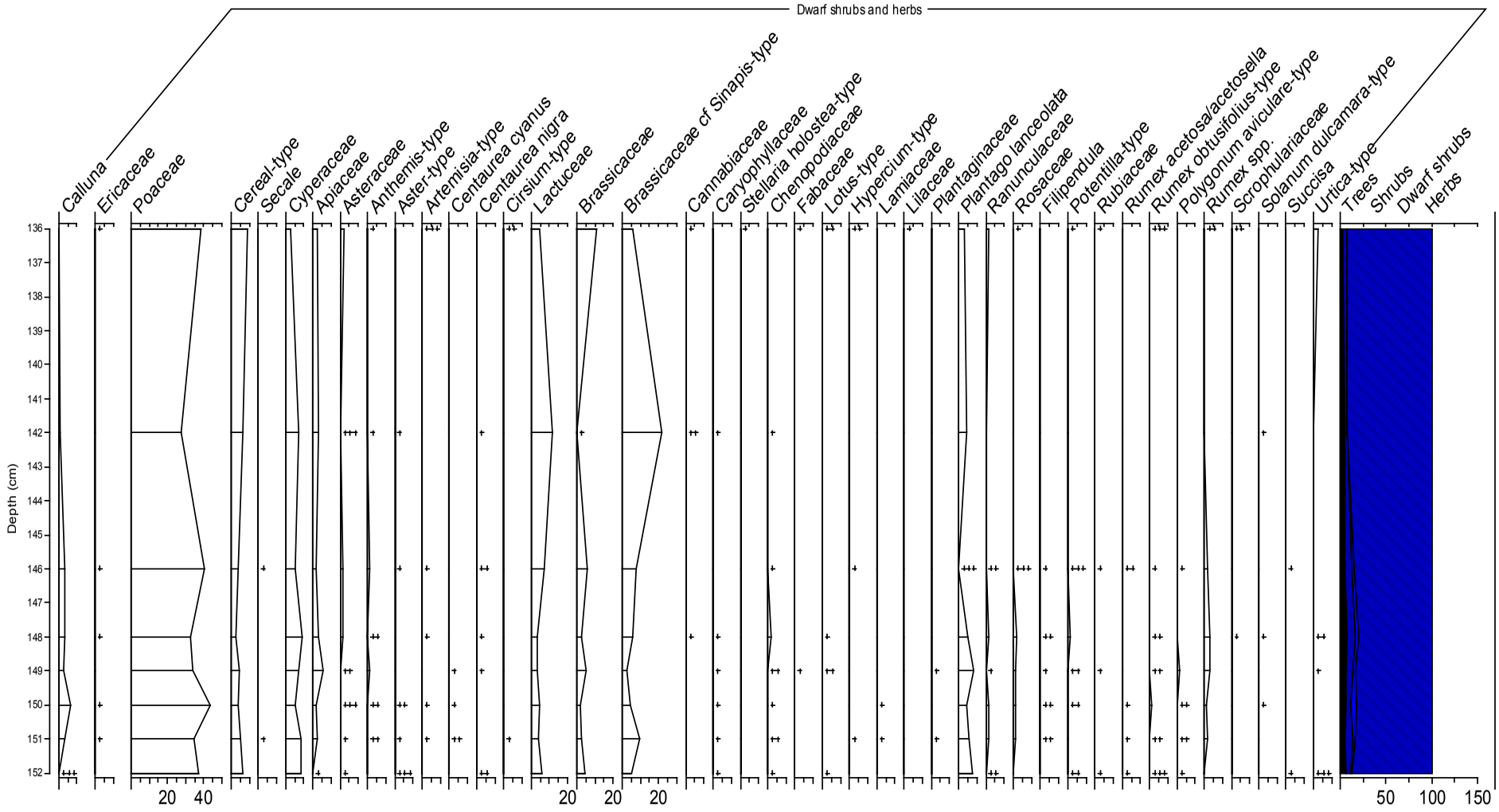
Pollen and non-pollen palynomorph (NPP) data are presented in this report from contexts [098] and [090]. Samples were prepared for pollen and non-pollen palynomorphs (NPPs) following Barber (1976) at selected intervals down the core, with samples at 2cm intervals at selected levels: from 176cm to 190cm from Context [098] and between 241 and 267cm from Context [090]. In order to remove mineral matter, the organic component of each sample was separated using a density flotation method (Nakagawa *et al* 1998). A sum of 300 total land pollen (TLP) was employed in those samples with relatively abundant pollen content, excluding spores and aquatic taxa. At certain depths the pollen content was sparse, so a minimum count of 100 was employed. All data are expressed as a percentage of total land pollen, although spores and aquatics were excluded from the TLP sum, while NPPs are expressed as a percentage of TLP plus total NPPs. Identification, including cereal-type pollen, was aided by reference to the keys in Fægri *et al* (1989) and Moore *et al* (1991). Because the separation of *Myrica gale* from *Corylus avellana*-type pollen is difficult, these grains are classed as *Corylus avellana*-type (Edwards 1981). Plant nomenclature follows Stace (1997) but takes into account the suggestions recommended by Bennett *et al* (1994). Summary curves for trees, shrubs (constituting arboreal pollen, AP) dwarf shrubs and herbs (non-arboreal pollen, NAP) are shown. NPPs were recorded during routine pollen counting and classified using illustrations and descriptions in van Geel (1978; 1986; 2001) and van Geel *et al* (1981; 1983; 2003). The NPP data are expressed as a percentage of total land pollen and NPPs. Rare types are shown as a cross, where one cross denotes one grain or palynomorph.

# 3 RESULTS

A pollen diagram for eight samples from Context [090] is shown in illus 5.1a and 5.1b. Pollen abundance and preservation varied considerably between the contexts and samples. Pollen abundance was poor in the samples from Context [098] but improved in samples from Context [090], therefore the latter samples were targeted for counting. In most of the samples a sizeable proportion of the pollen was degraded, broken or in the case of larger pollen grains, such as cereals, crushed. Differential preservation and possible secondary reworking, therefore, cannot be ruled out (cf Havinga 1985). Counting was restricted to those samples with good pollen content, while the remaining samples were scanned and the pollen taxa identified were recorded. No quantitative method has been used to assess microscopic charcoal, but all the slides contain it and therefore the use of fire, deliberate or accidental, is recorded in the sedimentary sequence.




*Illus 5.1a Pollen diagram: trees*




*Illus 5.1b Pollen diagram: herbs*

# 4 INTERPRETATION

The pollen record preserved in the ditch suggests that the landscape was open and dominated by grasslands. Evidence for woodland is limited, as the total tree and shrub percentages remain below 15%. Possible scattered individual trees or small patches of woodland containing alder (*Alnus*), birch (*Betula*) and hazel (*Corylus avellana*) existed with minor occurrences of oak (*Quercus*), elm (*Ulmus*), pine (*Pinus*) and willow (*Salix*). It is likely alder and willow grew in wet woodland. The number of trees in the landscape diminishes even further from 263cm as the total arboreal pollen percentage gradually decreases up to 251cm. It is possible that woodland was removed deliberately for either domestic or industrial purposes.

The deposits are relatively rich in cereal-type pollen, including rye (*Secale cereale*). While some of these grains might be wild grasses, it is likely that a high proportion reflect agricultural activity close to the ditch, because cereal grains are relatively large in size and therefore they are poorly dispersed by natural agencies (Heim 1962; Behre 1981). Further measurement of these grains will enable us to classify these grains more accurately. Heim (1962), based on observations of modern cereal pollen, suggests that cereal pollen percentages only rise above 4–5% when crops are grown in the immediate vicinity of the site. The cereal-type pollen percentages at St Patrick's Church reach up to 10% TLP in the uppermost samples in the pollen diagram and only fall below 5% TLP at 263cm. Other agricultural indicators of both arable and pasture are well represented. This includes ribwort plantain (*Plantago lanceolata*), cornflower (*Centaurea cyanus*), Goosefoot family (Chenopodiaceae), mugworts (*Artemisia*-type) and thistles (*Cirsium*-type) (MacGuire 1983). The broad-leaved dock (*Rumex obtusifolius*) and other docks and sorrels (*Rumex acetosa / acetosella*) are common by rivers and on waste and cultivated ground (Stace 1997). Pollen from the cabbage family (Brassicaceae) is also well represented, including possible members of the Mustards (*Sinapis*) which grow on waste and arable land.

A grazing-based economy is also supported by the presence of dung indicators, *Cerophora*-type, *Sporormiella*-type and *Podospora*-type in the non-pollen palynomorph record (van Geel *et al* 2003; van Geel 2001. The occurrence of tormentils (*Potentilla*-type) and Devil's-bit scabious (*Succisa*) along with pollen grains from the Carrot family (Apiaceae), buttercup family (Ranunculaceae), nettles (*Urtica*) and the occasional meadowsweet (*Filipendula*) suggests that some of the pasture was relatively wet. Further evidence for dung and/or dead wood is the presence of *Chaetomium* (Type 7) and *Coniochaeta xylariispora* (Type 6) (Innes and Blackford 2003). Evidence of burning is also indicated by the presence of *Gelasinopsora* (Type 1) and *Neurospora* (Type 55C), which is consistent with the regular presence of microscopic charcoal in all of the samples analysed from Context [090].

The ditch may have also been used to discard human waste. Parasitic eggs of *Trichuris trichuria* L. were recorded from most of the samples from Context [090]. *Trichuris trichuria* L., the whipworm, is the most common human intestinal parasite. Because the adult nematode worm inhabits the large intestine of its host, the eggs are passed in the host faeces (Dark 2004). The earliest known occurrence of whipworm occurred in late Mesolithic deposits from south Wales (*ibid*) but archaeological evidence for the presence of the whipworm includes other urban sites such as late Saxon London (de Rouffignac 1991), Viking Age and medieval York, and medieval Winchester (eg Jones 1985; Pike & Biddle 1966). The eggs found at St Patrick's are similar in size and shape to those described by Dark (2004) and therefore are most likely to come from humans rather than *Trichuris* eggs that are associated with animals such as pigs, sheep and cattle. *Trichuris* eggs were also found by rapid scanning of the slide at 130cm, along with cereal-type pollen, suggesting that such agricultural activity continued throughout Context [090].

The samples from Context [098] contained little pollen. A rapid scan of these slides recorded high amounts of elder (*Sambucus*) and Apiaceae pollen with the occasional pollen grain indicative of agricultural activity (eg *Centauera cyanus* at 180cm) in the uppermost samples from 188 to 176cm. At 190cm grasses (Poaceae), Brassicaceae, Apiaceae and Asteraceae were all recorded.