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# The interpretation of pollen assemblages from medieval and post-medieval cesspits: New results from northern Belgium

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## ABSTRACT

Pollen has been studied from cesspits and other archaeological structures containing human faecal remains from different sites in northern Belgium, dating from the 12th to the 17th century. The results show that a large amount of information can be obtained by analysing pollen from such archaeological features. In addition, it is demonstrated that this information is largely complementary to the results obtained by the analysis of botanical macro-remains. The consumption of different food plants like herbs, spices and leafy vegetables, but also the use of honey, pharmaceutical plant use, and the use of peat fuel is reflected in the pollen assemblages from the studied archaeological structures. Most of this information cannot be obtained through the analysis of botanical macro-remains.

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## 1. Introduction

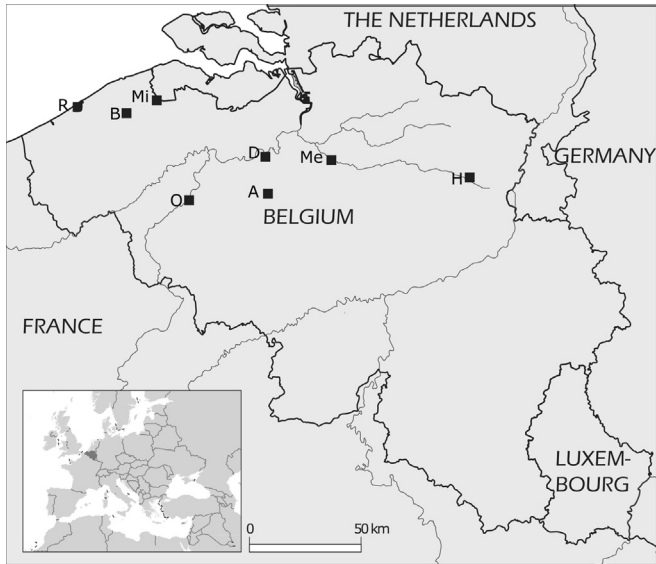
Cesspits, latrines, sewers, garderobe chutes and other kinds of structures containing human faecal material are frequent finds during archaeological excavations in historic urban areas in NW Europe (Sabine, 1934; Greig, 1982a; Addyman, 1989; Van Oosten, 2015). These structures are a very important source of information on former diet, medical practices and other types of plant use. Next to a general good preservation of botanical remains, the direct relation between the botanical content of the faecal material and ingested plant material facilitates interpretation of the results, at least for the botanical macro-remains, like seeds and fruits. Therefore there are numerous studies of botanical macro-remains recovered from this type of archaeological feature (e.g. Moffet, 1992; Dickson, 1996; de Hingh and Bakels, 1996; Hellwig, 1997; Badura, 2003; Märkle, 2005; Fairbairn, 2007; Smith, 2013; Badura et al., 2015). Pollen analysis on the other hand is only very occasionally applied to this kind of archaeological features (Greig, 1994; Smith, 2013). The main reason for this is the general lower taxonomic identification level of pollen compared to seeds and fruits. As a consequence, many crop plants cannot be detected by

pollen analyses as they belong to pollen types that contain several taxa or even whole families. Another important obstacle in the interpretation of pollen assemblages from such features is that it can be very hard to identify how the identified pollen types ended up in the cesspit because of the many possible sources from which these pollen types can originate (Greig, 1982a,b, 1994).

The few published pollen analyses of medieval and post-medieval cesspits and latrines however suggest that, despite these constraints, a large amount of information can be obtained by analysing pollen from such archaeological features. Moreover, this information seems to be largely complementary to the results obtained by the analysis of botanical macro-remains (e.g. Greig, 1981, 1982b, 1994; Knights et al., 1983; Jankovská, 1987; Kuijper and Turner, 1992; Horrocks and Best, 2004; Kalis et al., 2005; Deforce, 2010). This paper now presents the results of pollen analysis of medieval and post-medieval cesspits and other archaeological structures containing human faecal remains from northern Belgium. Issues like the possible origin of specific pollen types, possible taxonomic identification levels and the complementarity of pollen analyses with analysis of botanical macro-remains are discussed. The results are not only important for future analysis of cesspits but can also be useful for the study of gut contents, coprolite analysis and urban archaeological deposits in general.

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**Fig. 1.** Location of the studied sites. A: Aalst (including Aalst – Hopmarkt and Aalst – Stadhuis), B: Bruges, D: Dendermonde, H: Herkenrode, Me: Mechelen (including Mechelen – Begijnenstraat, Mechelen – OLV and Mechelen – Het Steen), Mi: Middelburg, O: Oudenaarde, R: Raversijde.

## 2. Material and methods

A total of 40 samples from 23 features originating from 11 different sites from northern Belgium, which date from the 12th to the 17th century, have been studied. All studied sites are located in Northern and Central Belgium (Fig. 1). From every studied structure, one or more samples were taken from that part of the fill that consisted of 'pure fecal material', avoiding layers of coarse debris and other waste that had been thrown in the cesspit.

**Table 1**  
Mean value (\*) and presence (v) of selected pollen types and macro-remains in the studied archaeological features.

Site	Feature	Feature type	Age	Reference pollen	nb of analysed samples	Cerealia (%)*	<i>Fagopyrum</i>	<i>Anthriscus cerefolium</i>	<i>Borago officinalis</i>	<i>Capparis spinosa</i>
Pollen										
Aalst-Stadhuis II	SP58	unlined cesspit	12B	De Groote et al. (2009)	1	44	–	v	–	–
Aalst-Stadhuis II	SP110	unlined cesspit	12d–13a	De Groote et al. (2009)	2	34	–	–	–	–
Aalst-Stadhuis II	SP116	unlined cesspit	13b–d	De Groote et al. (2009)	1	48	–	–	–	–
Mechelen-Grote Markt	SP2	brick-lined cesspit	13c–14a	Troubleyn et al. (2009)	3	36	–	v	v	–
Mechelen-Grote Markt	SP4	brick-lined cesspit	13c–14a	Troubleyn et al. (2009)	2	31	–	v	–	–
Aalst-Hopmarkt	II/I-26	unlined cesspit	14a–d	This publication	2	52	–	v	–	–
Brugge-Prinsenhof	XIV/113-1	brick-lined cesspit	14d–15d	Deforce (2010)	2	24	–	v	v	–
Brugge-Prinsenhof	XV/68-3	brick-lined cesspit	14d–15d	Deforce (2010)	2	35	–	v	v	–
Oudenaarde-Kasteel	SP289	barrel-lined cesspit	15b	This publication	2	57	–	–	v	–
Aalst-Hopmarkt	XIV B/A6	brick-lined cesspit	15d	This publication	3	35	–	v	v	v
Oudenaarde-Kasteel	SP225	garderobe chute	15a–d	This publication	1	37	–	–	v	–
Raversijde	655	barrel-lined cesspit	15a–d	Deforce (2006, 2013)	1	10	v	v	–	–
Raversijde	1554	barrel-lined cesspit	15a–d	Deforce (2006, 2013)	1	27	v	v	–	–
Raversijde	418	barrel-lined cesspit	15a–d	Deforce (2006, 2013)	1	11	v	–	–	–
Aalst-Hopmarkt	4	unlined cesspit	16A	This publication	1	45	v	v	–	v
Aalst-Stadhuis I	6	brick-lined cesspit	16a	De Groote et al. (2004)	2	36	v	v	–	–
Dendermonde	WP1	brick-lined cesspit	16a–c	This publication	3	26	v	v	v	v
Herkenrode	SP212	brick-lined cesspit	16d–17a	This publication	2	20	v	v	v	v
Mechelen-OLV	SP193	unlined cesspit	16a–d	This publication	1	33	–	v	–	–
Mechelen-OLV	SP37	brick-lined cesspit	16a–d	This publication	1	41	v	v	–	–
Middelburg	chute B	garderobe chute	17a	De Clercq et al. (2007)	3	9	v	v	v	–
Mechelen-Begijnenstr.	WP2	brick-lined cesspit	17a–d	This publication	2	20	v	v	v	v
Brugge-Prinsenhof	IX/1	brick-lined cesspit	17a–d	This publication	1	25	v	v	–	v

The studied feature type and age are given in Table 1. More detailed context information on the different sites and the archaeological structures analysed are given by De Groote et al. (2004) for Aalst – Stadhuis I and De Groote et al. (2009) for Aalst – Stadhuis II, Deforce et al. (2007a) for Brugge, Beeckman and Van Hecke (2016) for Dendermonde, De Groote (in press) for Herkenrode; De Groote et al. (2011) for Aalst – Hopmarkt, De Groote (2008) for Oudenaarde - Kasteel, Troubleyn et al. (2009) for Mechelen – het Steen, De Clercq et al. (2007) for Middelburg and Pieters et al. (2013) for Raversijde.

Samples were processed using standard techniques for pollen analysis (Moore et al., 1991). Identifications of pollen and spores are based on Moore et al. (1991), Beug (2004), Valdés et al. (1987), Reille (1992, 1994), Punt et al. (1976–2003), and a reference collection of modern pollen and spores, stored at the Flemish Heritage Institute (Brussels). Percentages are based on the sum of all pollen types ( $\Sigma P$ ). Spores and intestinal parasite eggs are excluded from this sum. Intestinal parasite eggs have been studied using the same slides as for pollen analysis. Most intestinal parasite eggs have dimensions comparable to pollen and are resistant to the chemicals used for pollen preparations (Wharton, 1980; Bouchet et al., 2003a). As a consequence, pollen slides can also be used for the study of intestinal parasites (e.g. Brinkkemper and Van Haaster, 2012) although some taxa might be lost or underrepresented using standard pollen preparation techniques (e.g. Dufour and Le Bailly, 2013). The identification of intestinal parasite eggs is based on Thienpont et al. (1979).

## 3. Results

Results from 6 sites have previously been published (see references in Table 1) and only the presence of some specific pollen types in the pollen assemblages of these samples are presented here (Table 1). New results from 19 samples collected from 11 different features and 7 sites are presented in Table 2.

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