

Textiles and Cordage from Walraversijde (Ostend, West-Flanders, Belgium)

Penelope Walton Rogers¹

Introduction

The excavation at Raversijde, on the site of the deserted village Walraversijde, has yielded 15 examples of textile and one of cordage². This collection, although small, is of especial interest, because few excavated textiles have been recorded from Belgium. While there have been some comprehensive studies of decorative textiles preserved above-ground, in treasuries at Tongres (Tongeren)³, Maaseik⁴ and Sint-Truiden⁵, and the history of the medieval cloth industry has been well documented⁶, the archaeological evidence has so far been lacking.

The excavated part of the Walraversijde site was essentially occupied during the 15th century⁷ and the textiles presented in this first report were all yielded by contexts dating from this period of occupation. They therefore belong to a time when Flanders' great, urban-based wool cloth industry was starting to decline, but her established linen industry was growing, especially in the countryside. This collection, then, provides a picture of some of the fabrics in use in a fishing village on the North Sea coast, in a region which was famous throughout Europe for its textiles. It is fortunate that both wool and linen textiles have been preserved. The soil conditions which favour the preser-

vation of wool and flax fibres are quite different⁸ and to find nine linens from the same general area as six wool textiles is quite unusual.

Wool textiles

The wool textiles include four coarse examples with less than 10 threads per cm, RAV97/298 (i), 97/298 (ii), 97/318, and 97/4271, and two which may be classed as medium weight, RAV97/361 and 97/613 (Table 1). They have been woven in tabby (plain weave) and 2/2 twill, which are the typical wool cloth weaves of the later 14th, 15th and 16th centuries⁹.

In all six, the yarn of warp and weft has been spun in opposite directions, indicated by Z and S. This is a feature of medieval wool textiles which becomes less common in 16th-century collections¹⁰. In Flanders in the early 14th century, the Z-spun warp yarn was generally worked on a suspended spindle, while the S-spun weft yarn was produced on the spindle wheel (the fore-runner of the spinning wheel). By the end of the century, both yarns were being spun on the wheel, but the tradition of spinning them in opposite directions continued, as described in the Ypres (Ieper) regulations, ... *dat niemen geen waerp moet drayen wevelwijs, noch wevel waerpwijs*¹¹.

One of the textiles, RAV97/361, has been given a dense, raised nap resembling modern billiard cloth. This form of soft-finishing is produced by brushing the cloth with teasels and shearing back the surface with large cropping shears. The process was repeated several times, as described in the regulations of towns such as Bruges (Brugge)¹², and because it was time-consuming it added considerably to the value of the cloth¹³. Such fabrics are found in towns throughout northern Europe, but are less in evidence in rural sites. The absence of any soft-finishing in the other wool textiles from

¹ Textile Research in Archaeology, 8 Bootham Terrace, York YO30 7DH, England.

² With thanks to Dr. C. Kightly for the coordination of this study.

³ Ceulemans *et al.* 1988.

⁴ Budny 1989 and de Boeck 1989.

⁵ Deconinck 1991.

⁶ Espinas 1913, 1923, de Poerck 1951.

⁷ Pieters 1997.

⁸ Jakes & Sibley 1983, Sibley & Jakes 1984.

⁹ Crowfoot *et al.* 1992, Walton 1981.

¹⁰ Walton 1981, 193-194.

¹¹ de Poerck 1951, 63.

¹² de Poerck 1951, 90-149.

¹³ Munro 1983, 29-70.

Table 1

Wool textiles from Walraversijde, Belgium.

Textile	Weave	Thread-count per cm	Spin	Finish	Dye
RAV97/298 (i)	tabby	9 x 9	Z x S	-	no dye detected
RAV97/298 (ii)	tabby	6 x 5	Z x S	-	woad
RAV97/318	tabby	7 x 7	Z x S	?	not tested
RAV97/361	2/2 twill	14 x 12	Z x S	**	no dye detected
RAV97/613	tabby	10 x 12	Z x S	-	woad with trace of madder
RAV97/4271	2/2 twill	9 x 5	Z x S	-	no dye detected

** heavily napped (teaselled and sheared)

Walraversijde marks them out as cheaper fabrics.

Dyes were detected in two textiles, RAV97/298 (ii) and 97/613. This does not mean that the others were undyed. Some dyes, especially yellows and browns, deteriorate during burial or become obscured by staining. Both RAV97/298 (ii) and 97/613 have been dyed with the blue colorant derived from the woad plant, *Isatis tinctoria* L. (represented by the chemical indigotin) and one, RAV97/613, has been boosted with a small amount of the red dye madder, obtained from the roots of *Rubia tinctorum* L.

Woad was grown extensively in the Low Countries, some villages of the Namur area having as many as five woad mills¹⁴. The dye was therefore easily obtained and inexpensive. Madder was also grown in the region, but the plant takes several years to mature and the dye requires the mordant alum in order to fix it on the fibre. Flanders had to import alum, from Castille, Algeria and further afield¹⁵, which made madder more expensive than woad (although still not as costly as the red insect dye kermes). A brief survey of dyes in medieval textiles from England suggests that madder is more common in urban and high-status sites¹⁶ and woad more frequently encountered in artisan houses and quayside sites¹⁷. The process of dyeing with woad

is described in the records of several Flemish towns and there is a colour called 'columbine blue' (*bleue d'acolie*, Mod.Fr. *ancole*, Fl. *acoleye*), which is a light woad blue overdyed with a small amount of madder¹⁸, just as RAV97/613 seems to have been. 'Columbine' is an old-fashioned English term for 'dove grey', but in medieval Flanders it probably represented the mauve-blue of wild columbine flowers (*Aquilegia vulgaris*).

To summarise, most of the wool textiles from Walraversijde, although well made, were cheaply produced. Only one, RAV97/361, may be regarded as of better quality. All of these textiles are the sort of quality to be expected of clothing fabrics. The colour range was probably blue-grey-mauve-brown.

Linen textiles

The plain linen textiles in tabby weave (Table 2) are a typical form of household linen, found throughout northern Europe in the medieval period. The range of thread-counts, from 12 x 12 to 16 x 16 threads per cm, represents the lower end of a range which runs from 11 x 10 to 30 x 26 threads per cm (author's unpublished data). The use of Z-spun yarn in warp and weft

Table 2

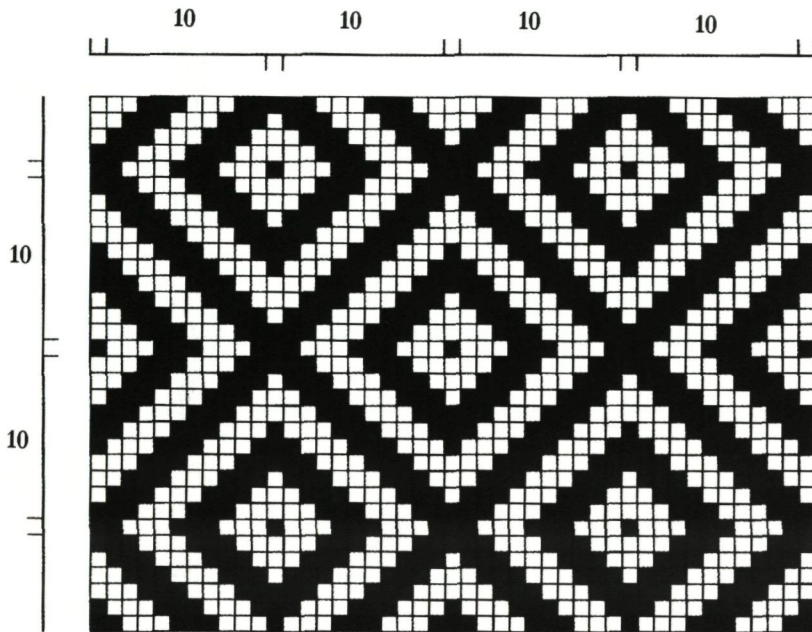
Linen textiles from Walraversijde, Belgium

Textile	Fibre	Weave	Thread-count per cm	Spin
RAV94/118	part-processed flax/hemp	tabby	12 x 12	Z x Z
RAV94/468 (i)	part-processed flax/hemp	tabby	16 x 14	Z x Z
RAV95/510	fully processed flax	3/3 diamond	24 x 22	Z x Z
RAV97/334	poorly preserved	?3/3 diamond	?	Z x Z
RAV97/680	fully processed flax	tabby	15 x 14	Z x Z
RAV4038	fully processed flax	tabby	16 x 16	Z x Z
RAV4040	fully processed flax	tabby	14 x 16	Z x Z
RAV4222	fully processed flax/hemp	tabby (i)	14 x 13	Z x Z Even yarn
		tabby (ii)	14 x 14	Z x Z Irregular yarn

¹⁴ van Houte 1977, 33.¹⁵ de Poerck 1951, 168-174.¹⁶ Walton 1992.¹⁷ Author's unpublished

data.

¹⁸ de Poerck 1951, 167-168.



1 *Diamond twill of RAV95/510*

was standard for linen in medieval Europe.

Properly speaking, linens are made from flax (from the plant *Linum usitatissimum* L.) and canvas from hemp (from *Cannabis sativa* L.), but where the material is not well preserved, microscopy cannot always distinguish between the two. 'Linen' is then used to cover both fibres. Three of the tabby-weave textiles from Walraversijde, RAV97/680, 4038 and 4040, are made from flax, but the others may be flax or hemp. In some, the raw material has been processed down to the finest individual fibres, but in others the fibres have not been fully processed (see Table 2). The latter would have been a little more stiff than the former and probably represent the sort of textile used for bolsters, mattresses, artisan aprons and so on, while the fully processed fibres were more probably used for sheets and underwear.

These 'linens' are likely to be farmhouse products. During the 15th century, as the wool textile industry declined in Flemish towns, rural production, especially of linens, began to grow. There had always been some weaving carried out in farmsteads, but it was now possible for farming families to extend their income by selling home-made linens at local markets. The main area of production was the Dendre valley, but there was small-scale peasant weaving in others areas, too¹⁹.

The finer diamond twills (RAV95/510 and perhaps also 97/334), are more likely to be urban products (Fig. 1). It requires skill and training to weave such fabrics and those skills could be found in towns, where weavers served apprenticeships and guilds controlled standards of production. According to Horner the common name for diamond twills, 'diaper', derives from 'd'Ypres', because that was the centre for their production²⁰. This is probably apocryphal - the

Old English Dictionary gives *diasprum*, 'marbled white', as the origin of the word - but it reflects the reputation certain Flemish towns had for the production of fine and patterned linens²¹.

Linen diamond twills are rare in the archaeological record, although some have survived above-ground in the Abbey of Sint-Truiden, in Belgian Limburg²², and in churches and monasteries in Switzerland²³. There are further examples at the Whitworth Art Gallery, Manchester, England, in the Bock Collection, which was collected in Germany and elsewhere on the Continent²⁴. The Sint-Truiden pieces are mainly dated 'after the middle of the 12th-century', while those from Switzerland are 14th- and 15th-century; the Bock pieces do not have firm dates attached. The Sint-Truiden examples have more elaborate weave structures, involving larger pattern repeats than in the Walraversijde example, which has small, simple diamonds, 12 x 12 mm each (24 warp threads x 24 weft) (Fig. 1) - although they obviously belong to the same general group.

It is evident from manuscript illustrations that diamond twills were frequently used for table linen. They can be seen, for example, on the table at an Italian royal feast in a mid 14th-century manuscript²⁵ and in a more homely scene in the English Holkham Bible (second quarter of 14th century). Such pictures may be illustrating Flemish textiles, as table linen, especially that from Courtrai (Kortrijk)²⁶, was an important export in the 14th and 15th centuries and England one of the major buyers²⁷. This textile, then, is a good quality fabric, probably representing the best table linen in a village such as Walraversijde.

Cordage

Some lengths of thin two-ply cordage, RAV94/468 (ii), were found with the piece of plain linen, 94/468 (i). The cords have been made from some sort of woody tissue, probably a thin stem from a tree or shrub which has been worked to make it flexible. One length has an overhand knot at one end, but it is difficult to suggest a function for the object. Ropes, bucket bindings, fishermen's creels and other types of basket were made from materials such as this in the medieval period.

Conclusion

The wool textiles from Walraversijde represent a typical range of fabric-types of the period and may be compared with much larger collections from other parts of northern Europe. The plain linens are also familiar from excavations outside Belgium. The linen diamond twill, however, is a significant piece and provides a link with the more decorative textiles preserved in cathedrals and museums. Although most of the textiles are of unexceptional quality, as

¹⁹ van Houte 1977, 84-86.

²⁰ Horner 1920, 346.

²¹ van Houte 1977, 35, 85.

²² Deconinck *et al.* 1991, 256-266.

²³ Schmedding 1978, no.'s 107, 111c; Flury-Lemberg 1988, no.'s 89/1, 89/4.

²⁴ F. Pritchard pers. comm.

²⁵ B.L. MS Add 12228 f.226v.

²⁶ Horner 1920, 347.

²⁷ van Houte 1977, 85.

might be expected of a fishing village, it is clear that at least some of the residents of Walravensijde had access to more attractive goods.

Catalogue

Notes: Microscopy of fibres was carried out with a transmitted-light microscope fitted with a polarising analyser, at x100 and x400 magnification. Dye analyses were by solvent extraction followed by absorption spectrophotometry and thin-layer chromatography of the solvent extracts.

RAV94/118; ditch 313.

Several small fragments of poorly preserved linen textile in tabby weave, 12/Z/0.8 x 12/Z/0.8 per square cm.

Microscopy shows fibre to be partially processed flax or hemp. Largest fragment 9 x 5 mm.

RAV94/468; barrel well 232.

(i) Several small fragments of poorly preserved linen textile in tabby weave, 16/Z/0.5 x 14/Z/0.5 per square cm.

Microscopy shows fibre to be partially processed flax or hemp. Largest fragment 15 x 12 mm.

(ii) Several lengths of cord, now 3 mm thick, but probably originally thicker; two-ply (two S-twist bundles of fibre twisted together in the Z-direction). There is an overhand knot at the end of one piece. Microscopy shows the fibre to be woody tissue, derived from a shrub or tree. Longest piece 30 mm.

RAV95/510; pit 686, probably a peat extraction pit. Several fragments of linen textile woven in 3/3 diamond twill (fig. 1); 24/Z/0.4 x 22/Z/0.4 per square cm; pattern repeat approximately 12 x 12 mm.

Microscopy of fibre shows fully processed plant fibre, almost certainly flax. Largest fragment 40 x 20 mm.

RAV97/298 (i); layer 2348.

Three fragments of wool textile in tabby weave; 9/Z/1.0 x 9/S/1.0 per square cm; closely woven and regular; yarn soft, woollen type; no finish; no dye detected. Largest fragment 30 x 28 mm.

RAV97/298 (ii)

Three fragments of wool textile in tabby weave; 6/Z/1.2 x 5/S/1.0-1.5 per square cm; S-spun yarn thicker and more uneven than Z-spun; no finish; indigotin detected during dye analysis, indicating originally dyed blue with woad or indigo. Clay and cinders adhering. Largest fragment 80 x 60 mm.

RAV97/318; layer 2356.

One fragment of wool textile in tabby weave, 7/Z/1.0 x 7/S/1.2 per square cm. Encased in solid encrustation, probably originally organic. 80 x 60 x 20 mm.

RAV97/334; ditch 887.

Several fragments of decayed textile: patterned weave possibly same as 510; thread-count not possible; yarn Z x Z.

Microscopy of fibre suggests flax or hemp, but very poorly preserved. Largest fragment 20 x 20 mm.

RAV97/361; layer 2348.

Several fragments of wool textile woven in twill, possibly 2/2 twill, approximately 14/Z/0.5 x 12/S/0.5 per square cm; some parts heavily felted, probably originally napped (teaselled and sheared); no dye detected. Encased in solid encrustation, probably originally organic. Largest fragment 70 x 70 x 20 mm.

RAV97/613; ditch 1160.

Fragment of wool textile in tabby weave, 10/Z/0.5 x 12/S/0.9 per square cm; no finish; indigotin with a trace of madder detected during dye analysis, indicating a purplish blue. 70 x 40 mm.

RAV97/680; barrel well 1186.

Three folded fragments of linen textile in tabby weave; 15/Z/0.6 x 14/Z/0.6 per square cm; rigid, semi-mineralised.

Microscopy shows fully processed plant fibre, flax or hemp (probably flax). Largest fragment 70 x 20 mm.

RAV 4038 (i); cesspit 1554.

Several fragments of linen textile in tabby weave; 16/Z/0.5 x 16/Z/0.5 per square cm; rigid, semi-mineralised.

Microscopy shows fully processed plant fibre, almost certainly flax. Largest fragment 60 x 30 mm.

RAV 4038 (ii)

Three fragments of linen textile in tabby weave, 17/Z/0.5 x 16/Z/0.5. Rigid, almost completely mineralised.

Microscopy shows fibre to be flax or hemp, fully processed. Largest fragment 55 x 45 mm. Several shells in association.

RAV 4040; cesspit 1554.

Two fragments of linen textile in tabby weave, 14/Z/0.3 x 16/Z/0.5; rigid, semi-mineralised.

Microscopy shows fibre to be fully processed flax or hemp, almost certainly flax. Largest fragment 40 x 20 mm.

RAV 4222; barrel well 1776.

Several fragments of linen textile in tabby weave; some pieces regular, 14/Z/0.5 x 13/Z/0.5 per square cm; others more irregular in appearance, 14/Z/0.5 x 14/Z/0.2-0.7 per square cm.

Microscopy shows fibre to be fully processed plant fibre, flax or hemp. Largest fragment 30 x 20 mm.

RAV 4271; barrel well 1645.

Several fragments of coarse wool textile woven in

2/2 twill; 9/Z/0.5 x 5/S/1.5 per square cm; Z-spun yarn finer than S-spun; no finish; no dye detected. Largest fragment 90 x 50 mm.

RAV97/485; pit 1127

A long, dense cone of moss (no textile included). Wads of moss of this shape were used to stuff the toes of shoes, especially the long-toed variety known in France as 'poulaines' (English 'piked shoes'), worn 1395-1410 and revived 1460-1480. Length 80 mm, diameter 30 mm.

SAMENVATTING

Textiel en touw uit *Walraversijde* (Oostende, prov. West-Vlaanderen)

In deze eerste studie over textiel en touw uit *Walraversijde* worden 15 stukken textiel en een stuk touw behandeld. Deze kleine collectie is van belang omdat nog maar weinig textiel uit opgravingen uit België is bestudeerd. Het textiel uit *Walraversijde* dateert uit de 15de eeuw, een periode waarin de grote stedelijke lakennijverheid reeds op zijn terugweg was maar waarin de linnennijverheid in volle opmars was, vooral op het platteland. Deze studie geeft een beeld van een deel van het textiel dat in gebruik was in een vissersdorp langs de Noordzeekust in een regio die over gans Europa gekend was voor zijn textiel. De site leverde zowel textiel op in linnen als in wol, een eerder uitzonderlijk gegeven daar beide stoffen uiteenlopende eisen stellen aan het bewarend milieu.

De textielresten in wol omvatten vier grove stalen met minder dan 10 draden per cm (RAV97/298(i), 97/298(ii), 97/318 en 4271) en twee stalen die als een middensoort kunnen worden geklasseerd (RAV97/361 en 97/613) (Tabel 1). Bij alle stalen is het garen van de ketting en de inslag gesponnen in tegengestelde richting (aangeduid door Z en S). Dit is een kenmerk van middeleeuws textiel dat reeds merkbaar minder voorkomt in 16de-eeuwse stoffen. Eén van de stoffen (RAV97/361) had een fijnere afwerking gekregen waardoor het op modern biljartlaken ging lijken. Na het weven werd de stof gekamd met kaardenbollen en vervolgens weer bijgeschoren. Deze tijdrovende activiteit maakte textiel met deze afwerking een stuk duurder. De afwezigheid van deze afwerking bij de andere stalen laat toe ze te catalogeren als goedkopere stoffen.

In twee stalen werden resten van verfstoffen aangetroffen (RAV97/298(ii) en 97/613). Dit hoeft niet te betekenen dat de andere stoffen niet geverfd waren, vermits een aantal verfstoffen afbreken of onherkenbaar worden tijdens hun verblijf in de bodem. Beide stoffen waren geverfd met een blauwe kleurstof afkomstig van wede (*Isatis tinctoria* L.). RAV97/613 kreeg nog een bijkomende behandeling met een rode verfstof gewonnen uit de wortels van *Rubia tinctorum* L. Meekrap was als verfstof een

stuk duurder dan wede omdat geïmporteerd aluin als beits nodig was om de kleur te fixeren op de vezels. Beide kleurstoffen zijn echter nog merkkelijk goedkoper dan bijvoorbeeld het rood van kermes. In een aantal historische bronnen over verven uit middeleeuws Vlaanderen wordt o.a. de kleur 'acoleye' (Engels: *Columbine blue*, Frans: *bleue d'acolie*), vermeld. Dit wordt beschreven als een licht wedeblauw oververfd met een kleine hoeveelheid meekrap. Nu is *Columbine* een verouderd Engels woord voor duifgrijs, maar in middeleeuws Vlaanderen verstond men onder acoleye vermoedelijk paarsblauw zoals de kleur van de bloemen van de wilde akelei (*Aquilegia vulgaris*).

De meeste stukken wol uit *Walraversijde* zijn goed afgewerkte goedkope producten. Enkel RAV97/361 is van betere kwaliteit. Deze stoffen zijn van de kwaliteit die gebruikt werd voor kledij. Het kleurengamma was vermoedelijk blauw-grijs-paars-bruin.

De stukken effen linnen zijn typisch huishoudelijk linnen in gebruik in gans Noord-Europa in de Middeleeuwen. Met 12 x 12 tot 16 x 16 draden per cm behoorde dit linnen tot de lagere kwaliteiten. Linnen wordt gemaakt van vlas (*Linum usitatissimum*) en zeildoek van hennep (*Cannabis sativa* L.). Wanneer microscopisch onderzoek het onderscheid tussen beide vezels niet mogelijk maakt wordt toch de term *linnen* gebruikt. Drie stukken linnen zijn gemaakt van vlas (RAV97/680, 4038 en 4040). De andere kunnen zowel van vlas als van hennep gemaakt zijn. Tussen de stoffen zijn verschillen in bewerkingsgraad vast te stellen. Soms is de grondstof tot op de individuele vezel bewerkt, bij een aantal is dit niet het geval. Deze laatste voelden wat stijver aan en werden vermoedelijk gebruikt voor kussens, matrassen en schorten terwijl de tot op de individuele vezel bewerkte stoffen vermoedelijk gebruikt werden voor lakens en ondergoed. Deze effen linnen vertegenwoordigen naar alle waarschijnlijkheid producten van rurale huisnijverheid.

De fijnere geruite kepers (RAV95/510 en vermoedelijk ook 97/334) zijn eerder stedelijke producten daar de vervaardiging ervan bekwaamheid en training vergde. Geruite linnen kepers worden zelden aangetroffen bij archeologisch onderzoek. Ze zijn beter gekend in bovengronds bewaarde collecties afkomstig uit abdijen en kathedralen. Van illustraties op manuscripten kan worden afgeleid dat dergelijke geruite kepers regelmatig als tafellinnen werden gebruikt. Ze vertegenwoordigen het beste tafellinnen dat te *Walraversijde* in gebruik was.

Enkele stukjes touw (RAV94/468(ii)) tenslotte zijn gemaakt van een houtachtige vezel, vermoedelijk afkomstig van de dunne stengel van een struik of een boom.

De lakens uit *Walraversijde* vertegenwoordigen een typische collectie stoffen uit de betrokken periode die kan worden vergeleken met heel wat grotere collecties uit andere delen van Noord-

Europa. De stukken effen linnen zijn ook goed gekend van opgravingen buiten België, maar de geruite keper is uitzonderlijk en kan worden vergeleken met decoratief textiel bewaard in kathedraal en musea. Ondanks het feit dat de meeste stoffen uit *Walraversijde* van doorsnee kwaliteit zijn – wat kan verwacht worden in een vissersdorp – hadden sommige bewoners toegang tot meer aantrekkelijke producten.

REFERENCES

- BUDNY M. 1989: The early medieval textiles at Maaseik. In: *Middeleeuws Textiel in het bijzonder in het Euregiogebied Maas-Rijn (Handelingen van het Congres, 13.02-16.02.1989)*, Sint-Truiden, 66.
- CEULEMANS C., DECONINCK E. & HELSEN J. 1988: *Tongeren Basiliek van O.-L.-Vrouw Geboorte, I. Textiel van de Vroege Middeleeuwen tot het Concilie van Trente*, Leuven.
- CROWFOOT E., PRITCHARD F. & STANILAND K. 1992: *Textiles and Clothing c.1150-c.1450, Medieval Finds from Excavations in London 4*, London.
- DE BOECK J. 1989: Restauratie van de textielstukken uit Maaseik. In: *Middeleeuws Textiel in het bijzonder in het Euregiogebied Maas-Rijn (Handelingen van het Congres, 13.02-16.02.1989)*, Sint-Truiden, 67-77.
- DECONINCK E., GEORGE PH., DE JONGHE D., VAN STRYDONCK M.J.Y., WOUTERS J., VYNCKIER J. & DE BOECK J. 1991: *Stof uit de Kist: De Middeleeuwse Textielschat uit de Abdij van Sint-Truiden*, Leuven.
- ESPINAS G. 1913: *La vie urbaine de Douai au Moyen Age*, Paris, 4 vols.
- ESPINAS G. 1923: *La draperie dans la Flandre Française au Moyen Age*, Paris, 2 vols.
- FLURY-LEMBERG M. 1988: *Textile Conservation and Research*, Bern.
- HORNER J. 1920: *The Linen Trade of Europe during the Spinning-Wheel Period*, Belfast.
- VAN HOUTE J. 1977: *An Economic History of the Low Countries, 800-1800*, World Economic History Series, London.
- JAKES K. & SIBLEY L. 1983: Survival of cellulosic fibres in the archaeological context, *Science and Archaeology* 25, 31-38.
- MUNRO J.H. 1983: The medieval scarlet and the economics of sartorial splendour. In: N.B. HARTE & K.G. PONTING, *Cloth and Clothing in Medieval Europe*, London, 13-70.
- PIETERS M. 1997: Raversijde: a late medieval fishermen's village along the Flemish coast (Belgium, Province of West-Flanders, Municipality of Ostend). In: G. DE BOE & F. VERHAEGHE (eds), *Rural Settlements in Medieval Europe. Papers of the 'Medieval Europe Brugge 1997' Conference* vol. 6, I.A.P. Rapporten 6, Zellik, 169-177.
- DE POERCK G. 1951: *La draperie médiévale en Flandre et en Artois. 1 La Technique, Bruges*, 1 of 3 vols.
- SCHMEDDING B. 1978: *Mittelalterliche Textilien in Kirchen und Klöstern der Schweiz*, Bonn.
- SIBLEY L. & JAKES K. 1984: Survival of Protein Fibres in Archaeological Contexts, *Science and Archaeology* 26, 17-27.
- WALTON P. 1981: The Textile. In: B. HARBOTTLE & M. ELLISON, An excavation in the Castle ditch, Newcastle upon Tyne, 1974-76, *Archaeologia Aeliana* 5th series 9, 190-228.
- WALTON P. 1992: Appendix: the dyes. In: Crowfoot, Pritchard & Staniland 1992, 199-201.