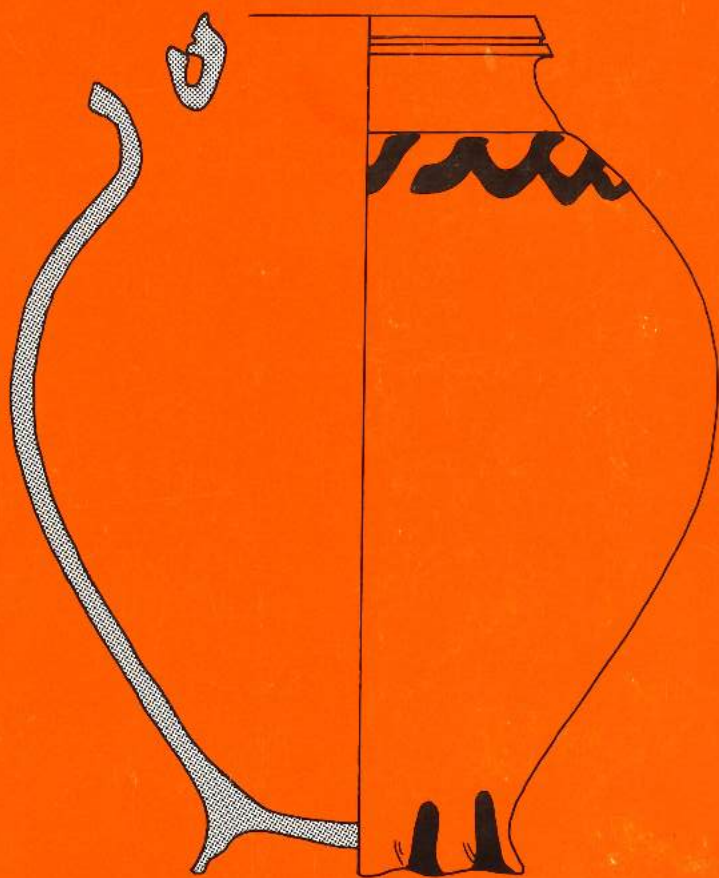


THE BRYGGEN PAPERS

Supplementary Series No 4



UNIVERSITY OF BERGEN

Norwegian University Press

THE BRYGGEN PAPERS

Supplementary Series

The Bryggen Papers

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THE BRYGGEN PAPERS

Supplementary Series

NO 4

THE BRYGGEN POTTERY I *Introduction and Pingsdorf Ware*

Hartwig Lüdtke

UNIVERSITY OF BERGEN

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Foreword

While practically every country in Europe in the Middle Ages had its own pottery production, there is not a single sherd amongst the vast amount of pottery found at Bryggen which is of Norwegian origin. Yet pottery was also in ordinary daily use in medieval Norway, at least in the towns and larger rural centres. The Bryggen ceramic material generally is very rich and varied, with imports from over seventy production centres in Northern and Western Europe, as well as from the Western Mediterranean.

It was not until 1986 that an analytical study of this important group of finds finally got under way, thanks to a long and close co-operation with the Archäologisches Landesmuseum, Schleswig, especially the Hedeby Project and with its director, prof Dr Kurt Schietzel. In 1986, one of the members of the project, dr. Hartwig Lüdtkke, was given leave of absence from Hedeby to work as a visiting research scholar at the University of Bergen, where he was assigned to the Bryggen Project, working daily in the Medieval Collections, Bryggens Museum.

In the course of his time in Bergen, Dr Lüdtkke worked on the identification and classification of the Pingsdorf Ware and Olive Proto-stoneware from the excavations at Bryggen, according to technological criteria, as well as by form and decoration.

Ten ceramic wares from Germany, England, France and Belgium were examined with the aim of drawing general conclusions about the absolute chronology and thereby obtaining a further corroboration of the locally established chronology based on historically recorded fires in the Bryggen area. The analysis of the material has also thrown light on production techniques, provenance, distribution patterns, the different uses of the table and kitchen wares in particular, and naturally on the widespread and changing trade relations of the city of Bergen in the Middle Ages.

It should be mentioned here that since the completion of Lüdtkke's manuscript in 1987, the chronological location of seven of the Pingsdorf Ware sherds has been adjusted with regard to the local chronology as a result of the post-excavation analysis of the stratigraphical relationships. This concerns five sherds from grid-squares I-K 8-10 and two sherds from F-G 11-12. However, this does not entail any adjustment of the percentage relationships in the ceramic material, nor a re-evaluation of the chronology of the entire ceramic sequence.

The illustrations, including the graphs and distribution diagrams, have been drawn by the Drawing Office of the Archäologisches Landesmuseum der Christian-Albrechts-Universität. The photos were taken by the author.

We are extremely grateful to our German colleagues and to the Archäologisches Landesmuseum der Christian-Albrechts-Universität for all their help and assistance in connection with Dr. Lüdtkke's stay in Bergen and for the valuable contribution which has

been made in the research and analysis of a significant group of finds of mutual importance.

The publication of this volume has been financed by the Norwegian Research Council for Science and the Humanities (NAVF). The German text has been translated into English by Ursula Frömming, Hamburg, with minor linguistic adjustments by Clifford Long.

The Editorial Committee responsible for the publication of the series consists of Professor Knut Helle, Dept of History, University of Bergen, Senior Curator Asbjørn E Herteig, Dept of Archaeology, Medieval Section, Historical Museum, University of Bergen, and Senior Curator, Dr philos Svein Indrelid, Dept of Archaeology, Prehistoric Section, Historical Museum, University of Bergen.

Bergen, May 1989
Asbjørn E. Herteig
Chief Editor

Acknowledgments

I should like to express my thanks to the University of Bergen and the Bryggens Museum, especially the leader of the Bryggen Project, A E Herteig, for the generous invitation to work on the project and for allowing me to analyse a part of the pottery. I should also like to thank my colleagues in Bergen, Oslo and Trondheim for access to unpublished finds and for numerous helpful discussions. Both the Christian-Albrechts- University in Kiel, as well as the Archäologisches Landesmuseum in Schleswig, deserve thanks for allowing the author a year off from other duties. The generous financial support by the *Spar-kassen- und Giroverband Schleswig-Holstein* has not only helped to make this paper possible, but also enabled me to work on the handbook of medieval pottery in northern Europe. The various diagrams were completed by the Archäologisches Landesmuseum Schleswig according to my instructions. The drawings were prepared by the Bryggen Project according to the original drawings by the author himself. The text was translated into English by U Frömming, Hamburg, with further suggestions by Clifford Long.

Hartwig Lüdtk

1 Introduction

In 1955, a disastrous fire destroyed large parts of the former German Wharf in Bergen. It was in this way that the opportunity arose for extensive archaeological excavations which, with interruptions, were carried out from 1955 into the 70s (Herteig 1985). The Bryggen Project developed into one of the largest undertakings in Scandinavian medieval archaeology: in terms of habitation-architecture and waterfront constructions, as well as the extent of the finds. The historical development of the city of Bergen, in many aspects well known, offers interesting possibilities for analysis. According to written sources, Bergen was founded in the 11th century (Helle 1982, 13), became the capital of Norway for a while, and was later the seat of the famous Hanse office. As a commercial centre the city maintained contact with numerous European countries. It was the port for the entire European trade with western and northern Norway.

The excavation site is on the northern shore of the harbour and includes parts of the wooden houses, as well as the waterfront construction (which had been gradually extended into the water). Property lines run perpendicularly to the waterfront forming long, narrow land parcels, constituting merchant tenements which usually consisted of a double row of buildings (Herteig 1985, 11). Altogether four such tenements were investigated: Gullskogården, Søstergården, Engalgården and Bugården (fig 1). The fire catastrophe in 1955 was not the first such incident. Since the High Middle Ages the predominantly wooden constructions have been destroyed by fire many times. This is evidenced in the stratigraphy by fire layers which are separated by rubbish and debris layers. Consequently, a relative chronology is easily established. Furthermore, the written sources are ample and describe the various fire catastrophes with precision (Helle 1979). As a result, we have an exceptionally good absolute chronology and can date the archaeological remains accordingly (Herteig 1985, 32).

Consisting of some 100,000 fragments, the medieval and early modern pottery assumes a special place among the finds. Besides the sheer quantity, there are above all two other aspects which promise results of exceptional quality. To begin with, we are dealing with a phenomenon I would like to call the 'Pompeii effect'. Normally, the archaeologists succeed in collecting artefacts which were mere rubbish for the people of that bygone time, something to be thrown away or left behind. It is the exception when a lost 'valuable' object appears among the finds. The interpretation possibilities as to how a household was equipped are particularly limited.

In the case of the finds of the Bryggen Project it is another story indeed: the conflagration served, more or less completely, to preserve the household objects in ash and debris. It is reasonable to expect that the pottery preserved in a fire layer reflects with relative accuracy the ceramic assemblage of a household. This means that the pieces from fire

layers require independent analyses. The term 'household' is used in a broad sense and includes the warehouses.

Secondly, during the Middle Ages there was no local pottery production in Norway. By contrast, in the periods both before and after there did exist a local pottery production, which also used native raw materials. Whatever the reasons may be, we can in any case assume that wood and soapstone were used, while pottery was imported. The ceramic vessels derive from almost every western European country. The investigation of the pottery sheds light on the ceramic importation from Europe to Bergen and, in turn, on the city's changing trade relationships. It should also be pointed out that both English and Continental wares occur in similar amounts. At no other site in northern Europe is this the case, at least not to this extent. Therefore, we have an exceptional opportunity to compare the chronological development and the interrelationship of English and Continental pottery. Although Pingsdorf Ware is the main subject to be discussed here it is nevertheless justifiable, 30 years after the first excavation began, to give a survey of the other main groups alongside a detailed discussion of the Pingsdorf Ware. Such a survey provides not only evidence for the chronological discussion, but also outlines certain questions and possibilities for analysis. In addition, it serves as a sort of interim report. Primarily, four questions should be answered by an analysis of the pottery:

- 1) Does an analysis of the horizontal distribution of the pottery and its provenances aid in differentiating the individual merchant tenements in terms of whether certain tenements concentrated their trade-links with particular countries at a specific time?
- 2) To what extent does an analysis of vertical distribution elucidate the chronological relationships of the wares? Does this help us determine when Bergen was first settled? Was there a re-settlement towards the end of the 11th century? Or do the traces of older settlements show a gradual growth (Helle 1982: 94)? In connection with the vertical analysis and chronological discussion we shall compare the absolute dates of the individual fires with traditional dates for the pottery elsewhere.
- 3) Considering the Pompeii effect, the amount and function of the pottery in the household will be investigated.
- 4) Because all the pottery was imported, the changing trade connections of the city of Bergen can be demonstrated using the pottery. The distribution of Pingsdorf Ware in Scandinavia will be presented and interpreted.

The present state of research of medieval ceramics in Norway has been influenced by a series of publications by P Molaug on finds from Oslo (Molaug 1977; 1979; 1982). There are other medieval sites under investigation, eg Tønsberg, Skien, Borgund and Trondheim, but the pottery has either been only partially published or not at all. Reed (1983) presented a small paper on the Trondheim finds. Myrvoll mentions a few aspects of the pottery, at Borgund (Myrvoll 1977) and at Skien (Myrvoll 1982). The report from W Janssen (1968) provides only a general impression. For Bergen, except for the photographs of some finds by Herteig (1969), there is only an overview of some finds from a small excavation (Marstrander 1983). Except for the Oslo finds, the material from Bergen stands rather isolated. This situation should change in the future when the work from other sites, such as Trondheim, is completed. Comparisons will therefore be made more with the southern Scandinavian area, for instance: Lödöse (Carlsson 1982), Visby (Forsström 1976), Århus (Andersen *et al* 1971), Ribe (P K Madsen 1985), Schleswig (Lüdtke 1985), Lübeck (Erdmann 1982 a; 1982 b) and also with London (Vince 1985). Pertaining to the Pingsdorf Ware, the report from Hurst (1969) from a colloquium on this type of pottery will be referred to. Also important is the work dealing with the imported pottery at Haithabu (W Janssen 1987), parts of which deal explicitly with the pottery's origin. This is especially important when considering trade relationships about which certain general conclusions can be drawn. In order, however, to go a step further in the analysis we must turn to the natural sciences for help in the future.

2 Method of find processing

2.1 EXCAVATION TECHNIQUES

The method of excavation, the collection of the finds and particularly the manner of documentation have been described in detail by Herteig (1985). His report also mentions the specific difficulties caused by climatic conditions. In this context therefore, it is only necessary to present briefly which directly concern the interpretation of the ceramics.

For the horizontal recording, a grid network of squares measuring 8x8m was laid out. Each grid square is defined by a code consisting of a letter and a number (fig 1). The orientation of the coordinate system was not set according to compass points, but follows more or less the medieval property lines of the individual tenements as they were found in 1955.

As a result, the grid square of rows 12 and 11 enclose the Bugården area, rows 10 and 9 Engelgården, rows 8 and 7 Søstergården. The Gullskogården area is more or less covered by the smaller numbers.

It should, therefore, be relatively easy to make a horizontal distribution analysis by following the grid squares and thus, maybe, recognize differences between individual tenements.

The vertical structure is mainly determined by the sequence of a total of eight fire layers which are evident throughout large parts of the excavation site. These were labelled with consecutive numbers, starting with the uppermost, ie most recent, layer. For every single piece (sometimes more than one if found together) an accession number (*Tilvekstnummer*) was recorded in the field report. This report contains all available information about a find's specific grid square, as well as its proximity to a particular fire layer. Furthermore, how the finds stand in relation, vertically and horizontally, to, for example, individual buildings, was recorded (Herteig 1985: 36). However, as the examination of these constructions, as well as the identification of the entire topography, have not yet been completed, this study deals exclusively with an assemblage of information based on grid squares and fire layers. It is therefore not concerned with the spatial relationship of the material to individual buildings or constructions.

Moreover, in the vertical distribution analysis the pieces are each assigned to a 'period' which I define briefly as the time between two fires. Hence, the find report records the provenance for each piece, for example as follows:

- O 6 : found above Fire Layer 6
- U 6 : found under Fire Layer 6
- I 6 : found in Fire Layer 6
- A 6 : found about Fire Layer 6
- K 6 : found on the same level as Fire Layer 6.

The last two of these categories do not occur very often. A look at the table in fig 7

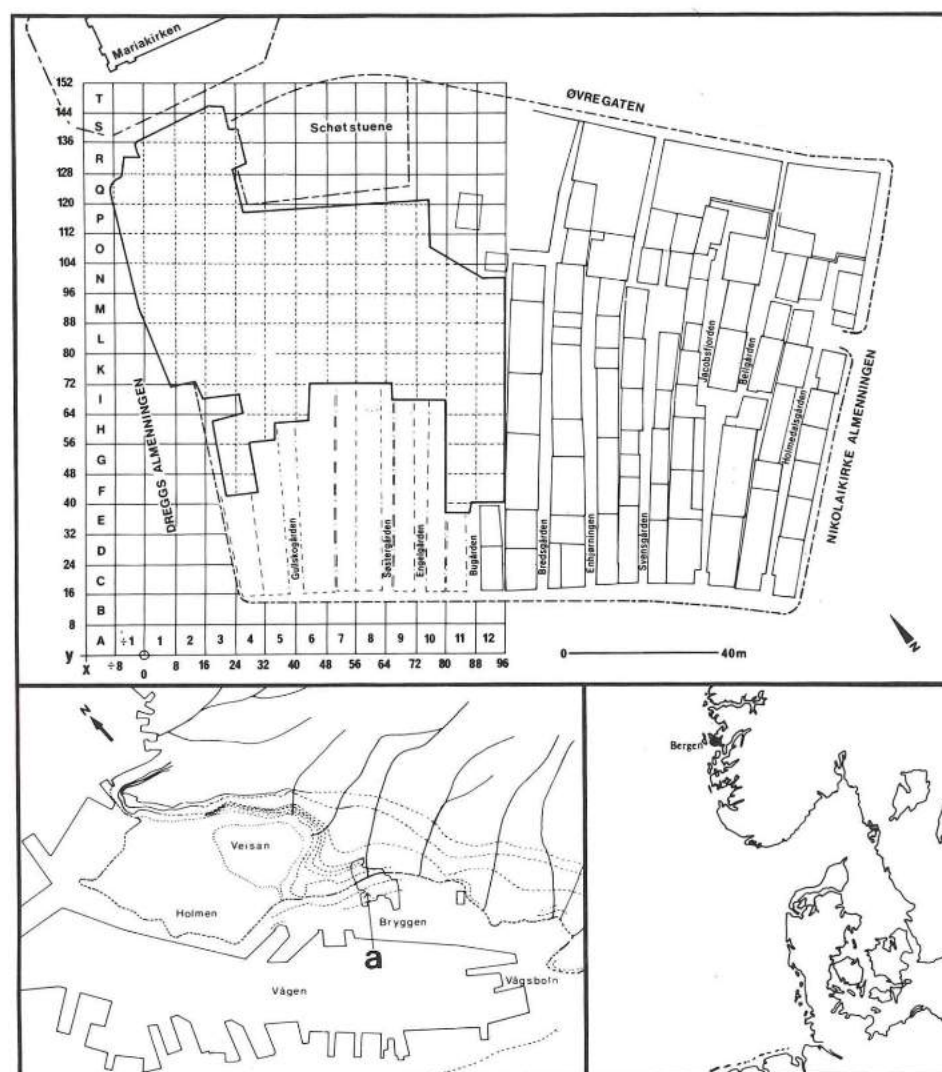


Fig 1 Site of the Bryggen Excavations (a)

reveals which periods the individual pieces belong to, as follows: One fragment belongs to Period 4. It was either found above Fire 6, or beneath Fire (layer) 5, or within Fire 5 or about Fire 5, or on level with Fire 5. A piece lying within Fire layer 5 must indeed have existed shortly before that specific fire took place in order to be able to get into the fire layer. This may also be true in the case of the rather vague specifications 'about Fire 5' and 'on level with Fire 5'.

The described manner of classification, indeed, defines the term 'period' in a somewhat broader methodological sense. In terms of a narrower methodological sense, however, only those finds could be referred to for the definition of Period 4 which were actually found in Fire layer 5. There are two types of vertical analysis: we differentiate

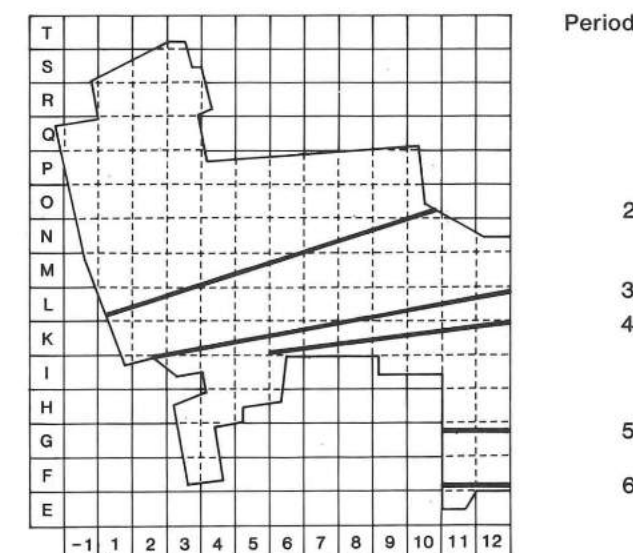


Fig 2 Advance of the waterfront in periods 2-6 (simplified)

between an analysis based on the material of a whole period and on one that only considers finds of the fire layers. The same distinction is made in respect to the horizontal distribution analysis, in order to separate those finds belonging to fire layers which could be used in a methodologically narrower sense from those deriving from debris layers in between. For the latter, much investigation concerning rubbish transport and the subsequent rearrangement of deposits have still to be made.

There is one essential fact to be taken into account in understanding the horizontal distribution analysis. With the rebuilding of the tenements after each disastrous fire, the constructions on the waterfront were extended further and further into the water, thus causing an expansion of the habitation in this direction (Herteig 1985, 29). In the present context, however, it is irrelevant whether this expansion was caused by the need for more space on the land or with the intention of reaching deeper waters for larger boats. It is only the landward part of the waterfront constructions extending from period to period (fig 2) that is of any use in a horizontal differentiation within the various tenements.

The patterns of distribution revealed by horizontal analysis, especially those of some more recent wares, are modified by the fact that in some parts the upper layers were removed by machines. Hence, only few finds were collected. Still, I will elaborate on this subject in detail when discussing the dating of the individual groups.

2.2 DISTRIBUTION OF CONJOINING SHERDS

In order to determine to what extent the deposits were ranged, both vertically and horizontally, relevant Pingsdorf fragments were analysed on the basis of perfect fit and different provenances (fig 3). Indeed, six such cases were identified, of which one even crosses a property line. In the vertical structure there are predominantly only gaps of one period. Only in one case were the pieces found two periods apart. In one case, however, there are fragments involved in this distribution which actually belong to two different

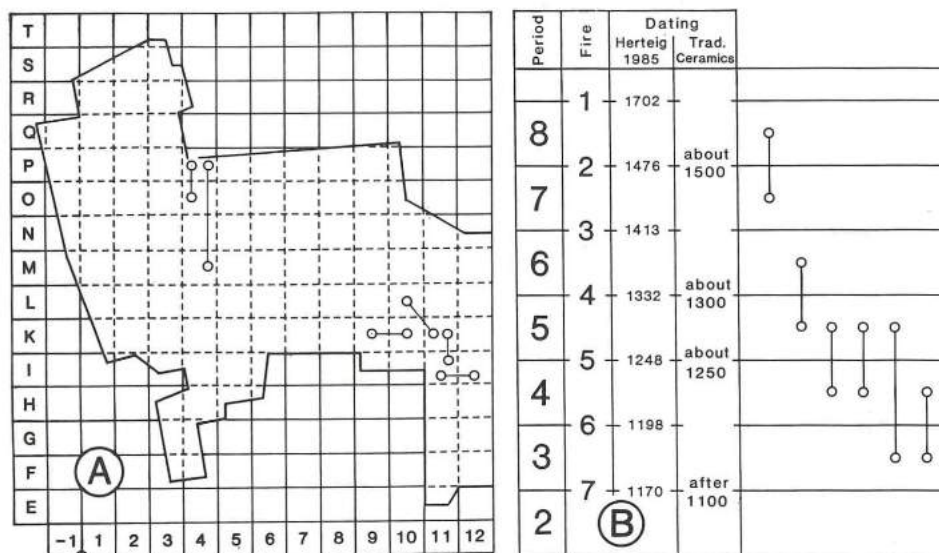


Fig 3 Conjoining sherds (see table 3) showing horizontal and vertical distribution

fire layers (fig 3). These six cases seem rather few, but here we are only talking about the Pingsdorf Ware and the Olive Proto-stoneware. Those two types of pottery merely add up to 4% of the entire material found, so that we may assume the number of such distributions to be about 25 times as high as this, ie about 150 cases. However, this result should not cause too much confusion. On the contrary, considering the busy reconstruction work and an extending waterfront (which had always started immediately after the fire) we should expect some movement of material. This is also true regardless of how the rubbish was dealt with. The results of a comparable study of the Schleswig site suggest a relative thickness of these layers of 75cm (Lüdtke 1985, 18). Indeed, as the patterns of distribution will show, disturbances do generally occur, yet single fragments found in places differing considerably from those expected do not affect the correctness of the chronological interpretation.

2.3 THE ABSOLUTE DATING OF THE FIRE LAYERS

The excavated occupation layers included eight fire layers, signifying eight actual fires. Each of these conflagrations more or less completely burnt down at least that part of Bryggen which we are dealing with, ie the northern part. This is why today we have such an excellent stratigraphical and, consequently, relative-chronological ordering of the material, a fact which I have already mentioned. As the Bryggen fires have been proved not only by the stratigraphy but also by contemporary written sources since the Middle Ages, a methodological correlation between archaeologically determined fire layers and the actual datings of the fire here seems feasible. Hence, this study is based on an analysis of the written sources presented by Helle (ms 1979), who refers to preceding investigations made by Lorentzen (1952). On the basis of those eight dated fires (described in their full extent by Helle) Herteig (1985, 32) assigns exact dates to the excavated fire layers (see, for example, fig 7). As the exact date of the earliest fire, Fire 8, cannot be

determined with absolute certainty, it remains without an appointed year. Furthermore, ceramic fragments were found neither within fire layer 8 nor beneath it, so that Fire 8 may be omitted from this analysis. This is why the table on fig 7 begins with Period 2 instead of Period 1.

As fascinating as this outlined approach for fixing an absolute chronology seems, we should not forget that it can hardly be verified. Although the above mentioned results can be regarded as highly probable, other possibilities should at least be mentioned. There may have been a fire which was not mentioned in the written sources or, alternatively, a fire may have proved to be less significant archaeologically than expected from the description (eg if the ground was thoroughly levelled, so that no prominent fire layer could be identified by the archaeologists). Furthermore, Helle (1979) mentions indeed a lot more than eight fires in Bryggen. However, these differ in extent and consequently can be omitted from consideration.

Nevertheless, it should be emphasized that the correlation between the fire layers and the absolute dates of the fires is already an interpretation of the material, rather than exact results obtained by dendrochronological analysis of comparative accuracy. In spite of these, slightly exaggerated, objections, this study is based on a relative chronological sequence of the layers, as well as on the corresponding dates of the fires as shown on fig 7. In the course of this examination these data will be compared to results obtained by the traditional methods of ceramic dating, such as numismatics or dendrochronology. Even cases of identical results would not be a proof of an actual fire, but, at least, they would suggest a strong possibility that these datings are not completely wrong either.

2.4 CLASSIFICATION OF THE MATERIAL

After the excavation had been completed, the entire collection of finds was sorted into groups, mostly according to the kind of material, in order to be available for different investigations. This classification was made with reference to a term common in medieval archaeology: the 'ceramic ware', and its specific (and traditional) categories. So far about 70 such wares have been defined as either 'medieval' or 'early modern' pottery by technical characteristics such as 'hardness', 'temper', 'wheel thrown' or 'glaze', or by criteria such as colour, or, rarely, decoration. This work of sorting was done by Ian Reed and Rory Dunlop in 1981. A year later Herteig (1982) published a first list of the Bryggen ceramics. The wares were given traditional names mostly referring to places of archaeological sites such as Pingsdorf, Siegburg, or Scarborough. However, this classification by provenance should not be mistaken as an unequivocal determination of the places where the pottery had actually been produced, although, it does correspond largely to the *Rahmenterminologie* or basic terminology describing medieval pottery in northern Germany which was developed by a group of North German archaeologists for the Schleswig Colloquia on medieval ceramics (Erdmann *et al* 1984).

Whenever a term introduced for the Bryggen material differs from this nomenclature, the respective term of the *Rahmenterminologie* is added in parenthesis. This is the case, for example, with the Paffrath Ware, called 'Blue-grey Ware' throughout this study, a term which the *Rahmenterminologie* proposes not to use any longer (*ibid* 424). It is common practice to define medieval pottery as different 'wares' according to technical characteristics, as well as to give them names referring to their places of discovery. Studies dealing with the former markets of these wares, such as Visby (Forsström 1976), Lödöse (Carlsson 1982), Schleswig (Lüdtke 1985) or Denmark (Bencard 1970), have also applied this terminology, and so has W Janssen (1987) in his very specialised treatment of the medieval Rhenish Ware imported into Haithabu. Other authors classify 'their'

material first by a code consisting of a letter and a number. In the context, of trade contacts, however, they also refer to traditional placenames (Molaug 1977, 110). The manifold well-structured Bryggen material should be especially appropriate for bringing forth further results in this matter, particularly by means of scientific provenance analysis.

All wares are stored in the Bryggens Museum, sorted and labelled with an accession number (*Tilvekstnummer*). The wares are kept in trays so that their individual proportions are easily established (see fig 4). The description of the ceramics - predominantly of the Pingsdorf Ware - follows the checklist as developed in the *Rahmenterminologie* (Erdmann *et al* 1984, 427). In this context the hardness (*Ritzhärte*) is determined according to the MOHS classification. The temper particle size is measured by an 8x magnification and specified according to geological terminology. The colour determination of the sherds is based on the colour charts as included in the Schleswig Publication (Lüdtke 1985, pl 41). Part of the Pingsdorf Ware is illustrated in the appendix (pls 1-15), at a scale of 1:3, and, because of special reconstruction techniques used, the individual diameters of the vessels could also be indicated. Additionally, there is a table giving the accession number for each illustrated piece, so that it may easily be referred to in any further investigation of the Bryggen pottery. Additional tables are provided which may, perhaps, also be of assistance in studies depending on a comparative analysis of the Bryggen material. These tables mainly consist of lists of dimensions based on the Pingsdorf Ware.

2.5 APPLICATION OF DATA PROCESSING

The documentation of the finds was largely organized by means of data processing in cooperation with the Computer Centre (*EDB-Senter*) of Bergen University. There are two voluminous sets of data which contain all essential information about the Bryggen material. The entries labelled C and H comprise all available data about localization which were processed by one specific code. The information concerning one piece (or a number of identically located finds) is arranged in boxes in a row (data file) preceded by the accession number (*Tilvekstnummer*). For this examination the categories 'grid square' and 'period' were used to define the location of a fragment.

The ca 2,500 fragments of the Pingsdorf Ware and the Olive Proto-stoneware were sorted and grouped according to technological criteria, as well as by form and decoration. Correspondingly, a key-list was worked out (table 1) consisting of a code which defines each sherd by a series of numbers. This code also includes, in addition to these coded numbers, the accession number assigned to each fragment. The resulting data file, comprising about 2,500 number 'chains', was treated as a separate input. The accession number then served as a link connecting this data file and the C- and H-entries with their information about the location of the individual pieces (or group of identical pieces). By this method a detailed catalogue of the entire examined material was processed by computer. It is not, however, presented here in printed form, but is available in Bergen to all those interested.

Subsequently, it was possible to isolate single characteristics, or combinations of characteristics, within the Pingsdorf Ware, both in terms of technical and formal criteria. Accordingly, tables were printed which indicate the horizontal as well as the vertical distribution of the individual phenomena. The results of these tables are shown on diagrams 1-30 in order to serve the analysis of various aspects of the Pingsdorf Ware and several other types of pottery.

Let us take for example the Siegburg Stoneware (diag 20); the figures in the grid

squares (diag 20A) correspond to the number of fragments found in this specific area. Diagram 20A includes the total amount of material taken from there, whereas diagram 20B only contains those fragments found in fire layers. Looking at the vertical distribution (diag 20C) we can see that the third column from the right comprises the number of Siegburg pieces actually belonging to the individual periods. Again there are two figures, the first signifies the total number of sherds of Siegburg Stoneware from one period (there are 350 pieces belonging to Period 8), the second figure merely reflects the number of fragments found in the corresponding fire layer (there are 58 pieces found in Fire Layer 1). These two figures are compared to the total number of ceramic pieces assigned to a period (see column on the far right) and then the specific proportions are worked out, as shown in the second column from the right. The 350 Siegburg pieces make up 21.39% of the 1,636 ceramic fragments belonging to Period 8, while the 58 Siegburg pieces ascribed to Fire 1 make up 26% of a total of 223 ceramic fragments found there. These percentages are represented by bars as shown in the centre of diagram 20C, whereby the total number of pieces found in a period was assumed to be 100%. Here I should like to point out that the scales on the bars vary between the diagrams because they depend on the absolute numerical presence of a ceramic group; indeed, there are four different scales. The individual quota is only represented by a bar when the bar had at least a length of 1mm.

The procedure concerning those types of pottery other than the Pingsdorf Ware which were used for comparative purposes was slightly altered. The original sherds were not sorted and recorded. Many of these different groups of wares classified in 1981 had already been entered into the computer and were available as a separate data set. These were merely sorted and counted according to the 'grid square' and 'period' system already mentioned. Indeed, in these cases the picture of the wares as worked out in 1981 is exactly reflected in the diagrams. A verification of each single fragment was not made. We have to distinguish two levels of investigation in this report: apart from the Pingsdorf Ware, (all) the remaining pottery types are only sorted within their own type. Not every single fragment is recorded separately, let alone differentiated further according to technical or formal characteristics! However, the pieces of the Pingsdorf Ware and the Olive Proto-stoneware were individually examined, counted and classified according to several aspects.

Strictly speaking, the figures within both the horizontal and the vertical distribution do not reflect the exact number of the individual fragments, but show the number of lines behind the accession number in the data file. Sometimes we find in one data entry two or more fragments of the same ware. As far as examination proved, this was not very often the case, so that a falsification of the results is not very probable. Nevertheless, this method proved indispensable for technical reasons, because it was possible to find out the exact number of fragments of individual wares, but there was not always information for the data column 'all wares'. On the other hand, an accurate interpretation of the vertical distribution could not be done without the percentages of the pottery types within the individual periods. This is why we established figures for each ware as well as for the total number of ceramics. If the analysis of all ceramics involved in the Bryggen excavation should be completed (and published) in a few years' time, a revision of the material should accomplish ultimate accuracy without much difficulty. As a matter of course, every single Pingsdorf fragment was recorded separately and will be treated thus in all other respects. Yet, all comparative studies of Pingsdorf Ware with the entire Bergen pottery are based on data entries and data lines rather than on the absolute number of Pingsdorf fragments. Furthermore, I should like to point out that the horizontal and vertical distribution analysis discussed above only includes those pieces for which there is information concerning 'grid square' and 'period' in the data file. Also, the study

of the constructions found and the whole topography have not yet been completed, so that in some cases reliable assignments of fragments to specific fires have still not been established in the data file. Consequently, some of the finds could not be included in the diagrams. I am speaking here of an estimated 25% of the pottery, which as far as I can tell does not bear any fundamental error. We may expect in the future an alteration of the absolute figures rather than of the essential proportions. The total number of finds seems sufficient to permit here a presentation of the results.

3 General Characteristics of the Bryggen Pottery in the Light of Selected Wares

3.1 SYSTEMATIC DIFFERENTIATION OF THE POTTERY ACCORDING TO PROVENANCE AND CHRONOLOGICAL SITUATION

To date, the only detailed analysis has been of the Pingsdorf Ware. Thirty years after the beginning of the excavation, some central questions remain and will remain for many years to come until the analysis of the entire pottery collection is completed. By way of an interim report, some answers to those questions will be outlined here. The pottery has already been recognized as holding a key position in the investigation of trade relationships (Helle 1982, 319). This aspect will be briefly discussed in the following section. The entire pottery is divided according to type of ware stored in 857 trays 45x100cm each. Only by counting the trays is it possible to quantify the material and to compare the individual groups (1). In this way it can be seen that the entire pottery is relatively evenly distributed (fig 4). The largest group (Grimston Ware) comprises 115 trays or 13%. The ceramic range at places whose local production was available at the same time indicates comparatively often a relationship in which the main groups are dominant. The locally produced hard grey ware in Schleswig, for example, comprises 86% of the Schleswig material in the 13th – 14th century alone (Lüdtke 1985, 25). This relatively even distribution in Bergen (along with the provenance spectrum) supports the possibility of analysis. That the group «Uncertain» is the third largest group is due primarily to the careful sorting of the pottery: all pieces which were not positively identifiable were placed in this group. Second on the list is a somewhat indifferent group: 'Diverse cooking pots'. Because these pieces cannot be clearly assigned to a place of origin they will be left out in the following calculations.

Most of the groups can be assigned to a country of origin, even when the exact places of production have not yet been clearly identified. Looking at the distribution of exporting lands (fig 5), one sees a clear dominance of German and English wares. Thereafter come the Netherlands, Denmark, Belgium and France. In order to see whether this changes in time, it is necessary to place the pottery in a chronological scheme; to do this, three chronological phases were defined: 1100–1250 AD, 1250–1400 AD and 1400–1600 AD. All wares were assigned to a phase: it was assumed that each type had its peak within the given phase (tab 2). Without doubt Siegburg Stoneware occurred already in the 14th century, and similarly Scarborough Ware was still occurring in the 15th century. On the one hand, some of the too 'approximate' dates containing room for mistakes cancel one another out. On the other hand, this type of systematic procedure seems to me to be justified when the goal is to sketch the main lines of development.

The presentation of results (fig 6) is divided into three levels for the three phases with each vertical column representing a country of origin. The sum total of all the columns in each level is 100%. The resulting picture shows that in the earliest phase German imports dominate over those from Belgium, England and Denmark, the main groups being

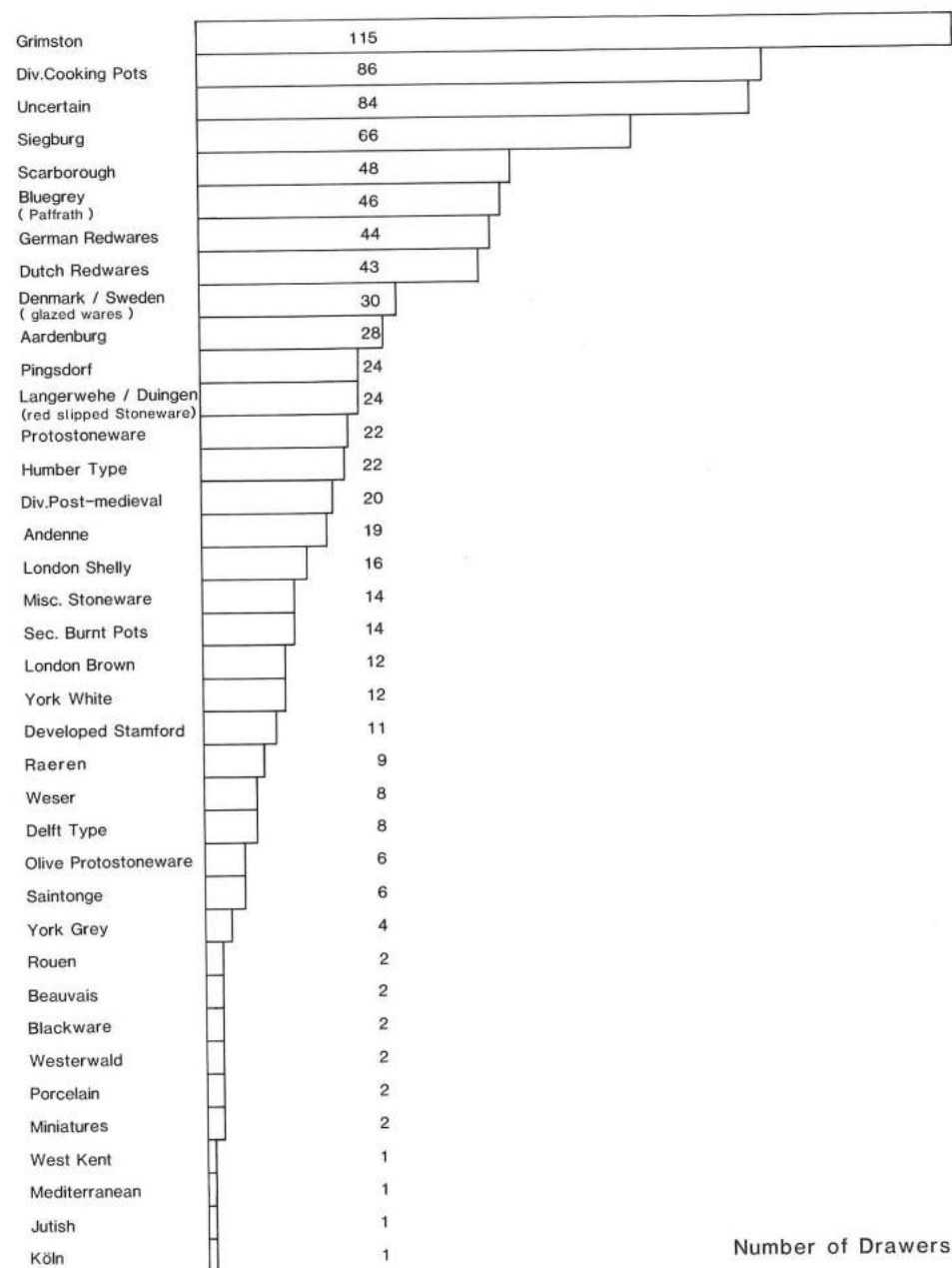


Fig 4 Quantitative distribution of various wares (based on the number of storage trays)

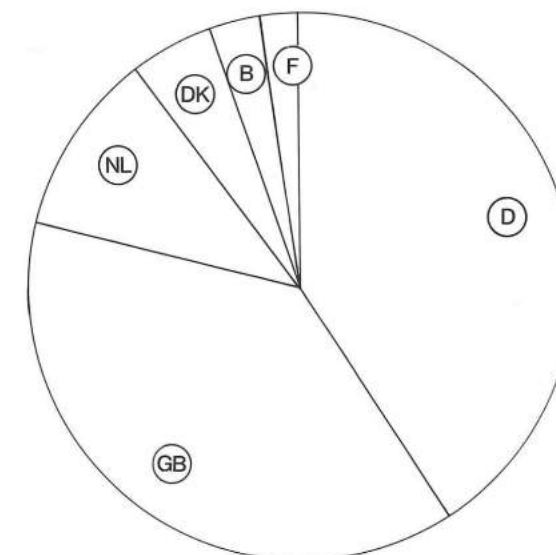


Fig 5 Proportional distribution of Bryggen pottery by countries of origin (based on the number of storage trays)

Paffrath Ware and Pingsdorf Ware. The largest number of participant countries is in the middle phase, where Belgium vanishes but France and the Netherlands come in. It is interesting to note that the dominant role has been taken over by England with the main groups being Grimston Ware and Scarborough Ware. In contrast, Germany's imports are no more than those of England's in the earliest phase (2). In the latest phase the picture changes most of all. Here the only representatives are Germany and the Netherlands. It is, however, Germany – with various stonewares – which dominates. To summarise, the development was that in the earliest and latest phases Germany predominated, whereas in the course of the 13th – 14th century England assumed the leading role. In the latest phase there is a reduction in the number of participant countries.

This picture of Bergen's development in trade fits hand in glove with what the historians have derived from written sources: a temporary orientation towards England prior to absolute dominance by the German Hanse (Helle, 1982, 388). The exact point in time at which German predominance set in will not be discussed here. After about 1400 England no longer has a significant part of Bergen's trade (Helle, 1982, 791). Nedkvitne (1986, 56) mentions the importance of the dried cod trade from Bergen to England. This trade waned by the end of the Middle Ages because English merchants began receiving large quantities of fish from Iceland. For the entire 14th century the export from Bergen to England was probably more important than from Bergen to Lübeck (Helle 1980, 34), although it was the Hanse merchants who transacted the exchange (Helle 1980, 35).

For Trondheim a similar picture of the changing import frequency is described by Reed (1983). On the basis of an excavation in which a good 7,000 pottery fragments (90% from modern times) were found, he also defines three periods: 1000–1250 AD, 1250–1500 AD and 1500–1800 AD. In the earliest period – in contrast to Bergen – English and German pottery are equally common (Reed 1983, 68). In the middle phase, however, English ceramic products dominate. In the latest period German and Dutch products dominate. Despite the caution demanded by methodology, a trend for western Norway can be

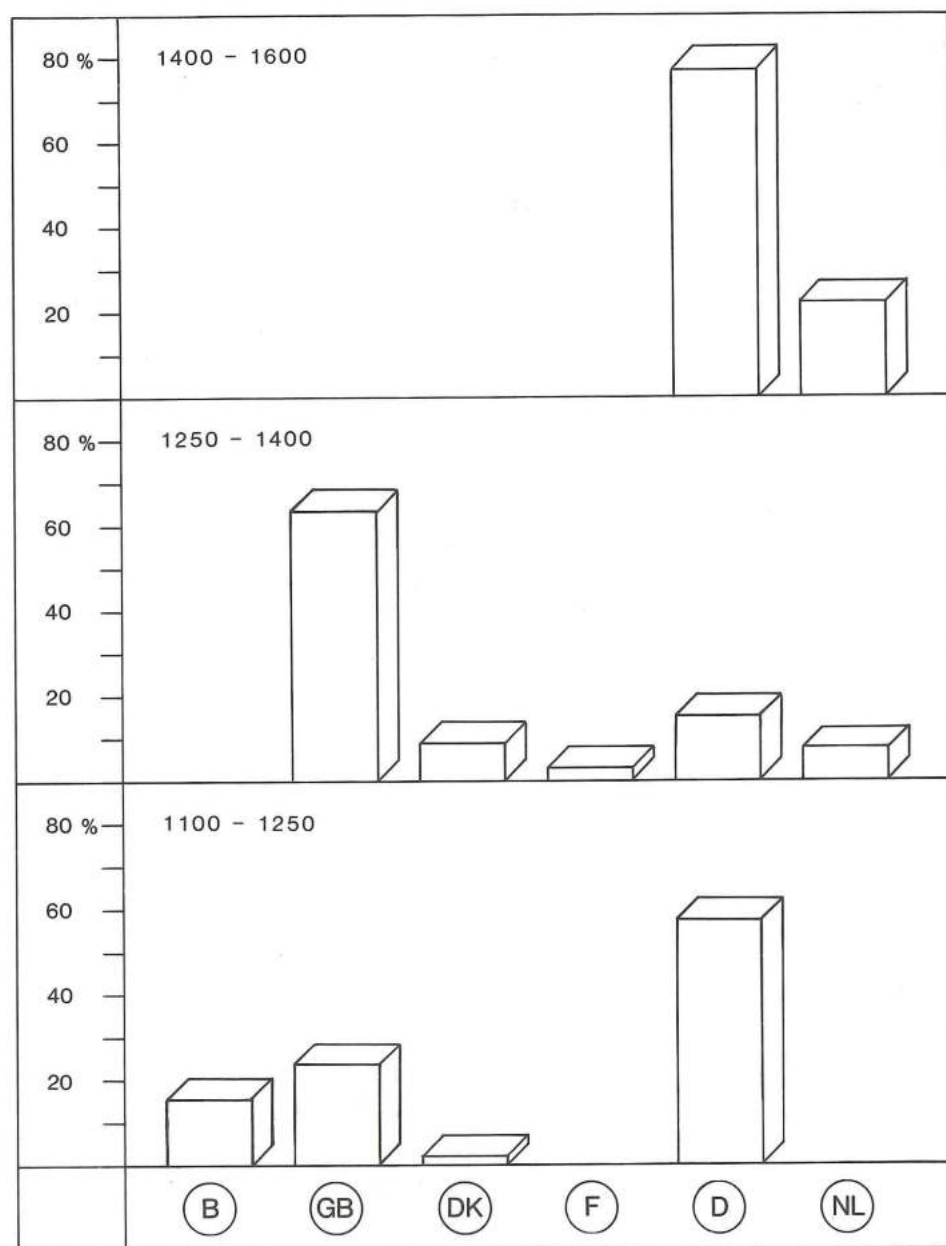


Fig 6 Proportional distribution of Bryggen pottery by countries of origin and period (based on the number of storage trays)

concluded from the developments in Bergen and Trondheim. The contact with England increases so much in the 13th century that it exceeds all other contacts. By the end of the Middle Ages there is a break which allows only German and Dutch pottery to reach Bergen (3). This clear contact with England in the 13th century was pointed out by Dunning (1968, 52) in his investigation of the ceramic trade in the North Sea area. Due to an increase in evidence, it is possible to go further than just the recognition of the fact that there was contact between Norway and England. It is also possible to quantify the contact and to present it as a part of a chronological development.

Also important for this overview is the description of pottery *not* found at Bergen. One would expect pottery from the Baltic as well, especially since it is assumed that there was contact with the Baltic area during the 12th century. The six or eight sherds, however, indicate that this type of pottery, neither as an object of trade nor as a container for something else found its way to Bergen.

3.2 HORIZONTAL DISTRIBUTION OF SELECTED WARES

As mentioned in the introduction, a horizontal analysis of the wares and their geographic origins was used as a means of determining whether the respective ceramic inventories exhibit a regional specialization on the part of the individual merchant tenements.

A similar horizontal differentiation of wares – albeit slight – has been observed for Baltic wares in Schleswig (Lüdtke 1985, 54); the ceramics here were relatively concentrated in one part of the excavated area. Particularly important is the pattern of horizontal distribution in the fire layers because this presumably represents the distribution pattern at the time of the fire. Before the Pingsdorf Ware and the Olive Proto-stoneware are dealt with, other pottery from Germany as well as pottery from England, France and Belgium will be presented for comparison. In addition, the Paffrath Ware will be considered. It is contemporary with the Pingsdorf Ware and is classified as 'Blue Grey' within the framework of the Bryggen pottery.

The term 'Blue-Grey' is applied differently especially in German literature. In order to avoid any misunderstanding, the basic terminology of the Schleswig Colloquium (Erdmann *et al* 1984, 424) already mentioned distinguishes between the grey-ware produced at many places in northern Germany on the one hand, and the genuine Paffrath Ware (Lung 1956) from the Rhineland on the other. This problem in nomenclature has already been pointed out by H Janssen (1983a, 171), and in this text the term Paffrath will be used. Furthermore, some stoneware from Germany will also be included. In Bergen the term 'Langerwehe - Duingen' is used to describe pottery, whose main characteristic is a red/violet engobe or slip and is, consequently, referred to in this investigation as red-slipped stoneware (Erdmann *et al* 1984, 428). Some of these pieces were not completely sintered (fused) so that this category also includes red-slipped proto-stoneware. The name 'Langerwehe - Duingen' is derived from the fact that this type of ware occurs in Langerwehe (Sielmann 1980), as well as in Lower Saxon places of production such as Duingen (Löbert 1977), Coppengrave (Stephan 1981b) and Bengerode (Grote 1976). An attempt has been made to distinguish the particular places of production but certain assignment of every individual fragment is impossible. With corresponding finds from Schleswig, for example, certain formal characteristics could indicate an origin in Lower Saxony (Lüdtke 1985, 70). One of the most extensive groups in the later phases is the completely sintered white Siegburg Stoneware from the Rhineland (Beckmann 1975). Another group in the later phases is the Raeren Stoneware whose sherds are grey with a brown, salt glaze. The latter probably has its origin not only in Raeren, but because it is recognizable as a special fabric it is so grouped and named. Lastly, there is the Wester-

wald Stoneware. Its characteristic blue decoration on relatively consistent grey salt glazed fabric makes it easily identifiable.

Four English wares will be used for comparison. The oldest ware is the London-Shelly Ware. This thoroughly fired, ground shelly-tempered grey earthenware is closely related to St Neots Ware (Williams 1979). Alongside that are three lead glazed earthenwares: London-Brown (recently described under the name London-Type Ware (Pearce *et al* 1985), Scarborough Ware (Farmer 1979) and Grimston Ware, the latter most recognizable from its dark grey fabric with green glaze.

Similar in fabric to the Pingsdorf Ware is the Belgian Andenne Ware. It generally has a light yellow, sometimes orange, glaze. There are some known production sites in the Andenne area (Borremans & Lanssance 1956; Borremans & Warginaire 1966). Two French wares which are easily identified by the naked eye complete the inventory: firstly, the thin-walled Rouen Ware (Barton 1965) and secondly, pieces which are presumably from the large production area of Saintonge (Chapelot 1983).

The horizontal analysis (diag 1-30) is based on the distribution pattern of the entire ceramic assembly. The distribution of the pottery in its entirety is represented by the finds of the whole periods (diags 1-2) as well as by finds from the actual fire layers (diags 3-4), where the individual periods and the sum totals are represented. The same system is used for the Pingsdorf Ware (diags 5-8). The other wares (as for various characteristics of the Pingsdorf Ware) are represented in terms of their entirety and in terms of their occurrence in fire layers (diags 10-30). In the distribution of all the Pingsdorf fragments (diag 6, sum) there is a concentration in the grid-squares K-L/8-12. This corresponds to a similar concentration in the distribution of the entire pottery (diag 2, sum): the area K-L/8-12 attracts our attention because of the numerous pieces found there. In Period 2 the Pingsdorf pieces are concentrated in the area of rows 2-6 (diag 5). This is also the case for all of the pottery (diag 1). Similarly for the Periods 4 and 5 there is a paucity of Pingsdorf Ware in the area of rows 5-7 (diag 5) corresponding to a relatively low occurrence of pottery in general in the same area at the same time (diag 1). A similar situation is evident in the fire layers. In Period 2 there are few finds in the upper left area, and this observation is valid for the Pingsdorf Ware (diag 7) as well as for the fragments in general (diag 3). In Period 3 there are a few fragments in rows 9 and 10: this is true of the Pingsdorf Ware (diag 7) and of the pottery in general (diag 3). The summations also show that the Pingsdorf pieces are most numerous (diag 8) where there is a large number of fragments in general (diag 4). Although the advancing waterfront (fig 2) serves as the background, a concentration of Pingsdorf Ware in particular areas of the excavation is not ascertainable, nor can a horizontal differentiation within the Pingsdorf Ware itself be determined. Taken together, the various forms (diags 13-16) present a highly consistent picture. The weakness, however, of an analysis of the fire layer finds becomes apparent here: the small absolute number of fragments from fire layers hardly allows any statement about the horizontal differentiation (diags 13b-16b). To this extent one cannot rely solely on this - methodologically advantageous - type of presentation, but must always keep in mind the other diagrams as well.

An analysis of the Paffrath Ware, which occurs contemporaneously with the Pingsdorf Ware (diag 22), produces a similar picture. There is, for example, a concentration in areas L-S/9-11 and a second peak in the area of rows 2-4. The situation is similar with the pottery finds in general as well as for the Pingsdorf Ware alone. As we are dealing in both instances with pottery from the Rhineland it comes as no surprise. A comparison of the distribution of Pingsdorf and Paffrath Wares with the contemporaneous Belgian Andenne Ware (diag 21) reveals a similar pattern. This is also true for another coeval ware, the London-Shelly Ware (diag 23): a relatively common occurrence in rows 9-11 and a somewhat less frequent occurrence in rows 2-4. Consequently, for the earlier phase

- characterized by the occurrence of Pingsdorf, Paffrath, Andenne and London-Shelly - it is not possible to determine any specialization of individual merchant tenements.

When considering the distribution of the later wares it is necessary to recall that the upper deposits in the area of P-M/5-12 were removed by a machine and, therefore, few finds were harvested. The distribution of the total assemblage as well as individual wares for Periods 5-8 indicates a void of finds there. This should not, of course, be interpreted as a paucity of finds representative for the respective periods.

Two German wares, Langerwehe and Siegburg, reveal similar distribution patterns in the later phase. Fire layer finds of both Langerwehe (diag 19B) and Siegburg (diag 20B) are plentiful in rows 2-3 and the lower part of rows 9-12. When dealing with an equivalently high total number this is also true for all the finds of both wares (diag 19A, 20A). As before, the distribution correspond to that of the pottery in general (diag 2 sum, diag 4 sum) when the areas dug by machine are taken into account. The same pattern is followed by the French Rouen Ware (diag 25) and Saintonge Ware (diag 26). The fire layer finds are, again, of insufficient number to allow interpretation.

Lastly, we turn to the English wares Scarborough and Grimston. Allowing for the areas mechanically dug, both English wares exhibit a similar horizontal distribution. Both Scarborough Ware (diag 27) and Grimston Ware (diag 28) show concentrations in the back part of rows 2-4 and in the waterfront areas of rows 9-11. Once again the distribution matches that of the pottery as a whole (diag 2, sum, diag 4, sum). This means that conclusions cannot be made about tenement specialization on the basis of this evidence.

The analysis of the horizontal distribution of various wares produces a definite negative result. None of the wares shows a deviation from the distribution pattern of all the pottery. Accordingly, there can be no specialization in pottery of this or that provenance identified on the basis of contrasting distributions. Also, within the Pingsdorf Ware itself, the distribution pattern indicates no preference for a particular form on the part of any tenement. It is interesting to note that the two contemporary English wares, Scarborough and Grimston, have the same distribution. One might have expected the two wares, coming from different parts of England, to have exhibited a contrast which could have indicated a stronger contact of individual merchant tenements with particular areas. Either there was no specialization of trade with particular regions, or, if there was, then due to steady exchange between tenements it is not ascertainable using the archaeological finds. It is also possible that for relatively short time spans (archaeologically speaking) a specialization existed but that it fluctuated from decade to decade; due to the relatively long life of pottery, this fluctuation would not necessarily be noticeable.

Methodologically interesting is the observation that the distribution pattern of the respective finds within the scope of the pottery of all the periods hardly differs from the picture of fire layer finds. The complete number is always higher and the distribution borders are defined somewhat less sharply. In general though, the diagrams present us with roughly the same picture. This correspondence - that the fire layer finds do not also show a horizontal differentiation - may mean that a strong horizontal displacement between the fire layers (due to rubbish treatment) did not take place or, conversely, that a complete mixing of finds between the fire layers is the cause. Either way the same diffused picture would result, and either way the result is the same: negative.

3.3 VERTICAL DISTRIBUTION OF SELECTED WARES

When discussing the vertical distribution, the topic of chronology is inevitably foremost. The main goal is to compare absolute dates - verified numismatically or by dendrochronology - with Bergen's fire chronology and, when possible, to synchronize them. To get some idea of the ceramic quantities involved let us consider the distribution of the pottery in general throughout the periods. In fig 7 - and only there - the percent values have been calculated on the basis of the column sum being 100%. The bar diagram reflects the relative amounts per period. The chronological curve represents a normal distribution: in the lower and higher levels little was found whereas in the middle period numerous ceramic fragments emerged. This standard distribution will be used to judge the distribution patterns of all other wares while keeping each ceramic's special characteristics in mind. Thus, an occurrence percentage will be ascertained.

By reviewing each vertical diagram in turn (diags 10-30) each ware will be dealt with. The Pingsdorf Ware and Olive Proto-stoneware are here excluded because they are to be dealt with later, each in its own chapter. The Pingsdorf Ware (diag 9) will only be mentioned for purposes of comparison. The Paffrath Ware (Blue-Grey) will also be drawn upon (diag 22). The vertical diagram (22C) is set up in such a way that the final column gives the number of all the ceramic fragments for the respective period, the first of the three columns at the right gives the number of Paffrath fragments, and the middle column gives the percentage of Paffrath Ware in relation to the total ceramic assembly for the period. The vertical distribution is given twice for every period, namely for all pieces in a period and for just those pieces found in the fire layer above it. The length of the bars is determined by the relevant percentage value. Only those bars with a minimum length of one mm are included. It is also important to note that, strictly speaking, the

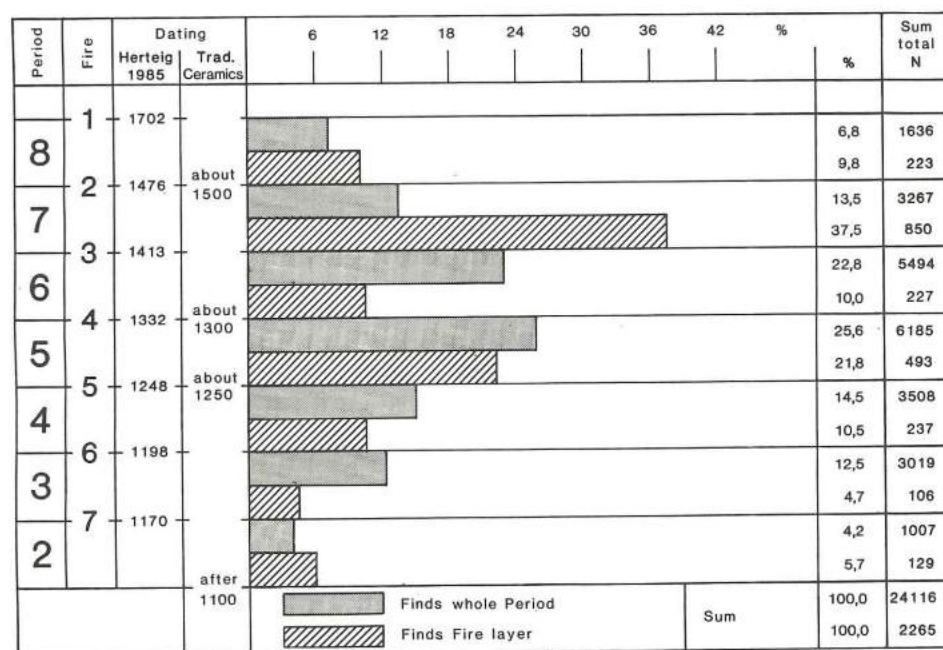


Fig 7 Proportional distribution of all pottery per period, included fire layer (upper bar) and of pottery found only in the fire layer (lower bar)

absolute numbers do not come from the number of fragments but rather indicate the number of entries in the data catalogue (data file), ie the accession numbers.

The total number of fragments is somewhat higher because an accession number occasionally stands for several fragments at once. This method is, however, acceptable because no systematic mistakes resulted, eg only particular wares showing occasionally several fragments within one catalogue entry. (Concerning this problem see page 19.)

The Paffrath Ware (diag 22) has its main occurrence clearly in the early periods. There is a continual reduction from 40% in Period 2 to 0.75% in Period 6. The percentage value of all finds is higher in Periods 4 and 5 than the values for finds in the fire layers. The occasional occurrence of individual fragments in the upper layers should also be mentioned, but this does not cloud the described picture. A completely different pattern is evidenced by the red-slipped Proto-stoneware and stoneware (Langerwehe – Duingen Ware) (diag 19). With relative suddenness this ware appears in Period 6 and fluctuates between 7% and 11% to Period 8. The values of all finds vis a vis the fire layer finds are higher in the upper two periods. There is a noticeable small concentration in Period 3 almost independent of the later development. It is possible, however, that some of the ceramic material was incorrectly sorted, so that possible Langerwehe – Duingen pieces have been placed with red-slipped earthenware. This will be important later within the framework of the detailed description of the stoneware.

The Siegburg Stoneware (diag 20) has a similar distribution pattern. After sporadic occurrences in Periods 4 and 5 there is a massive occurrence in Period 6. Over the course of time it increases to a peak of 26% in Period 8. The Raeren Stoneware (diag 30) reaches an even greater concentration in a higher part of the stratigraphy. In Periods 6 and 7 it is only 1% but by Period 8 (the latest layer) it has reached 13%. It is only in the latest periods that the Westerwald Stoneware emerges at all with 3% (diag 29).

The stratigraphy indicates that the London-Shelley Ware is the oldest English ware (diag 23). It reaches its maximum of 5% already in Period 2 and in Period 5 drastically recedes. The percentage values of fire layer finds recede evenly from Period 2 to Period 5, while the values for all the finds increase in Periods 3 and 4 and in Period 5 are significantly higher than the values for fire layer finds. The same observation can be made for the London-Brown Ware (diag 24). The values rise from 1% in Period 2 to just 7% in Periods 3 to 5. In Periods 6 and 7 it still remains at least detectable on the diagrams, whereas the fire layer finds vanish after Period 5. The heaviest concentration is in the middle areas of the stratigraphy. Clearly later is the Scarborough Ware (diag 27). It occurs from Period 3 to Period 8. The fire layer finds reach a maximum in Period 4 and 5, whereas the maximum for all the finds lies in Periods 5 and 6. Similar to the Scarborough Ware, the Grimston Ware has a rather long life, from Periods 3 to 8 (diag 28). Here as well, there is a distinct maximum in Periods 5 to 7, where the Grimston Ware fluctuates between 16% and 31%. Scarborough and Grimston begin about the same time but the heaviest concentration of the Grimston Ware is vertically higher, in other words later, than that of the Scarborough Ware.

The French Saintonge Ware maintains itself just at 1% from Periods 2 to 6 and a wee bit into Period 7 (diag 26). The ware has a long life without showing a pronounced maximum. The percentage values of the fire layer finds continually recede from Period 3 to 7, whereas the values for all the finds reach a maximum first in Periods 5 and 6. The Rouen Ware occurs only in small numbers distributed over Periods 4-7. Only in Period 5 and Period 7 are fragments found in the fire layers (diag 25). The Belgian Andenne Ware is stratigraphically one of the oldest wares (diag 21). It reached a maximum of 22% already in Period 2 with a steady reduction to Period 5, while fire layer finds cease with Period 4.

While studying the vertical distribution of the various wares, a special phenomenon

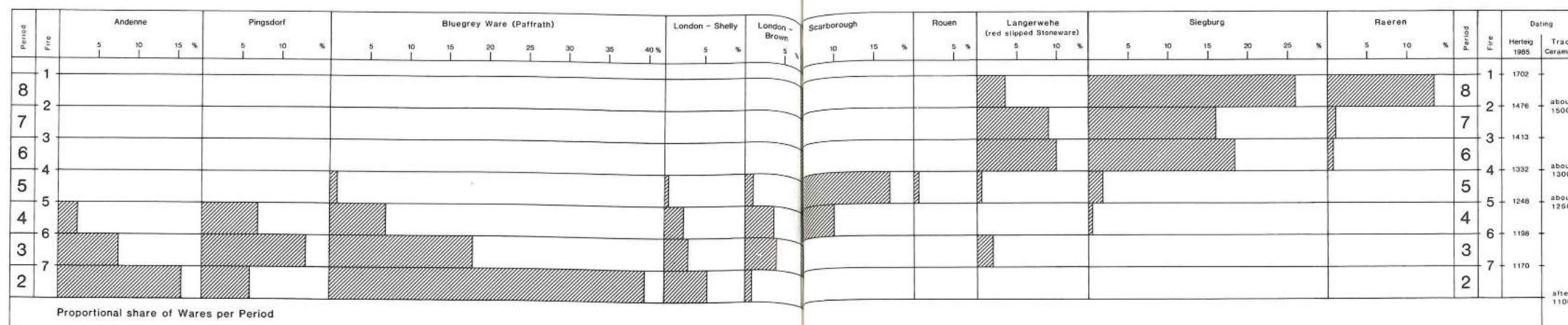


Fig 8 Vertical distribution of ten selected wares found in the fire layers

catches the eye. It is of particular importance not only for the chronological interpretation of the ceramic material but also for that of all artifacts found. The comparison of the stratigraphical distribution of the finds in the fire layers with those of the entire periods (both above and below the fire layers) shows a systematic deviation. The maxima for all the finds throughout all periods were one or even two periods higher than the distribution maxima of fire layer finds. The systematic shift is especially noticeable for the Pingsdorf Ware (diag 9A), Langerwehe – Duingen (diag 19), Andenne (diag 21), Paffrath (diag 22), London-Shelley (diag 23), London-Brown (diag 24), Scarborough (diag 27) and the Grimston Ware (diag 28). In every case the finds for the respective period indicate a higher level in the stratigraphy – ie a later dating – than the fire layer finds. A possible explanation of this phenomenon runs as follows:

After every fire catastrophe, but before the erection of new buildings, an extensive levelling was undertaken, combined with much deposition for the regularly advancing waterfront. In the course of such levelling work a large amount of material would be moved and transported, and debris brought in from neighbouring properties (debris resulting from the fire). Included among this would be objects which had been in use just before the fire. In the course of filling and levelling this mass of debris would be stratigraphically above the actual fire layer. In this way objects which had been in use before or up to the fire might end up just above the actual fire layer. It is, then, the finds directly out of the fire layers which are the «correct» representatives of the time in question. Finds from the debris layers between the fire layers signify a later date but are actually from a period older than their position would indicate. Therefore, detailed discussion of the chronology must be based on the finds from the fire layers themselves. Otherwise the dating will on average be one period too late because the large quantity of finds from the debris layers suppresses that of finds from the true fire layers. These remarks pertain to constructions on the landward side (the habitation area) and not to the backfilled area by the waterfront.

With this fact in mind, a synopsis of ten selected wares will be made in order to reach some general conclusions about the absolute chronology. The vertical distributions of ten wares have been placed beside each other (fig 8). Only the fire layer finds are included. The length of each bar is based on a percentage scale common to all. It is easily noticed

that the stratigraphy of the individual wares forms series. The mixture of finds from different periods (cf chap 2.2) may make the borders a bit fuzzy but taken altogether we have an almost textbook picture. First there is an early phase, Periods 2–4, with Andenne, Pingsdorf, Paffrath, London-Shelley and London-Brown Ware. Following this is a phase with a concentration stratigraphically in the middle, documented by the Scarborough and Rouen Wares. Thereafter comes a later phase of Periods 6–8 with the stonewares Langerwehe–Duingen and Siegburg. Finally the latest phase is marked by the emergence of Raeren Stoneware only in Period 8.

The joint occurrence or the mutual exclusion of different wares over the course of time (ie the relative sequence of pottery), as shown in fig 8, corresponds to the relationships discovered in Oslo. The whole amount of pottery was also imported there. Although the quantitative emphasis in Oslo is different from that in Bergen, the relative sequences are similar. By way of comparison, the excavation will be mentioned at which extensive finds came to light: 'Mindets tomt' (Molaug 1977). There is a phase which extends to Level 8 in the stratigraphy there and which is comprised of Paffrath, London-Shelley, Andenne and Pingsdorf Ware (Molaug 1977, tab 1, 2, 6). (4). Afterwards these wares recede, just as in Bergen. Another, later phase differs through the characteristic occurrence of Siegburg and Langerwehe Stoneware beginning in level 6 or 5 (Molaug 1977, tab 6). Overlapping both these phases, but with a concentration in between, is an amount of English glazed earthenware such as Grimston and Scarborough Ware in levels 9 to 4, proving the persistence of Grimston Ware in Oslo (Molaug 1977, tab 3). This would indicate that the stream of ceramic imports during the Middle Ages reached Norway with chronological consistency and without strong regional differences (in the sense of either strongly progressive or conservative regions). In the area of southern Scandinavia the situation is similar, although the extent of imports diminished through competition from indigenous pottery. Let us take Schleswig as an example: for a while Pingsdorf, Paffrath and Andenne Ware occur parallel and then vanish at the same time (Lüdtke 1985, 70).

The vertical distribution of the ten selected wares (fig 8) has been examined in order to indicate fixed points in the absolute chronology of each ware. The Andenne Ware, here seen in Periods 2–4, was traded primarily in the 12th century in northern Europe (5). The position of the Andenne Ware in the 12th century and the beginning of the 13th is evident

in the excavation of the «Schild» site in Schleswig (Lüdtke 1985, tab 44). The stratigraphy is five metres thick. Its absolute chronology is relatively certain due to dendrochronological and numismatic investigations (Lüdtke 1985, 34). These datings correspond to those of finds at Ribe, where dendrochronological methods were also employed. The pertinent finds in several layers date from 1150 to 1225 (P K Madsen 1985, 60). Several excavated sites in 's Hertogenbosch have likewise provided an absolute chronology for the ceramic finds there (H Janssen 1983b). The Andenne Ware comprises some 20% of the ceramics in 's Hertogenbosch from the 12th century. In the first half of the 13th century it wanes and during the second half eclipses (H Janssen 1983b, 190). In contrast to Schleswig, there are isolated Andenne fragments in the second half of the 13th century, but this is not surprising because of the relative closeness to the place of production – especially at a time when this ware was no longer traded further north. Consequently, the Andenne Ware at Bergen can be dated in the 12th and first half of the 13th century.

Although the absolute chronology of the Pingsdorf Ware will be dealt with in a chapter of its own, one result may be anticipated here: an occurrence of Pingsdorf Ware can be reckoned with up to the first half of the 13th century. The Paffrath Ware occurs mainly in Periods 2–4 though traces can still be found in Period 5 (fig 8). In Schleswig, the Paffrath Ware occurs – like the Andenne Ware – in the 12th century and a little beyond (Lüdtke 1985, tab 43). A coin hoard from Zierikzee, buried in 1225 (Sarfatij, 1982, 498, No.2), proves that the Paffrath Ware still occurred at the beginning of the 13th century.

Dendrochronology and numismatics were also used in dating medieval ceramics from London of which only a survey has been published (Vince 1985). There is an unassorted variation of Shelly Ware from the 12th century (*ibid* 38) and some still at the beginning of the 13th century (*ibid* 44). Around the middle of the 13th century the Shelly Ware appears only sporadically and afterwards ceases altogether (*ibid* 52). The London-Type Ware (known in Bergen as 'London-Brown') has recently been dealt with in an extensive study of the London finds (Pearce *et al* 1985). Again it is a combination of dendrochronological and numismatic evidence from several sites in London which provides the absolute chronology. The London-Brown Ware first appears in the middle of the 12th century. By the end of the 13th century it has dropped back in percentage (*ibid* 14). During the 14th century it is only found as traces in the assembly. For the purpose of dating the Scarborough Ware, a symposium was held, the results of which were published in *Medieval Ceramics*, vol 6 (1982). These results are used here as a basis, without any detailed discussion of the literary sources and no attempt will be made to present subgroups of the ware. Despite some controversy, one can assume that from 1200 onwards, and in any case after the middle of the 13th century, Scarborough Ware was traded (Farmer 1982, 84 and 100). There is not a consensus as to how long the ware was produced, but one can reckon with the presence of the ware for at least until the second half of the 14th century.

The Rouen Ware appears at Schleswig in layers from the 13th century (Lüdtke, 1985, 66). The Rouen Ware finds at Ribe come from a chronologically comparable layer in the stratigraphy. They can even be more precisely dated to the beginning of the 13th century. Two fragments managed to be buried before 1180 (P K Madsen 1985, 60).

A discussion of the absolute chronology of the group Langerwehe – Duingen is at present made difficult by the inclusion of red-slipped Proto-stoneware in this group of predominantly red-slipped Stoneware. Each type would actually demand a separate chronological analysis. Taken together as Langerwehe – Duingen Ware it does show a slightly differing distribution pattern, which will be gone into later. At this point it must suffice to give some indication of the ware's earliest occurrence. A Possible differentiation between the Rhineland and Lower Saxony forms of the ware will not be attempted.

Red-slipped Proto-stoneware appears in Höxter in two numismatically dated contexts from 1250–70 and 1270–1306 (Stephan 1978, 39). On Bornholm, the Skriversgade coin-hoard vessel is of just this kind of ware. It was buried around 1285 (Liebgott 1978, 51). Similarly, in Stege, Denmark, another coin hoard with the same ware was found which dates to about 1355 (*ibid* 70). From Roneklint is yet another coin-hoard from 1380 (*ibid* 77). Gilles (1983) has published no less than five coin hoards associated with red-slipped stoneware from the Mosel and Eifel region. The vessel from Schöndorf was buried around 1322, that from Freudenburg 1335, from Niersbach 1350, from Breit 1360 and the one from Marzing-Novian 1362 (Gilles 1983, 277). Further coin hoards from the Netherlands have been published by Sarfatij. The vessel from Brunssum was buried 1310–1400 (Sarfatij 1982, 499, No.3), the one from Delden 1430 (*ibid* 503, No.9), the vessel from De Emelangen c 1430 (*ibid* 504, No.10), that from Vorden 1432 (*ibid* 504, No.11) and that from Honsbroek 1481 (*ibid* 508, No.16). These serve as examples of medieval, but not of the latest, red or red-brown slipped stoneware. Red-slipped proto-stoneware can be reckoned with from the last third of the 13th century onwards. There are numerous examples of coin hoards from the 14th and 15th centuries. Neither the difference of provenance nor of technique of the stonewares grouped together here will be discussed in any detail. Important, though, are the examples from the 13th century. It is indeed possible that in the future red-slipped stoneware must be seen as beginning in the second quarter of the 13th century. This has been indicated by Stephan (1982b, 95) in a study of northern German ceramics in the Middle Ages. The same author has written a survey of the development of German stoneware (Stephan 1983) which deals extensively with this topic.

The emergence of fully developed Siegburg Stoneware is comparatively easy to deal with. Some coin finds from Denmark indicate a date in the middle of the 14th century: for instance, the coin hoard from Særslev 1352 (Liebgott 1978, 69) and somewhat later the vessel at Vordingborg from 1390–1400 (*ibid* 78), that from Kallerup 1390–1400 (*ibid* 80), from Stege II c 1400 (*ibid* 84), from Meløse 1403–10 (*ibid* 86) and the vessel from Stege III from 1420 (*ibid* 88). A series of coin vessels from the Netherlands has been presented by Sarfatij: vessels at Dalfsen c 1371 (Sarfatij 1982, No.4), at Nijmegen c 1384 (*ibid* No.5), Woerden c 1425 (*ibid* No.7), Barneveld c 1425 (*ibid* No.8), Sneek c 1435 (*ibid* No.12), Kudelstaart c 1434 (*ibid* No.13) and Merselo ca 1449 (*ibid* No.14). Whereas all these finds point to an earliest dating in the third quarter of the 14th century, H Janssen (1983a, 175) places the first occurrence of this ware in the second quarter of that century. From Amsterdam, Baart reports a dendrochronologically dated instance of Siegburg Stoneware as early as around 1300 (6). Stephan (1983, 101) considers a date towards the end of the 13th century possible. Without nailing it down to a particular decade, I think it permissible to place the first emergence of fully developed Siegburg Stoneware in the period 'around 1300'.

Numismatic evidence is also important for the absolute chronology of the Raeren Stoneware. Sarfatij has gathered together the coin finds in the Netherlands: there are coin hoards from Lenselo dated to after 1506 (Sarfatij 1982, No.18), Aartswoud c 1512 (*ibid* No.20), Garven c 1515 (*ibid* No.21), Feerwerd after 1527 (*ibid* No.24) and Leeuwarden c 1539 (*ibid* No.26). The dates are relatively close together. It is therefore fair to say that the Raeren Stoneware is primarily possible first in the 16th century or at best just a little earlier.

Though the dating for all the wares is not always completely satisfactory – eg for the red-slipped stoneware – it is nevertheless possible for many of the wares to present plausible indicators for an absolute chronology. The primary evidence is derived from dendrochronology and numismatics. Using the overview just presented, some absolute dates will be applied to the stratigraphy. Noteworthy is that the Pingsdorf, Andenne and

Paffrath Wares all cease at about the same time, namely in the first half of the 13th century. The same parallel development of the three wares can also be observed at Bergen (fig 8). The fire layer in which all three wares appear for the last time may therefore be dated in the middle of the 13th century. Indeed, we are dealing with Fire 5 which Herteig identifies as the fire catastrophe of 1248. In the light of this agreement, the dating 'ca 1250' should be included next to Fire 5 in the column 'Traditional ceramic dating' of the vertical diagram tables. Both London-Shelly and London-Brown Wares are found in England in small amounts in the second half of the 13th century. At Bergen – parallel to England – they are just barely represented in the following Fire 4. That, combined with the presence (in a small quantity) of Siegburg Stoneware in the same fire layer, allows for the tentative dating of 'ca 1300' for Fire 4. This dating would agree with Herteig's assignment of this layer to the fire of 1332. Fire layer 2 may be dated 'c 1500' because the Raeren Stoneware is here for the most part missing, whereas it comprises a significant part of the pottery in the level above the fire. Again, Herteig's dating of 1476 for Fire 2 should be included within the range of tolerance.

The ceramic sequence aids in marking the starting date for the whole stratigraphy. Whereas the Pingsdorf Ware occurs between 900–1250 (dealt with in detail below), the Andenne Ware as well as the Paffrath Ware are encountered primarily in the 12th century. This is shown especially within the Schleswig stratigraphy. Were there a layer of any sort in the stratigraphy at Bryggen going further back than the 12th century there would have to be Pingsdorf fragments without the accompanying presence of Andenne and Paffrath Wares. This is, however, not the case. On the contrary, all three wares appear together in the lowest layer, which means that this layer can be no earlier than 'c 1100'. Strictly speaking, this is only a *terminus post quem* because it is possible that the ceramic material might not have become buried until the middle of the 12th century.

The assumption of a starting point of 'not before 1100' affects the historical interpretation of the development of Bergen's settlement. On the one hand there is the hypothesis of a long development with roots in the early Middle Ages (Helle 1982, 96), on the other hand the hypothesis of a sudden expansion following the foundation (*ibid* 96). The latter hypothesis seems more likely because there is no evidence among the ceramic material for a settlement earlier than 1100. The hypothesis of the settlement's evolution, based on a mineralogical and botanical analysis, proposed by Krzywinski and Kaland (1984, 34) is in no way corroborated by the archaeological evidence. Indeed, the question arises whether a reconstruction of the Merovingian and Viking settlement phases (Krzywinski and Kaland 1984, 36) is not an overinterpretation of a relatively small amount of evidence.

An analysis has been made of the vertical distribution of a number of wares. In addition, Herteig's suggested fire chronology has been compared with the traditional ceramic chronology. Both investigations show that the northwest European ceramic chronology and the fire chronology at Bergen stand in agreement to one another. This should not be understood as meaning that the ceramic finds prove the Herteig chronology down to the very year. Strictly speaking, it is only maintained that the traditional ceramic dating and the Bryggen fire chronology do not contradict one another. Nevertheless, looking at it from the standpoint of this ceramic study, one must conclude that the suggested fire chronology may in the future – as in the past – be used as the basis for the analysis of the various finds (7).

4 The Pingsdorf Ware

4.1 CLASSIFICATION AND DESCRIPTION

In Bergen the Pingsdorf Ware appears on the whole to be rather homogeneous. The vessels are without exception thrown on a fast potter's wheel, and because of their wall thickness of between 3mm and 6mm they can be regarded as relatively thin-walled. As the temper has an average particle size of 0.2–0.4mm it could be classified as 'fine' according to the *Rahmenterminologie* or basic terminology of the Schleswig Colloquium (Erdmann *et al* 1984, 427). Prominent temper particles produce the sandpapy quality of the surface, which is characteristic of this ware. Two groups have to be distinguished on technical grounds. On the one hand there is the ware which was most likely fired entirely with oxygen present (pls 1–6); they show a pale yellow, sometimes nearly white colouring on the exterior and the interior of the vessel. This tone corresponds to colour No.8 'Pingsdorf Yellow' of the colour charts published with the Schleswig Pottery (Lüdtke 1985, pl 41), while the nearly white variant, colour No.7 'Pingsdorf White' (*ibid* pls 41), appears very rarely in Bergen. On the other hand we have a group of sherds (pls 7–12) exhibiting a dark colouring at least on the surface (often even through the whole piece). These were presumably fired in a reducing atmosphere. The tone thus created would best be described as 'olive' and corresponds to colour No.9 'Pingsdorf Dark', on the Schleswig colour charts (*ibid* pl 41). The hardness of the sherds varies from 6 to 7 according to the Mohs' scale and may consequently be called 'very hard', occasionally even 'very very hard' (Erdmann *et al* 1984, 419). Yet, determinations of hardness are problematic and in the last analysis only useful in a very limited sense (Eggebrecht 1974). Therefore, these specifications are simply meant to facilitate communication with the reader. It is rather difficult to distinguish the Olive Proto-stoneware (pls 13–15) from the latter darker coloured group, in terms of technical characteristics. The composition of the sherd, its temper and colour correspond largely to the darker variant of the Pingsdorf Ware. Altogether, the Olive Proto-stoneware was fired to a harder degree than the variant, and the fabric shows a much higher degree of sintering, but to draw an exact line between these two wares is hardly possible. This is why a separate chapter of this study is dedicated to the investigation of the Olive Proto-stoneware (chap 5). Behind the close relationship of these two groups presumably lies the fact that they were produced in the same workshops which, in the course of time, fully specialized in the production of the Proto-stoneware.

Functionally, there are two types of Pingsdorf vessels to be distinguished in Bergen, the jug and the beaker. This range of usage is in agreement with the Pingsdorf finds from Lödöse (Carlsson 1982, 33) as well as from Ribe (Bencard 1970, figs 2 and 4), Haithabu (W Janssen 1987, pls 24–27) and Schleswig (Lüdtke 1985, pls 33–35). The functions of these assumed drinking vessels is the subject of a separate chapter in this study. Due to

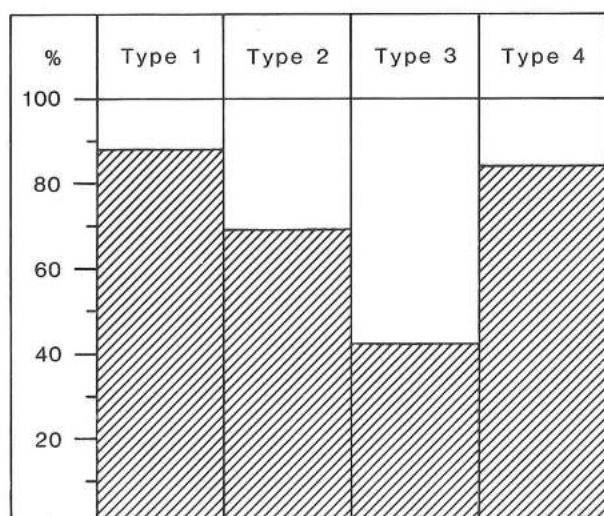


Fig 9 Red-painted Pingsdorf Ware: distribution by type

the shape, a total of four types of drinking vessels can be defined, which are all present in both colour variants. The first type is a kind of jug, which has a flat, relatively broad shoulder beginning immediately beneath the rim (pls 1-2), as opposed to type 2, which is characterized by a more or less distinctly shaped neck between the rim and the shoulder (pl 3). Both types have in common the existence occasionally, but not necessarily so, of flat handles (*Bandhenkel*) attached to the upper part of the rim (pls 2.4-7 and 9.3-4) and tubular spouts (pls 1.3-4 and 3.4), both features sometimes occurring on the same vessel (pls 1.1 and 8.1). Type 3 represents a jug of a slim shape with a relative steep neck and shoulder (pls 4.6-10 and 8.4-8). Neither handle nor spout was found on any vessel of this type. In this respect we should speak of a jar rather than a jug, as a jug is distinguished by the presence of a spout, whereas a jar is defined (among other characteristics) by the absence of a pouring device (cf the basic terminology of the Schleswig Colloquium, Erdmann *et al* 1984, 430). Finally, type 4 comprises the beaker (pls 5.1-5 and 10). All four types frequently exhibit, though not exclusively, a red-painted decoration. The percentage of decorated pieces of type 1, 2 and 4 comes up to between 70% and 90%, while only 40% of type 3 are painted (fig 9). The decoration is the so-called «comma-type» which has a series of comma-shaped strokes forming a band around the shoulder of the vessel (pls 1.1 and 2.1). Very rarely we find that kind of decoration which consisted of commas arranged in columns (pl 5.11). The beakers, in particular, ie type 4, are usually decorated with groups of diagonal lines at the neck area (pl 5.3), sometimes with a horizontal line running below them right round the neck (pls 10.3,8,11).

In order to consider further the question of the uses to which these vessels were put and in order also to gain an idea about the least number of vessels that had existed, a Minimum Individual Number (MIN) was inferred by means of a special method. I have already used and described it in detail in connection with my investigation of the Schleswig Ceramics (Lüdtke 1985, 79). It is done by determining what percentage each rim-sherd represents of the original vessel's rim circumference. A complete rim makes 100%, a half-preserved rim makes 50%, and so forth. If, for example, the total of all the percentages makes about 1200, the former existence of at least 12 vessels can be inferred

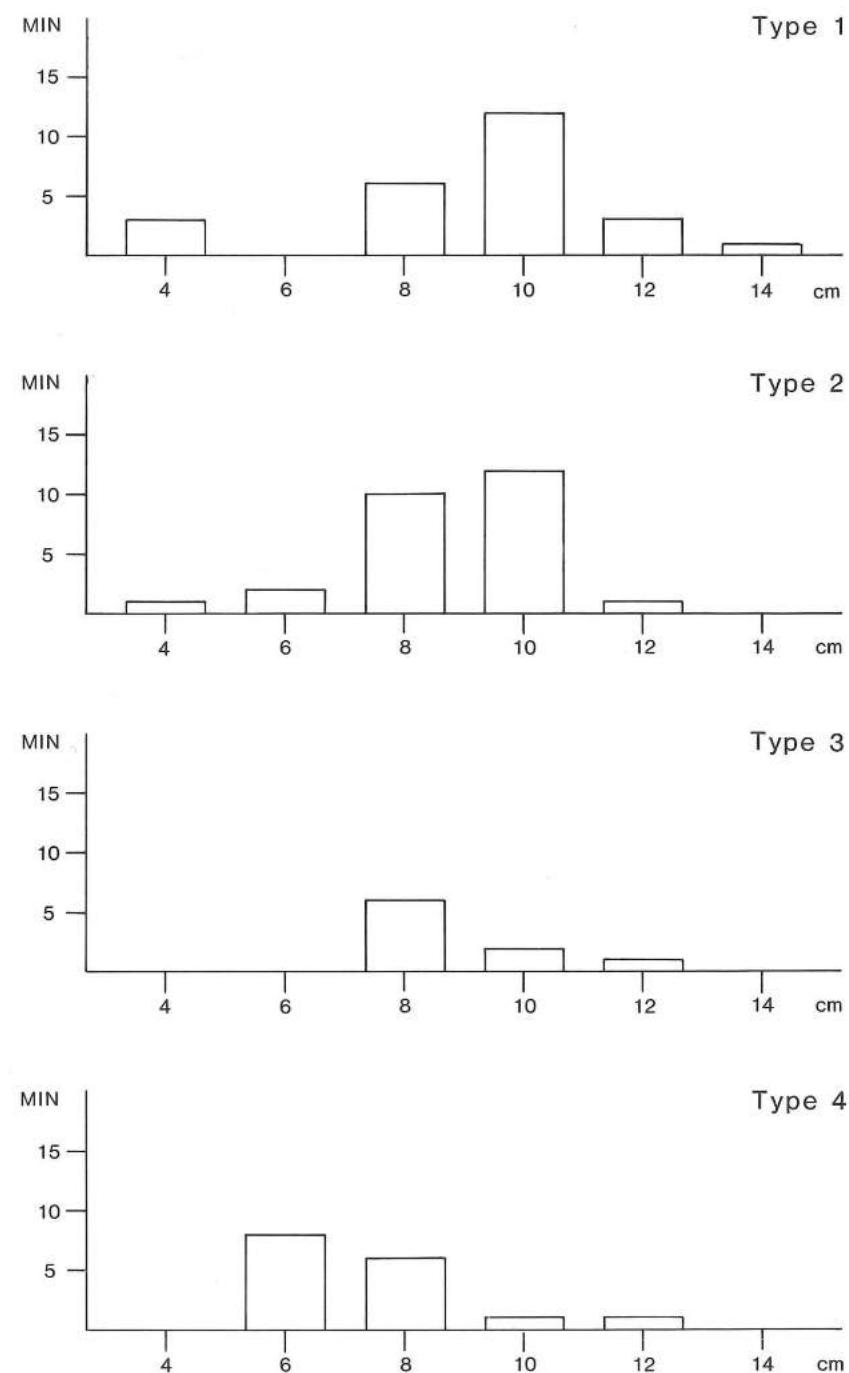


Fig 10 Pingsdorf Ware: minimum number of vessels divided according to type and rim diameter (cf table 4)

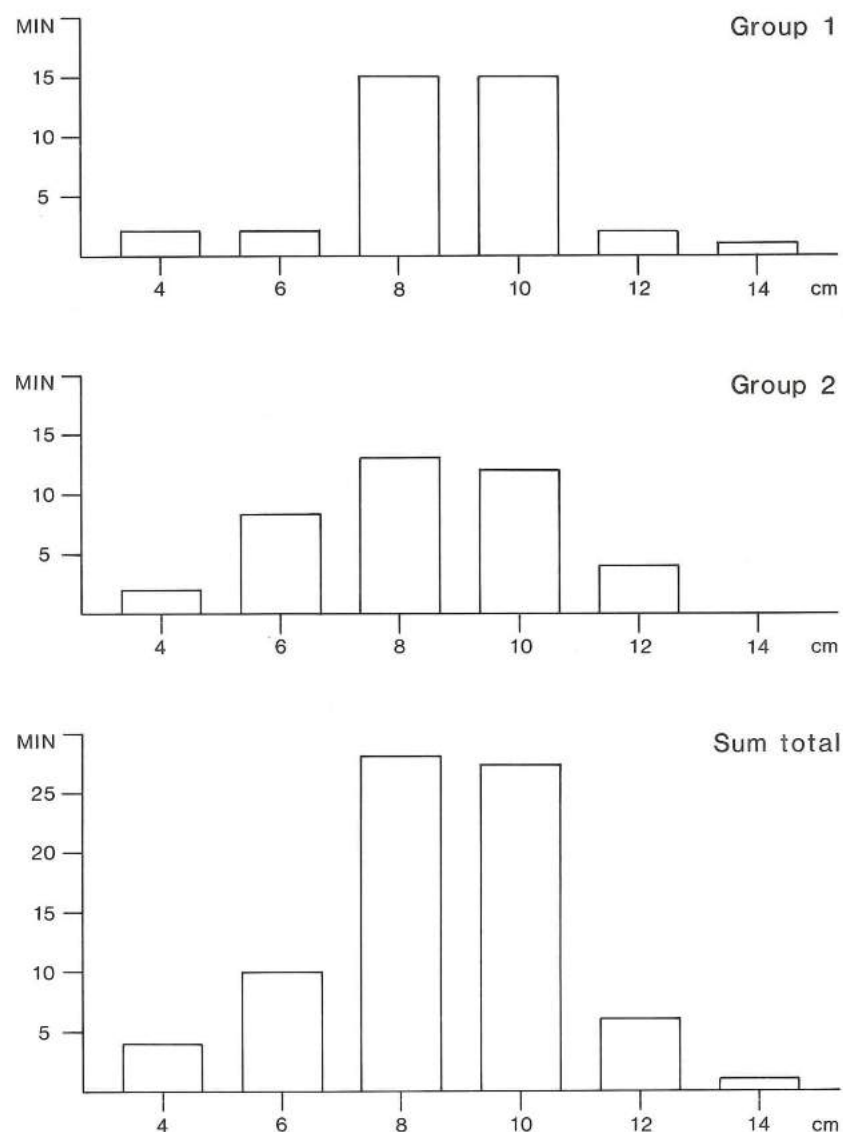


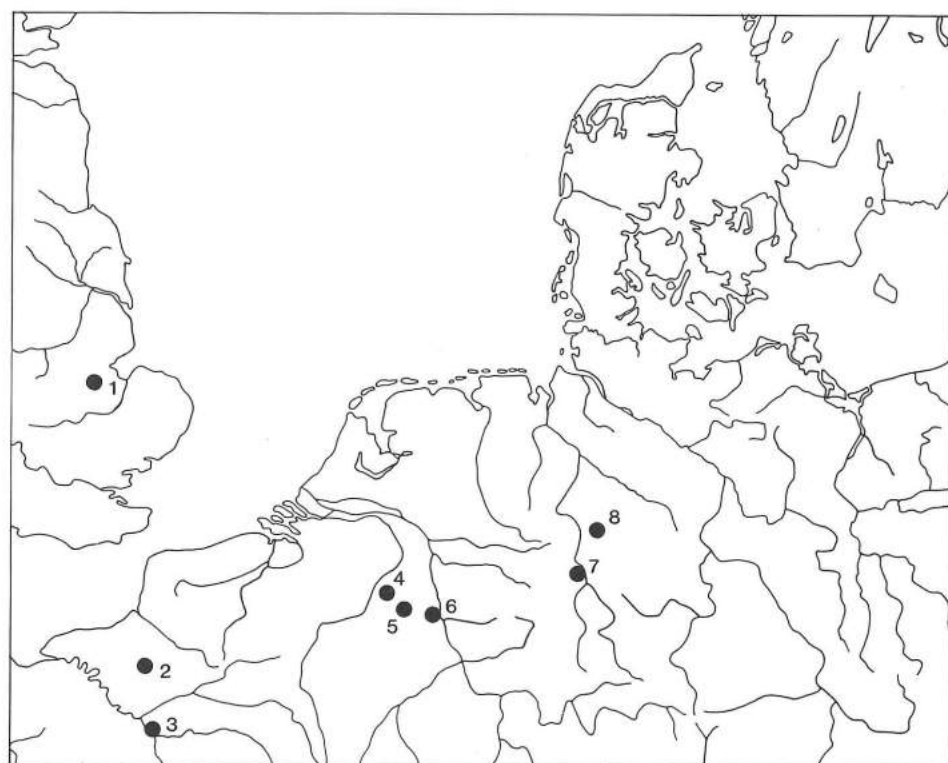
Fig 11 Pingsdorf Ware: minimum number of vessels divided according to group and rim diameter (cf table 4)

(12x100=1200). But as the rim fragments are assigned to different size ranges, types and groups, their rim values are added up separately, according to these three parameters respectively. The results are shown in table 4, while table 5 comprises the analogous data based on calculations of the base fragments. From this list we may conclude that there must have been at least 76 Pingsdorf vessels, which are very evenly (37:39) assigned to the two colour-groups described above. Also types 1 and 2 reveal a very similar (25:26) occurrence in number, while only 9 vessels belonging to type 3 and 14 assigned to type 4

were ascertained (tab 4). I will come to these proportions later. However, it should be emphasized that types 1, 2 and 3, ie jugs and jars, are rather evenly spread between the two colour-groups. Only type 4, ie the beaker, is an exception to this rule, with a MIN of 3 in group 1 and 13 in group 2. So here we are dealing with a majority of dark beakers, fired in reducing conditions. A graphic presentation of the range of rim diameters for each type (fig 10) shows that the curves for types 1 and 2 are very similar with their peaks at about 10cm. This agrees with the distribution of rim diameters determined for the Pingsdorf Ware from Schleswig (Lüdtke 1985, 73). The maximum rim diameter for type 3 is at 8cm, but for type 4 it comes to only 6cm (fig 10). As type 4 has relatively small rim diameters it does not appear very often in group 1, so it is not surprising that a comparison of the different graphs reveals a distinctly higher 6cm value in group 2 than in group 1 (fig 11). Taking the surviving base fragments, we come to a MIN of 112 vessels (tab 5), which is considerably more than could be identified by the estimated number of rim fragments. Nevertheless, since it is not possible to assign the base fragments to the four types described above, we will not use these 112 vessels in further calculations. Moreover, the MIN is an abstract term, as we notice by the difference of 36 vessels between the total derived from rim-sherds and that calculated from base-sherds (112-76=36). This means that numerical proportions may be described but we are hardly able to make reliable specifications about the absolute numbers of vessels having been in use. Besides, an obvious explanation of the above phenomenon is that when a vessel is broken, it is likely to produce less base fragments than rim pieces. Provided that the archaeologist finds an even and proportionately reduced number of objects, we may conclude that the individual base piece represents indeed more of a vessel than the individual rim fragment, which is why we arrive at a higher MIN for the base fragments, even though it was not calculated separately according to types. Indeed, this differentiation can only be made on the basis of rims.

4.2 PROVENANCE

Pingsdorf Ware derives its name from the village of Pingsdorf on the *Vorgebirge* between Cologne and Bonn, which is regarded as an important place where pottery workshops were found (Böhner 1956). However, this is not the only place; other workshops, or at least depositories of ceramic wasters, have been excavated at other places on the *Vorgebirge* and beyond (fig 12, No.6) during the last decades. This region has been known as a well-developed pottery area since Roman times, where numerous characteristic earthenwares, and later also stonewares, were mass-produced for foreign trade. A comprehensive list of medieval potter's workshops in the Rhineland has recently been worked out by W Janssen (1987) in connection with his description of imported ceramics at Haithabu. It also includes kilns with Pingsdorf Ware originating from the Langerwehe area (fig 12, No.5). In view of the detailed description of these ceramics by W Janssen (1987), as well as the combined distribution analysis of the Rhenish and the neighbouring Dutch potteries by Brongers (1986, 373), I think we can dispense here with a presentation of a similar catalogue. I was also given the opportunity to compare several Pingsdorf fragments from Schleswig with various kiln finds at the Rheinisches Landesmuseum in Bonn. As the technical characteristics proved largely to be identical, we may claim that the Schleswig pieces are of Rhineland origin (Lüdtke 1985, 61). Also W Janssen (1987) comes to the conclusion that the Pingsdorf Ware found in Haithabu actually originates from the Rhineland. Furthermore, the Schleswig pieces as well as the Haithabu finds correspond exactly with the material found at Bergen, so that we should not object to a



- | | | | |
|------------|----------------|--------------|-----------------|
| 1 Stamford | 3 Paris | 5 Langerwehe | 7 Reinhardswald |
| 2 Beauvais | 4 Southlimburg | 6 Vorgebirge | 8 Duingen |

Fig 12 Production areas of red-painted earthenware in the 10th - 12th centuries

Rhineland provenance according to technical aspects. A number of vessels from the Rhineland match the Bergen finds exactly in respect of several characteristics. This is also the case, for example, with several jugs, included in a catalogue of medieval pottery (Reineking von Bock 1985, 96), which are characterized by flat handles attached to the upper part of the rim, short spouts, and an irregular comma decoration. Also illustrated are beakers (Reineking von Bock 1985, 101) which have their precise equivalent in Bergen. However, very similar pottery was produced at other places in Europe throughout the Middle Ages, and these will be briefly discussed here and compared with the material found at Bergen. In the Netherlands, adjoining the Rhineland we find an important production area of such pottery at Südlimburg (fig 12, No.4). The material excavated there has been investigated in several studies and published by Bruijn (1960, 1961, 1964); Brongers (1986) has recently worked particularly on the technology of this ware. However, a similarly comprehensive presentation and analysis of the Rhenish material is yet to come, which is why we have a much more profound knowledge of the entire Südlimburg range of forms than of the Rhenish pottery. There are characteristic forms belonging to the early periods, such as the jugs with spouts and the beakers, which

are formally similar to the Bergen vessels. In contrast to this there is no equivalent to either the globular pots or the bowls (or dishes) and the lamps (Bruijn 1964, fig 1) among the Bergen material. Furthermore, the red decoration in Südlimburg predominantly shows a pattern consisting of groups of lines arranged chainlike in columns placed side by side (Bruijn 1964, fig 1). This decoration does appear in Bergen, but only extremely rarely (pl 5, 11). Also a grid pattern was found in Südlimburg (Bruijn 1964, fig 1), which could not be identified in Bergen at all. Some of the technical characteristics are certainly identical. However, from the reflections on vessel shape mentioned and especially from the decoration I would regard a Südlimburg provenance for the Bergen finds as probable only in particular cases. There is another significant production area which comprises the mountain regions of the southern parts of Lower Saxony and Northern Hesse. In particular, the ceramic workshops of the *Rheinhardswald* (fig 12, No.7) have been the subject of a special publication (Leineweber 1982). The forms of the Yellow Earthenware produced there do not bear much resemblance with any Bergen material. Neither do we find any bottles with handles (Stephan 1982a, figs 15, 44, 45), nor any specially shaped jars (*ibid* figs 17, 73-75) nor even the globular pots (*ibid* 107), though, for instance, the colours (*ibid* tab 3, 4) are indeed identical with the Bergen finds. In the special case of the ware produced in Duingen (fig 12, No.8), a comparatively soft surface was identified which feels a bit like chalk and in this respect differs from the Pingsdorf material collected at Bergen. (8). Also, the pieces excavated at Hannover and published by Plath (1958) have no equivalent among the Bergen finds. Mineralogical analysis proved a provenance from around the Duingen area in Lower Saxony for several of the Hannover finds. Yet, these predominantly consisted of globular pot-like forms (Plath 1958, figs 15, 17, 19, 21), which have not a single Bergen piece to match. Consequently, workshops from Lower Saxony and/or Hesse probably did not belong to the suppliers of Pingsdorf Pottery to Bergen.

In addition to these areas the main French production centre at Beauvais should be referred to. Here, similar to the Rhineland, red-painted yellow earthenwares and later, stonewares were manufactured (fig 12, No.2). The Beauvais fabric with its sandpappy surface resembles some of the Pingsdorf pieces. However, the decoration within the red painting differs substantially from the regular structure common on the Bergen Pingsdorf Ware. In Beauvais we find long, vertical stripes running parallel and thus covering nearly the whole vessel (Chamie 1969, fig 6), as well as special grid patterns (*ibid*, fig 10) and rather large bow patterns, which cover most of the surface with red paint (Cartier 1980). From the resemblance of the sherds, single pieces from Beauvais may be found among the Bergen material, though not the whole spectrum of Pingsdorf Ware. Apart from Beauvais, I should like to refer to another French centre of ceramic production. As Nicourt (1986) has recently presented the ceramics from Paris (fig 12, No.3) we should at least include this town in our discussion. The results of the Paris study are analogous to those of the Beauvais finds. The distinct differences in form between the Bergen material and the ceramics from Paris hardly permit a connection of these types of pottery. Neither the vessel shapes nor the rim shapes originating from Paris (Nicourt 1986, 105, 109, 114-116, 127-129) nor those typical Paris decorations consisting of a red painting covering nearly the whole vessel have any equivalent in Bergen (*ibid*, 136). Hence, also here we may abandon the idea that at least some of the Bergen finds originated from Paris.

More or less for the sake of completeness I should finally like to mention the red-painted yellow earthenware belonging to a kiln complex from Stamford, England (fig 12, No.1) (Kilmurry 1977). However, neither the ornamental transversely ridged bands (*Zierleisten*) on the handles nor the pattern of red, parallel stripes (Kilmurry 1977, fig 65) bear any resemblance to the Bergen finds.

A comparative examination of the Bergen Pingsdorf Ware with several other Euro-

pean areas of respective ceramic production shows evidence of some supranational resemblance in terms of the red-painted yellow earthenware. Yet, on closer inspection a number of workshops are not very likely to belong to the main group of potential suppliers of ceramics to Bergen. Consequently, the Rhineland (fig 12, Nos 5, 6) may be regarded as having contributed the major share of the pottery trade with Norway. As I said, this analysis predominantly relies on traditional archaeological results which are based on the examination of form and decoration. Exactly at this point the introduction of scientific examination is required. By means of mineralogical or chemical analysis, similarities and differences among the Bergen sherds themselves on the one hand and among several ceramic workshops on the other could be determined. Until this can be done we must be satisfied with the archaeological hypothesis that concludes a Rhineland provenance for most of the Bergen pieces.

Let us resume the subject of the red-painted wares which were discussed at a symposium especially dedicated to the type of pottery (Hurst 1969). After a further twenty years of research the following points can be made. The dating of the Pingsdorf Ware from 900 until about 1250 has been very well proved in the meantime at various places either by dendrochronology or by numismatics (ref chap 4.5). Indeed, significant changes in such results should no longer be expected. In the course of the last twenty years not so much the number of places producing ceramics has had to be revised, but the knowledge about these places has considerably improved. This is true especially for Süddlimburg, but also for the areas in France and southern Lower Saxony. In this context the investigations and publications about the Rhineland itself as an area of pottery production have been rather scarce. Nonetheless, the extent of the research work already done on the subject is, as I said above, sufficient to allow a comparative analysis of the different areas of ceramic production. This way a Rhineland provenance of the Bergen finds may be regarded as probable.

In respect of these two fundamental questions, the research situation has greatly improved within the last twenty years. Still, the question of the *origin* of the red-painted medieval earthenwares remains to be solved. The idea of an Italian influence reaching northern Europe and Germany via France merely served as a provisional explanation twenty years ago (Hurst 1969, 96) – and still does today. It seems even highly probable that, a short time later, the technically well-developed Rhineland gave an impulse to similar production in Hesse and Lower Saxony (Stephan 1982a), as well as to southern Germany (Lobbedey 1968, 76; Scholkmann 1978, 153). But these presumptions have not yet been really verified. Now that the Bergen finds are assigned to the later phase of Pingsdorf Ware, the questions about origin and provenance of red-painted earthenwares in medieval Europe will not be pursued any further here.

4.3 MANUFACTURING TECHNIQUES

The limited scope of the entire Pingsdorf production excavated in Bergen is not sufficient to cover all significant aspects of its manufacturing techniques. Furthermore, I will refrain from the idea of presenting a more abstract model on ceramic manufacture. Van der Leeuw (1975) explains rather extensively the production process of a medieval ware thrown on a potter's wheel. He also describes later (van der Leeuw 1980) a more general scheme of ceramic production, though he includes many significant factors. Without intending to initiate further discussion on the subject, we may presume that these factors and procedures were basically identical with the main aspects of Pingsdorf production. Göbels' (1971) detailed investigation of Rhenish pottery is, of course, based on the manufacturing of stoneware, but it also deals with the usage of various tools and

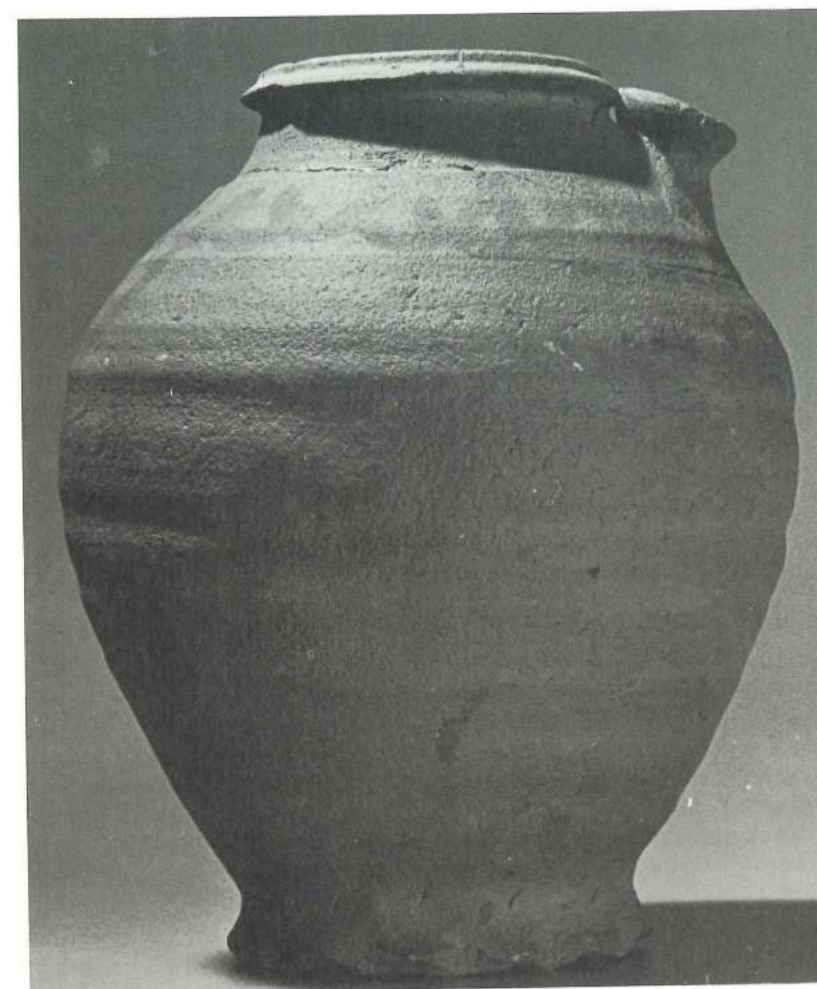


Fig 13 Pingsdorf Ware, type 2 (1:2)

describes some production techniques, which are also valid for the slightly older Pingsdorf Ware. The production of modern stoneware from the Eifel (Kerkhoff-Hader 1980) has been examined very carefully, from a more ethnological point of view. The study also includes detailed information about the sources of the clay, the production of vessels, and firing techniques, inasmuch as the Bergen finds contribute to the comprehension of the subject. The obtaining of the clay, often accomplished from remarkable depths, has been described by Göbels (1971, 22) as well as the subsequent processing by watering (*Wässern*), stamping (*Mauken*) and tempering (*Magern*) (*ibid* 46). Thereafter the actual forming of the vessel on a fast potter's wheel took place. The Pingsdorf pieces found in Bergen were without exception thrown on a fast wheel. (9). This is clearly demonstrated by the horizontal fluting of the surface (figs 13, 14). There are two types of fast potter's wheels, which were probably used for the production of Pingsdorf Ware, the cartwheel (*Töpferrad*) and the kickwheel (*Blockscheibe*). The cartwheel is often fixed at

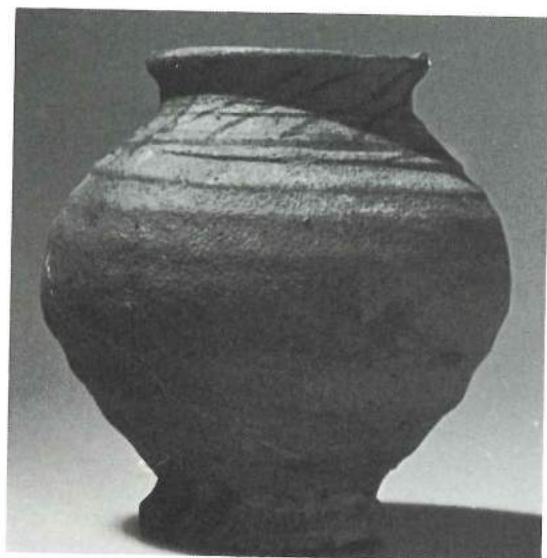


Fig 14 Pingsdorf Ware, type 4 (1:2)

floor level, or on a low bench, and is set in steady rotation by a swinging pole, or by hand. The cartwheel weighs so much that it remains in rotation for a while. A vessel can then be shaped on the top of the wheel. Thus the work process is organized in two phases: (a) setting the wheel in motion and (b) the actual forming of the vessel. Illustrations of this type of wheel provide evidence for its existence, for example, in France during the 13th century (fig 15a), and in Italy as late as the 16th century (fig 15b). In the Rhineland this type was known as the *Wirkrad* and was in use until about 1900 (Kerkhoff-Hader 1980,



a



b

Fig 15 Medieval potter's wheel, cartwheel type
a) French, 13th century (Harvey 1975, fig 41)
b) Italian, 16th century (Rieth 1960, fig 83)



a



b

Fig 16 Medieval Potter's wheel, kickwheel type
a) French, 13th century (Rieth 1960, fig 86)
b) German, 15th century (ibid, fig 88)

figs 70, 71). The kickwheel was fixed at a level which enabled the potter to work the clay while sitting, while simultaneously setting the wheel in motion with his foot. As the machine's own weight does not suffice to keep the wheel moving, the potter must work it with his foot all the time. Also for this type we find documents dating back to the 13th in France (fig 16a) and about the 15th in Germany (fig 16b).

The advantage of the kickwheel is that the potter can set the wheel going and form the vessel at the same time; this is indeed an important aspect for shortening working hours. For the cartwheel, in contrast, the potter needs two subsequent stages of throwing. Yet, the big swinging device attached to the cartwheel permits considerably more relaxed working. The potter does not need to keep the wheel in permanent rotation, because once the swing is set going, it usually suffices for the production of one vessel. Van der Leeuw (1976, 124) concludes that the kickwheel is more suitable for the throwing of smaller vessels, because no energy is wasted here on setting a swinging device in motion. For the production of bigger vessels, however, the cartwheel seems more suitable. Likewise for the jugs, which he examined, van der Leeuw finally concludes that the cartwheel was used. This is probably also true for the Pingsdorf jugs, which have a similar size. Moreover, a needless waste of energy during the production on the cartwheel of smaller vessels, such as the beakers in Bergen, can be avoided by throwing small forms from only one large lump of clay (Colbeck 1969, 116).

In addition the cartwheel represents the typical potter's wheel of the Roman Civilization (Rieth 1960, 54). Since there is a certain continuity of Roman pottery in medieval ceramic production, we may deduce that Pingsdorf Ware was thrown by means of the cartwheel. It is, however, possible that both types of wheels, with which we are dealing here, were in contemporaneous, though perhaps specialized, use. Most probably big vessels were produced on the cartwheel, small beakers were thrown on the kickwheel. Indeed, Göbels (1971, 67) gives an account of such a specialization in the 17th century, according to which the «Kannenbäcker» (who produced earthenwares) used the cartwheel, while the «Düppenbäcker» (who produced stonewares) preferred the

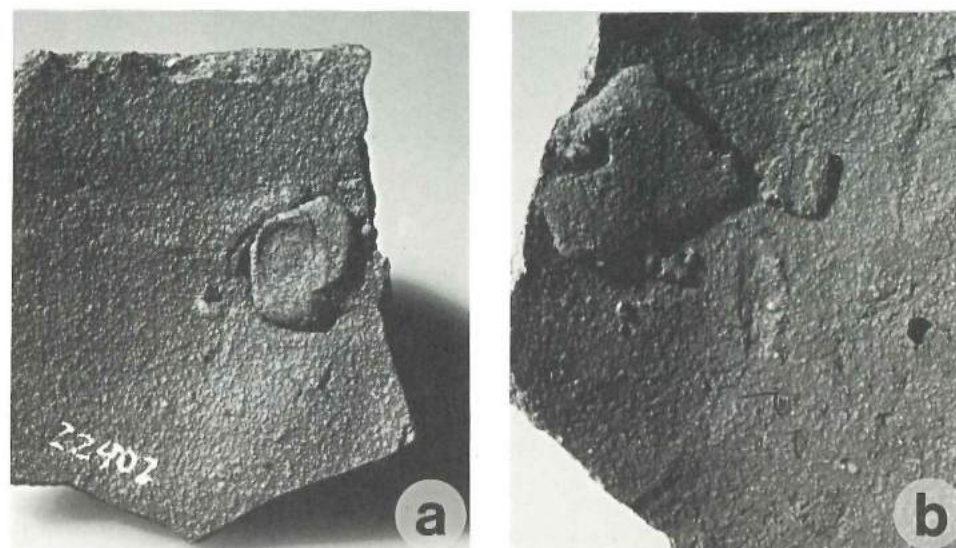


Fig 17 Pingsdorf Ware: pieces of clay applied to the interior of a vessel as a repair (1:1)

kickwheel. However, the technically much more developed spindle wheel (*Spindelscheibe*) was certainly not in use at that time. Its appearance in the 16th century, though, is verified by Löbert (1984, 212). On the one hand, the production of Pingsdorf Ware with kickwheels cannot be denied. On the other hand, there is some strong evidence for an exclusive, if additional, use of the cartwheel. In this context, van der Leeuw mentions a further aspect concerning the Haarlem vessels, which is also relevant to the Bergen finds. If during the throwing process, a defect occurs or even a hole is caused in the wall of the vessel, perhaps by the dragging of temper particles, the potter using a kickwheel can stop the process immediately and repair the damage with some clay before continuing; the defect will scarcely be noticeable later. However, the situation for the potter using a cartwheel is rather different. Here it would be difficult to bring the wheel to a standstill, and to set it in motion again would involve unreasonable effort. Instead, the potter would prefer to leave the vessel as it is and repair the defect with clay after completion (van der Leeuw 1976, 125). These tiny lumps of clay, sticking to the wall of the vessel, are regarded as giving some evidence that Haarlem pottery was thrown on the cartwheel. They are also repeatedly found on the Pingsdorf pieces found in Bergen (fig 17). Of course, these repairs are not necessarily a proof for clay lumps as a mending device, as they might have been necessary in any case. They are, however, an indication of the use of cartwheels.

After the actual throwing, the potter had to trim the vessel, in the course of which superfluous clay, especially at the base, was cut off and the wall received its final thickness (Colbeck 1969, 59). Occasionally, the finishing touches were also put to the interior of the vessel, or, where necessary, superfluous clay was removed. A number of various tools were used for this work. Traces of tools used for these improvements were found on several of the Bergen fragments (fig 18). At this stage further parts of the vessel such as handles and spouts were attached. Often the clay was not properly smoothed at the edges, so that it is clearly visible how, for example, a spout was fitted into the wall (fig 19). Marks in the interior could indicate a treatment with different tools: there are traces

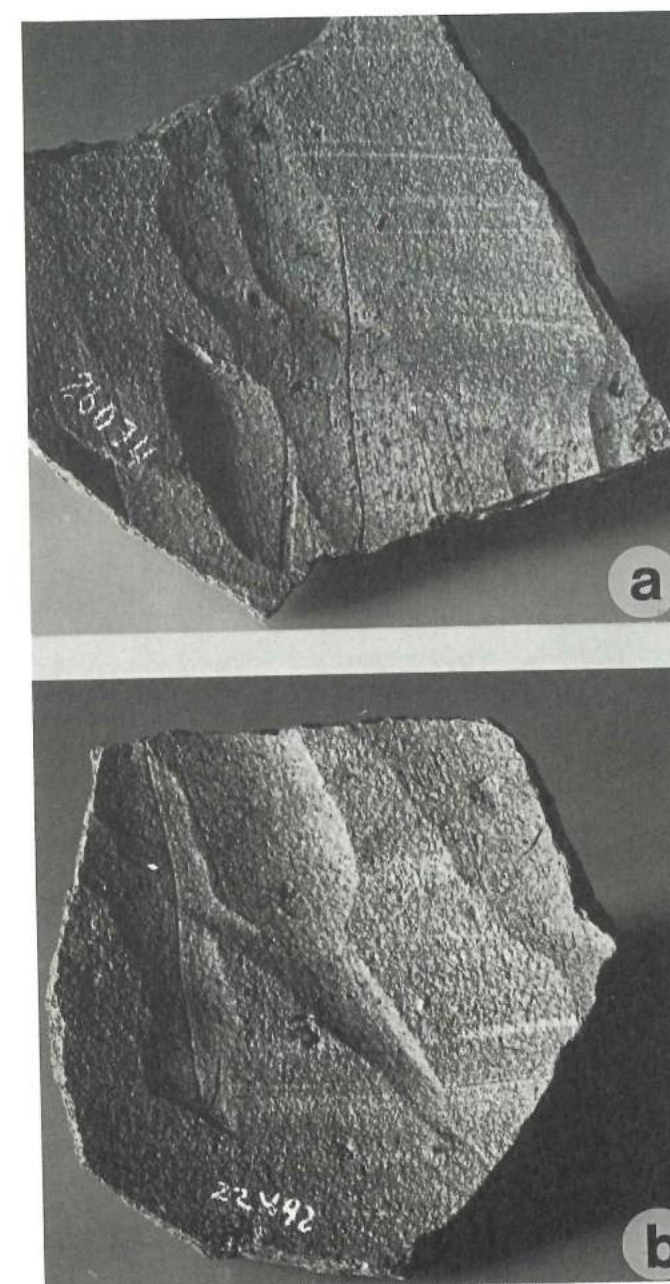


Fig 18 Pingsdorf Ware: tool-marks on the interior of vessels (1:1)

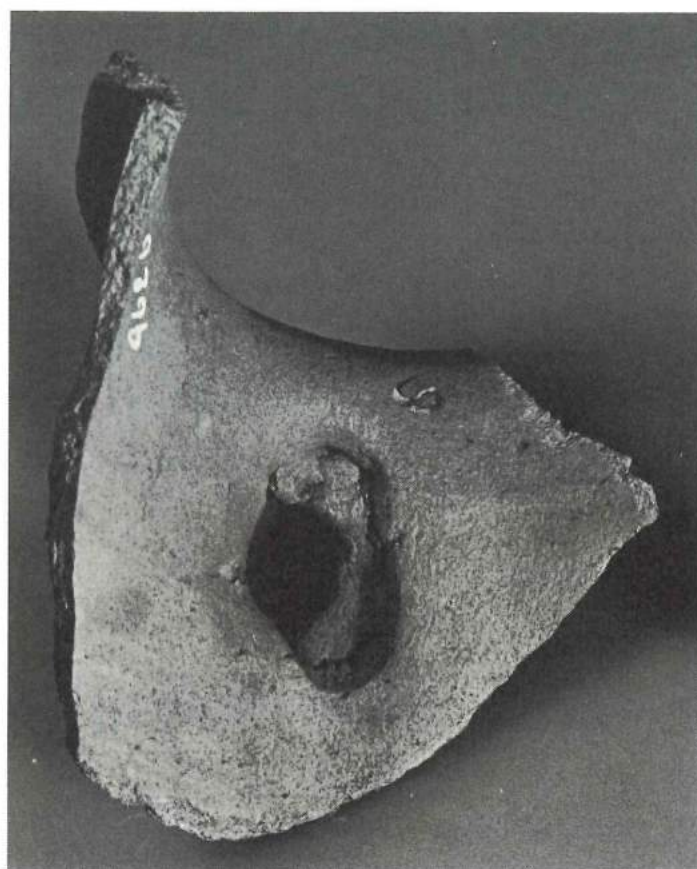


Fig 19 Pingsdorf Ware: attachment of a spout, seen from inside the vessel (1:1)

of either cuts (fig 18) or scratches (fig 20b). On the underside of the base of the same vessel a fissure (fig 20a) signifies a crack which happened during the drying process. Possibly, the painting is applied to the surface before firing. It is extremely fluid and hardly identifiable as a coating in its own right. In this respect it differs clearly from the comparatively viscous, more plastic application of the red-painted Hunneschans Ware (W Janssen 1987, 19).

For the firing basically two types of kilns have to be taken into consideration, which are both likely to have been in use in the Rhineland during the Middle Ages. Firstly, there is the so-called updraught kiln. Its firing chamber and its stacking chamber are arranged one above the other and separated by a perforated floor (Köpke 1985, fig 4). We are here dealing with the typical Roman kiln (Rohdes 1968, 16). I have already mentioned that in respect of the potter's wheels a Roman influence on Rhenish pottery production during the Middle Ages can hardly be denied. Consequently, the existence of typically Roman kilns in the Rhineland is not surprising (Lobbedey 1968, 170). The remains of such vertical kilns were excavated, for example, at Brühl-Eckdorf; this is exactly within the expected production area of Pingsdorf Ware (W Janssen 1987, 87).

Secondly, in the horizontal kiln, the firing chamber and the stacking chamber are

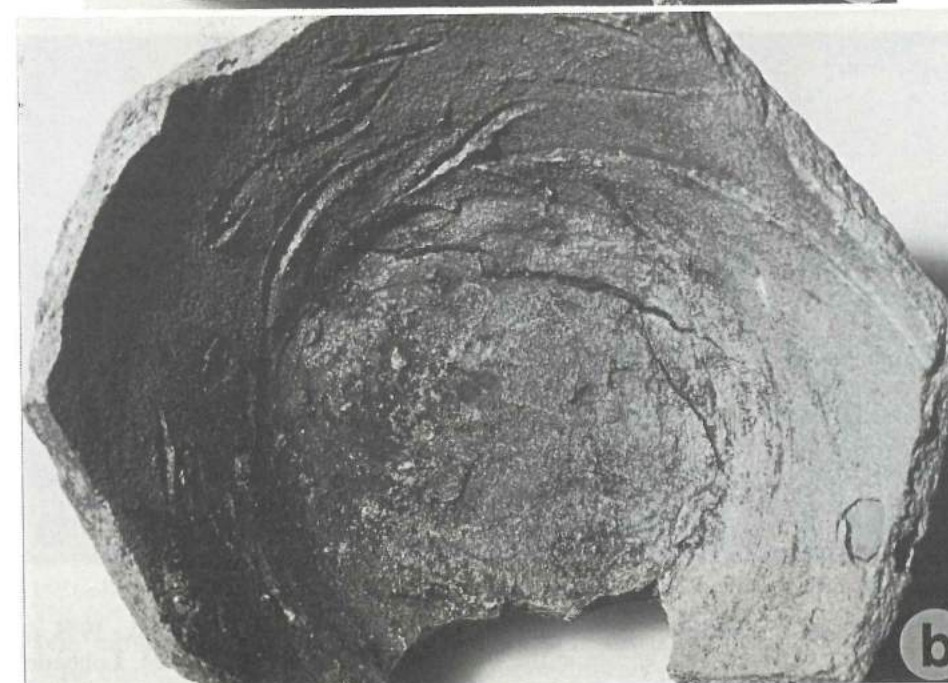


Fig 20 Pingsdorf Ware: base (1:1)
a) fissure on the underside b) tool-marks on the interior

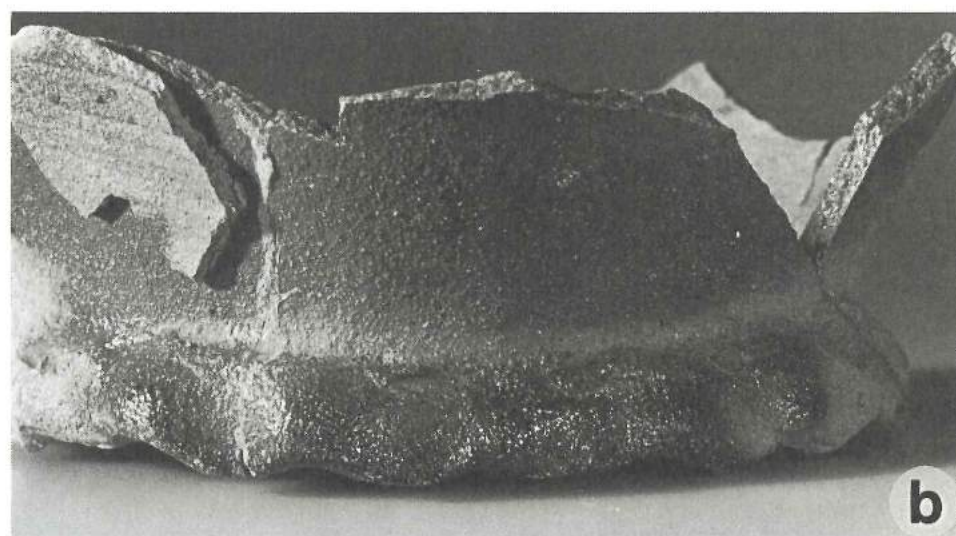


Fig 21 Pingsdorf Ware: fragments fused together during firing (1:1)

positioned next to each other, so that the heated air flows horizontally (Köpke 1985, fig 5). This type of kiln is also known in the Rhineland (W Janssen 1987, 124, Lobbedey 1968, 167). Furthermore, these two types of kilns have received some recognition in association with other medieval finds beyond the Rhineland, for instance in northern Germany.



Fig 22 Pingsdorf Ware: cavity in the wall of a vessel (1:1)

(10). It is difficult at this stage to determine clearly which of these two types of kilns briefly described here were used for the firing of Pingsdorf Ware. Both forms, indeed, seem possible. Occasionally, we find baked-on pieces on the base (fig 21a) or the wall (fig 21b) of a vessel, small fragments which become literally attached to the vessels during the firing process. In order to make the most of the heating energy, the objects to be fired were closely piled up in the kiln. Jugs standing too closely together would sometimes bake together. Usually both vessels would be considered as wasters. Yet, the quality control was so lenient that even jugs with wall fragments of other vessels stuck to them (fig 21b) could be offered for sale. In this context, smaller defects, such as cavities within the wall, which were probably caused by the burning out of originally embedded organic particles, (fig 22) would not mean any depreciation of value.

Comprehensive ceramological investigations of the Südlimburg material made during the last years have been published recently by Brongers (1986). This Dutch pottery is, as has been mentioned, rather similar to the Pingsdorf Ware found in Bergen (fig 12.4), not so much in terms of form and decoration, but very much so in terms of technical characteristics. For this reason the results of those scientific analyses may also be applied to the Bergen finds. Among other aspects Brongers deals with the determination of the ancient firing temperatures by means of dilatometer measurements. According to this method specifications about the firing temperatures can be made with an accuracy of ± 50 degree C (Brongers 1986, 392). However, for some questions absolute values are less relevant than the relationship of one group of test-pieces with another. The values for cooking pots are relatively similar, varying from 1000° to 1100° C (Brongers 1986, 404), while for the pouring vessels and the drinking vessels, Brongers observes a considerable deviation (Brongers 1986, 405). It is obvious that the potters tried to keep the apparent porosity, especially that of the drinking vessels, low by using a higher firing temperature. The fact that the firing temperatures were increased between the 11th century and the 14th century may give some evidence to these assumptions (Brongers 1986, 414).

As I have already mentioned, there are some aspects which suggest that the potters were professional craftsmen, who produced ceramics as a full-time occupation:

- (a) the use of a fast wheel, possibly even of two different types of fast wheels,
- (b) firing techniques involving very high temperatures, and

(c) the high degree of uniformity in the products.

There are, though, examples of domestic production, such as the Jutish Pottery (Lynggaard 1972), which was widely traded as special products. Yet, the vast and quantitatively significant distribution of Pingsdorf Ware gives some evidence of a production within the framework of a specialized craft. Only this could have provided for such a voluminous production qualified for export. Even though written sources of that time hardly elucidate this point, W Janssen (1987, 129) presupposes the existence of specialized workshops at least for the Rhineland. Other regions, however, such as northern Germany, seem to have developed a proper professional pottery craft at a much later time (11).

4.4 HORIZONTAL DISTRIBUTION

A horizontal distribution analysis was made in order to gain some knowledge about the extent to which the individual tenements at Bryggen specialized in trade with specific European regions. I have discussed this aspect in chap 3.2. The result was negative, and a specific structure could not be identified. In this context both the distribution of the total ceramics (diag 1–4), and the distribution of the Pingsdorf Ware per period (diags 5–8) were explained. I also referred to the fact that the pottery was analysed twice: (a) all the pottery from a period and (b) those pieces coming directly from the fire layers. Furthermore, in comparison with the distribution of the total finds no horizontal differentiation of the Pingsdorf Ware was determined. The analysis of the finds belonging to the individual fire layers (per period) (diags 7–8) mainly reflects the gradual extension of the waterfront constructions into the water after each fire (fig 2). In this chapter I will further examine whether a horizontal differentiation within the Pingsdorf Ware (which is divided into different subgroups and types) can be identified. The distribution of all Pingsdorf fragments (diags 5–6) showed a certain concentration in the area of grid squares L–Q 2–4 and I–N 8–12. These relative concentrations correspond exactly to the distribution pattern of the total ceramics within the periods concerned (diags 1–2). A comparison of diagrams 1 and 2 with the distribution of the two defined Pingsdorf groups also reveals an identical picture. Group 1 (diag 11) as well as group 2 (diag 12) occur most frequently in these specific grid squares. This is also true for the separate analysis of the four defined types of Pingsdorf Pottery (diags 13–16). Nevertheless, if we consider the source material critically, we have to accept that hardly anything specific can be said about their distribution, especially as the total numbers of the types 3 and 4 are so small. This is particularly the case with the analysis of the finds belonging directly to the fire layers, none of which could provide any of the types 3 and 4. So we finally arrive at the conclusion that the same is true for a horizontal analysis of individual Pingsdorf characteristics as for the analysis of several wares of different provenances: that a horizontal structure of the excavation site is not identifiable and, apparently, all the examined tenement were equipped with the same range of Pingsdorf Ware. In the future, ie after the examination of the topography and the constructions has been completed, we shall see whether new approaches to specialized questions on the subject have arisen. Our expectations, however, should not be too great.

4.5 VERTICAL DISTRIBUTION

The total number of the recovered sherds is well spread throughout the different periods and has a standard distribution (fig 7). Its peak is found in the middle layers, while within

the upper and the lower layers there are considerably less finds. The same can be basically said about an analysis involving all the pottery from a specific period as about one which merely deals with the pieces stemming from the respective fire layers. It is this standard curve with which the vertical distribution of the Pingsdorf Ware has to be compared. Diagram 9A, whose structure has already been described in chap 2.5, shows that the Pingsdorf pieces are assigned to the lower layers of the strata set. The finds taken only from the fire layers confirm the concentration of Pingsdorf Ware during Periods 2 to 4, with Period 3 contributing most (13%), whereas the distribution of all the ceramic material from a whole period indicates that pieces still occur up to Period 6, though only in a percentage of 0.7%. The maximum represented by 16%, however, is to be found only in Period 5. This difference between the vertical distribution patterns of material in the fire layers and of that found in the debris layers between the fire layers has been explained after a critical interpretation of sources concerning the levelling up of the site and how rubbish was dealt with (chap 3.3). For a chronological interpretation, only those pieces which were just taken from the fire layers are relevant. I will not, however, consider scatters of sherds which are quantitatively irrelevant: there are some single pieces found even in the upper layers (diag 9A). These may be regarded as secondary deposits. Hence, Pingsdorf Ware appears for the last time in connection with Fire No. 5. In the following I will therefore be concerned with the determination of this final dating in terms of an absolute chronology. For this purpose reports from various other countries which give some evidence of the absolute chronology of the Pingsdorf Ware will be briefly discussed.

The beginning of Pingsdorf Ware we may assume to be shortly after 900. This follows from a large concentration of vessels of the Hunneschans Ware found embedded for acoustic purposes in a wall underneath the floor of the collegiate church of Meschede. Dendrochronologically this find is dated to about 900 (Claussen and Lobbedey 1985, 81), and this should therefore be regarded as just before the occurrence of Pingsdorf Ware. Here we are dealing with numerous and completely preserved vessels, which, though still exhibiting the relatively soft fabric of the Badorf tradition, already show a red painting similar to early Pingsdorf times. W Janssen (1987, 45) also shares this view, though, at the same time he does not accept the vessel of Zelzate as Pingsdorf Ware, and, consequently, he does not accept its early dating in that group (*ibid* 116). The presence of Pingsdorf Ware at Haithabu demonstrates the distribution of this ware during the 10th and 11th centuries (Hübener 1959, 122). Based on the finds from Haithabu, Hübener also discusses the relevance of the Trier coin hoard, which makes Pingsdorf Ware certain for the 12th century (*ibid* 123). I have already mentioned the absolute chronological stratigraphy in Schleswig, which was determined by means of dendrochronology and numismatics. There the Pingsdorf Ware occurs from the beginning of the stratigraphy up to the middle layers, and we notice a phase in which this pottery and the presumably locally produced red leadglazed Earthenware overlap (Lüdtke 1985, 39–42). This stratum is datable to the beginning of the 13th century. Finds from Ribe belong to the same period. Pingsdorf Ware still appears there in a context which is dendrochronologically dated to 'about 1225' (P K Madsen 1985, 59). Also in 's Hertogenbosch it was regarded as belonging to the 12th century and even into the first quarter of the 13th (H Janssen 1983b, 190). This is also the case with a coin hoard from Arnheim dated 1190 (Sarfatij 1982, 498, No. 1), associated with a small beaker which is parallel to the beakers found at Bergen. Another small beaker from Gotland dates to 1196 (Wahlöö 1976, No. 521). As the most recent Pingsdorf find of a fixed date, another small vessel from Cologne should be mentioned, which, from a coin found inside it, found its way into the ground in about the middle of the 13th century (Zedelius 1980, 249). These examples demonstrate that Pingsdorf Ware became common from the 10th century onwards and we have to reckon with its existence

well up to the middle of the 13th century. From this information it should be correct to add 'about 1250' to the fire layer in which Pingsdorf Ware occurs for the last time in any amount worth mentioning, (Fire No.5). Even by careful consideration this may be regarded as a confirmation of the date 1248 which the excavator had already assigned to this fire (fig 8 and diag 9A).

Looking at the vertical distribution of the two Pingsdorf groups we realize that both occur equally frequently and are therefore well-structured. Also they have exactly the same chronological position (diags 11 and 12). Both appear in the fire layers of Periods 2, 3 and 4; those single pieces of the darker type, though, which are assigned to Fire 5 (diag 12) should not be regarded as a deviation from the normal distribution pattern. Furthermore, the peak of each is to be found in Period 3, and also the finds of the whole period each reveal an identical picture. Consequently, the pale, yellow variant and the dark, olive variant of the Bergen Pingsdorf Ware do not differ chronologically in any way. This corresponds, incidentally, to the observation made in Schleswig, where no distinction in chronology between the pale variant (consisting of the white and the yellow Pingsdorf fabric) and the dark, olive fabric could be identified (Lüdtke 1985, 61). In opposition to this, a slight difference of maximum frequency was noticed between the almost white and the yellow variants (*ibid* 61). The almost white variant, though, was very rare among the Bergen finds, so that the observation made in Schleswig cannot be confirmed here. However, the Schleswig chronology comprises the 11th as well as the 12th century, while for Bergen we only have finds dating from the 12th century. In this respect the rare occurrence of the white variant in Bergen confirms the Schleswig conclusion that this specific Pingsdorf Ware tends to belong to the 11th rather than the 12th century.

The same is more or less the case with the chronological relationship among the four

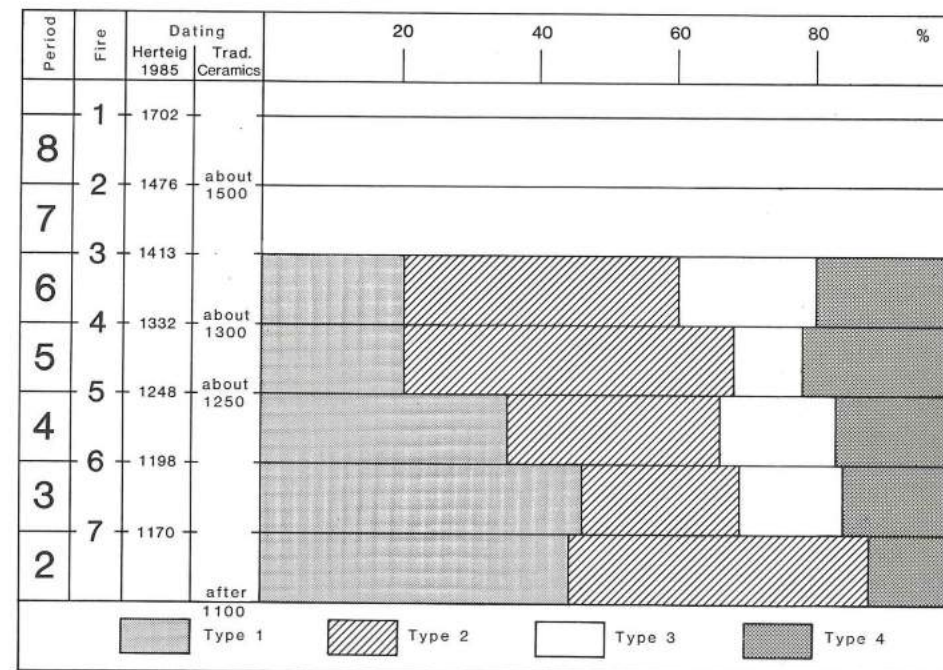


Fig 23 Pingsdorf Ware: proportional relationship of the four types per period (Finds of the whole period considered)

Pingsdorf types, though here a proper determination proves extremely difficult, because of the relatively few finds. Of types 3 and 4, for example, no pieces at all were found in the fire layers. Considering the numbers of fragments of each type taken from all the periods together, we observe an identical distribution over the Periods 2 to 5. This corresponds exactly to the distribution of the entire Pingsdorf pieces (diag 9A). Solely the absence of type 4, the beaker, in Period 2 may imply a more recent date, unless its small number proves to be an error which suggests a wrong picture of distribution. This may become clear by a comparison of the four types, each amounting to 100% in each Period, as shown in fig 23, where just the absence of type 4 from Period 2, and a slight proportional decrease of type 1 in the course of time may be verified. Hence, we arrive at the conclusion that these four types show a parallel chronology and that distinct differences cannot be identified. The same is true indeed for the red decoration. All red-painted pieces were analysed separately (fig 9B) revealing a distribution pattern which exactly corresponds to that of all the Pingsdorf fragments (fig 9A).

According to this result the number of red-painted vessels remains constant during the time examined here. Finally, I would like to point out that separate vertical analyses were made for all the recovered base and rim sherds, in order to identify weaknesses of classification in case of irregularities. As, however, also these analyses proved identical with the distribution of all Pingsdorf Wares any further critical investigation of the material is not necessary.

4.6 VESSEL USES

The vessels of the Pingsdorf Ware at Bergen can clearly be divided into two main types: jug and beaker. They are so different in size that they can be distinguished without any difficulty at all. Three jugs and three beakers are sufficiently complete that three size measurements could be obtained. These are represented in a triangular diagram (fig 24). Korbel (1985) has already discussed the construction and interpretation of such a triangular diagram in connection with the examination of ceramics, so it need not be gone into in detail here. The three measurements, taken from tab 8, are the height of the vessel, the maximum width, and the height at which the maximum width occurs. The sum of the three values for each vessel form 100%. The respective percentages of each value are then arranged on the triangular diagram with triangles representing the three beakers and circles representing the three jugs. Firstly, both types can be graphically separated: all the beakers are below a height percentage of 42%, while the jugs all show the same height percentage of 42%. Proportionally speaking, the beakers are a little more compact, the jugs a little slimmer and taller. Secondly, the symbols are all in close proximity to one another. This second aspect seems to me the more important one: despite significant differences in their actual sizes, both beakers and jugs are of nearly the same proportions. I should like to see this as an indication of a production by professional craftsmen. Domestic production would be less likely to achieve such standardization. Furthermore, I should also like to hazard the guess that both beakers and jugs are products of one and the same workshop, or at least of the same group of workshops. Such uniformity of shape and proportion can in this way best be explained. The volume of the six vessels was also determined (tab 8). The jugs have a volume of 2.4 to 2.7 ltrs, the beakers only 0.4 to 0.6 ltrs. A jug can hold circa five times that of a beaker. In Schleswig the volume of some finds has also been measured (Lüdtke 1985, 74). However, there is to date not enough data available concerning measurements for reliable statements to be made about units and standard vessel sizes.

Obviously, both types of vessels have something to do with drinking: vessels placed

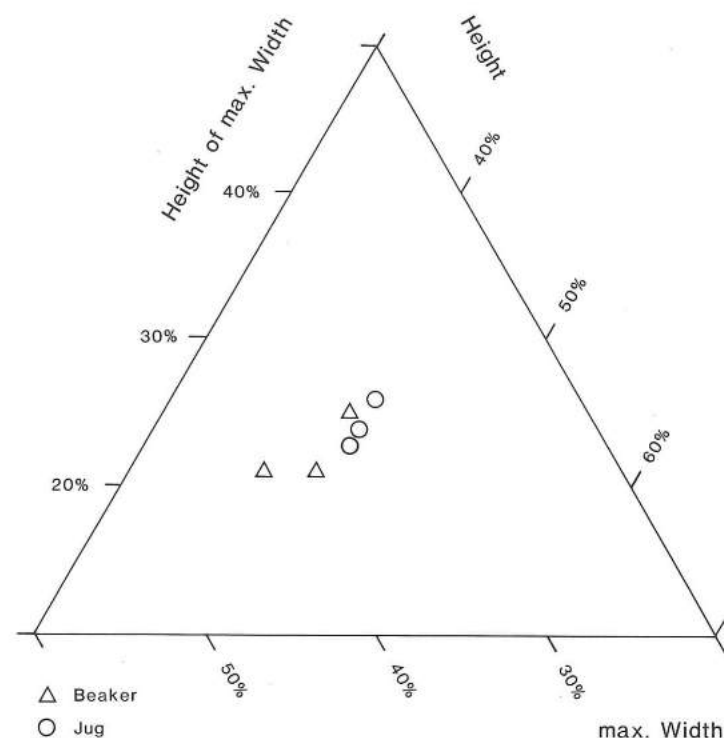


Fig 24 Pingsdorf Ware: correlation of height (right-hand axis), maximum diameter (bottom), and height of maximum diameter (left). Triangles = beakers, circles = jugs. Cf table 8

directly on or near the table at mealtimes or on other occasions involving libation. One indication for this is the decoration using red paint: when the beakers and jugs are placed so that the decoration is continually visible, they will have a pleasant appearance. The Pingsdorf Ware in Bergen was, therefore, table ware, rather than merely kitchen crockery. Other wares, for instance Paffrath Ware or London-Shelly Ware, both without decoration, provided the kitchen pots. Erdmann (1985a) has made some interesting observations about medieval kitchen equipment using various examples. But he says little about table and drinking customs which could be helpful for the Bergen Pingsdorf Ware.

The same combination of Pingsdorf beakers and jugs is known for Lödöse (Carlsson 1982, 33), Ribe (Bencard 1970, figs 2 and 4), Haithabu (W Janssen, 1987, pls 26, 27), Schleswig (Lüdtke 1985, pl 33-35) and London (Dunning 1960, 75). The combination we encounter at Bergen is then by no means an isolated occurrence. Ellmers (1965) has presented some common combinations of drinking equipment for the Viking age. He states that the combination of bucket with drinking vessel, or Tating Ware jug with glass beaker are common - if not standard (Ellmers 1965, 21). Interestingly enough, this type of Viking age combination, as with the Pingsdorf jug and beaker, was common throughout Scandinavia. There evidently existed similar drinking customs in both the 9th and the 12th centuries over a broad area.

In Bergen, the number of Pingsdorf jugs is significantly higher than that of beakers. On

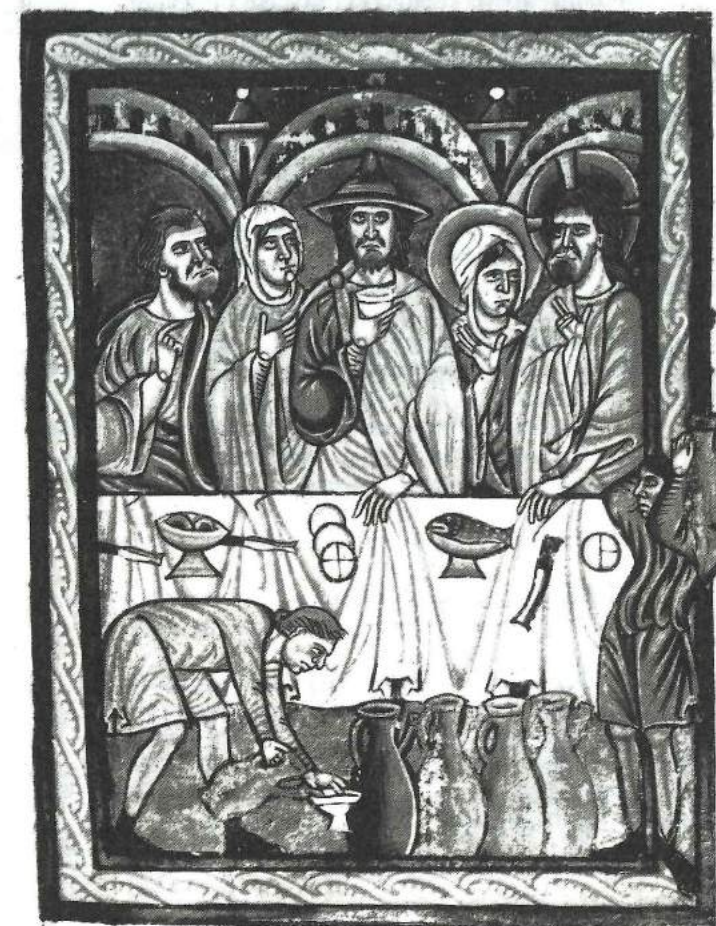


Fig 25 Illustration of jugs and beakers as used at the table, England, 12th century (Haslam 1978, pl 1)

the basis of the MIN, there is a total of 60 jugs to 16 beakers and 196 jug fragments to 46 beaker fragments (tab 4). There are around four jugs to every beaker. Considering the volume ratio, it is somewhat surprising that the ratio is not just the reverse. One explanation would be that there were also numerous wooden beakers. One wonders, though, whether this sufficiently explains the quantitative divergence of Pingsdorf beakers from jugs. Perhaps other aspects played a role. In seeking an answer we shall examine contemporary literary and pictorial sources concerning medieval drinking habits (12).

Take for example an illustration of an English drinking scene (fig 25) around 1200. The iconography of this scene of the Marriage of Cana need not here be minutely analysed, but it is worth paying attention to the objects illustrated. On the floor are four jugs, a fifth is being poured from and a sixth is being carried in. There are six jugs to only two beakers, one of which is being filled, while the other is held breast high by the person in the middle. The form of the jugs shows that they are ceramic, whereas the beakers' material is uncertain. More important is that the 'set' of two drinking vessels and six jugs has a ratio

of 1:3. This is similar to the ratio 1:4 of Pingsdorf beakers to jugs at Bergen. In both cases there is a higher number of jugs than beakers.

For elucidation of this phenomenon let us turn to some earlier authors (listed in Note 12) who have analysed medieval literary sources. Schultz (1879, 295 ff) gives much evidence for the use of beer and wine: 'Wine was stored in barrels from which, when need be, a quantity could be tapped' (*ibid* 304). Ceramic vessels are also mentioned. The organizational plan for a banquet at the beginning of the 13th century mentions a servant whose task it was to 'supply the court with earthen vessels which could be used in the storeroom and kitchen as well as to serve wine from at the table' (Bumke 1986, 264). Helle (1982, 318) gives evidence for the presence of wine and beer at Bergen as everyday beverages in the 12th century. It was common to treat the wine by adding honey, fruit, spices or water (Schulz 1879, 305). One could perhaps speak of a sort of punch. Accordingly, at least two jugs were necessary: one for wine and one for water.

'The wine was brought out in jugs from which the beakers were filled' (*ibid* 319) and further: 'Often several guests drank from the same beaker' (*ibid* 332). There need not have been a separate beaker for every guest. Beakers were standard equipment at every table: 'spoons, knives, salt barrels, beakers' are mentioned on one occasion and another time 'bowls, beakers, spoons, knives, salt barrels' (*ibid* 312). Schultz cites a breach of table manners which indicates that several persons drank from the same beaker:

'It is not proper to turn to one's neighbour to offer him the beaker when one still has it to one's lips' (*ibid* 335).

Other authors report much the same. Fuhse (1891, 35) writes: 'Provisionally, one took food from the bowls with the hands, normally there was one bowl for two persons to eat from and one beaker from which both drank'.

The estate of Archbishop Roger of York 1182 included exactly twice as many spoons as drinking vessels (Schultz 1879, 316), for every guest a spoon, a beaker for every two guests. A 12th century illustration shows a table scene in which it is clear that one beaker was used for every two people (Bumke 1986, 269). In 1189 King Richard the Lionheart had 1,770 jugs and 900 goblets made for the coronation festivities (Gillingham 1981, 137): almost two jugs to every goblet. Schiedlausky (1956, 16) cites Erasmus of Rotterdam (beginning of the 16th century) as evidence for the sharing of table equipment by pairs of guests.

These examples suffice to show that there were definitely several jugs needed and that not every guest had his own beaker. This is corroborated by contemporary illustrations (fig 25). The ratio of finds in Bergen is therefore not surprising. The medieval inhabitants of Bryggen obviously followed the same table customs prevalent in England and on the Continent. This would mean that not only were wine and pottery imported, but the table customs as well. A little piece of cultural history has come alive to us, not that the observation is surprising. The Continental merchants who emigrated to Bergen (for instance from Lübeck) brought their customary utensils with them. Beyond this it cannot be determined to what extent Norwegian customs were influenced.

From this analysis of customs another aspect important for the Pingsdorf Ware becomes apparent. If the ware was imported as a drinking 'set', then we are not just dealing with pottery used as a container for some desired commodity during transport but rather with ceramics themselves which were the commodity being traded. The wine was not transported, for instance, in fragile Pingsdorf jugs but in wooden barrels (see above). Of course on a ship, where storage space is at a premium, it is possible that the jugs were also used to hold something or other. If the Pingsdorf beakers and jugs were imported as sets to Bergen then the same must be true for this ware at other cities – be it London or Haithabu.

In the 13th century, at the end of the time period dominated by the Pingsdorf Ware,

other wares appear and with them other forms. The English Scarborough and Grimston Wares included decorated jugs, also used presumably in a drinking service. To a similar category belong the standardized jugs of the Olive Proto-stoneware (chap 5). The demand for pouring and drinking vessels appears to have been greater in the 13th century than in the preceding period. Oslo, too, imported its ceramics; the number of jugs rose drastically there in the 13th century (Molaug 1982, 204). In Schleswig in the 13th century, jugs were introduced as a new type of vessel and added to the repertoire of the local manufacturers (Lüdtke 1985, 35): in the 11th and 12th centuries jugs did not belong to the standard inventory there. This tendency – in Oslo, as well as in Schleswig – goes hand in hand with a general growth in the number of household ceramic vessels (Lüdtke 1985, 34). The finds at Bergen are quite appropriate for studying just such changes. A prerequisite for a study of this sort is that the entire group of finds be typologically and chronologically worked through. Only then can the different values be compared; only then can the differences between, for instance, kitchen crockery and table ware be worked out. At this point, however, it must suffice to postulate a few solutions. The absolute number of vessels in a household should be kept in mind. Derived from the field of ethnology, data concerning the life span of ceramic vessels will be combined with information about the number of households in the excavated area. This has been done at Schleswig (Lüdtke 1985, 81). But before this can be done, the work not only on the ceramics but on all the finds must first be completed.

4.7 PINGSDORF WARE AS AN INDICATOR OF TRADE CONTACTS

Considering that 100% of the pottery at Bergen was imported and that the respective provenances are known, the role of an indicator of trade contacts falls to the medieval ceramic. Three aspects are important here. Firstly, a direct contact between place of production and end market can be postulated. Secondly, the distribution of the individual wares can be charted. This chronological analysis of regional divisions is then used to work out ceramic provenances of traffic areas. These are characterized by the respective presence or absence of certain wares. Refined by a quantification process, the analysis can lead to precise statements and delimitations. Thirdly, it is occasionally possible to pursue the question whether a particular location served as a centre from which the pottery was distributed. In examining these three aspects we shall turn to the provenance determined for the Pingsdorf Ware (chap 4.2) and to the map of Scandinavian finds (fig 26).

There are other alternatives but the Rhineland appears to be the most likely area of manufacture (fig 12.6). The export to Bergen proves in any case contact between Norway's west coast and the Cologne area. Further trade contact with Scandinavia can be ascertained from the distribution map which shows Pingsdorf Ware from that area (fig 26). No map was prepared for the area south and west of the Elbe: the map published by Hübener (1951, 107) over thirty years ago indicates numerous find locations along the southern North Sea coast; the only change is that there has been an increase in material found. Hübener's map, however, shows only seven locations north and east of the Elbe. Since then the number has increased threefold (fig 26). Dunning (1968, 36) added two Norwegian locations (13). Selling wrote (1968) of finds from Kalmar, 'Pingsdorf Ware, its most northerly outputs'. But since then another nine locations north of Kalmar have been identified. The distribution is orientated along the coast, obviously ships were the means of transport. Interestingly, the ware never found its way into the interior of Norway and Sweden.

At the first impression, the distribution map of Pingsdorf Ware (fig 26) would seem to

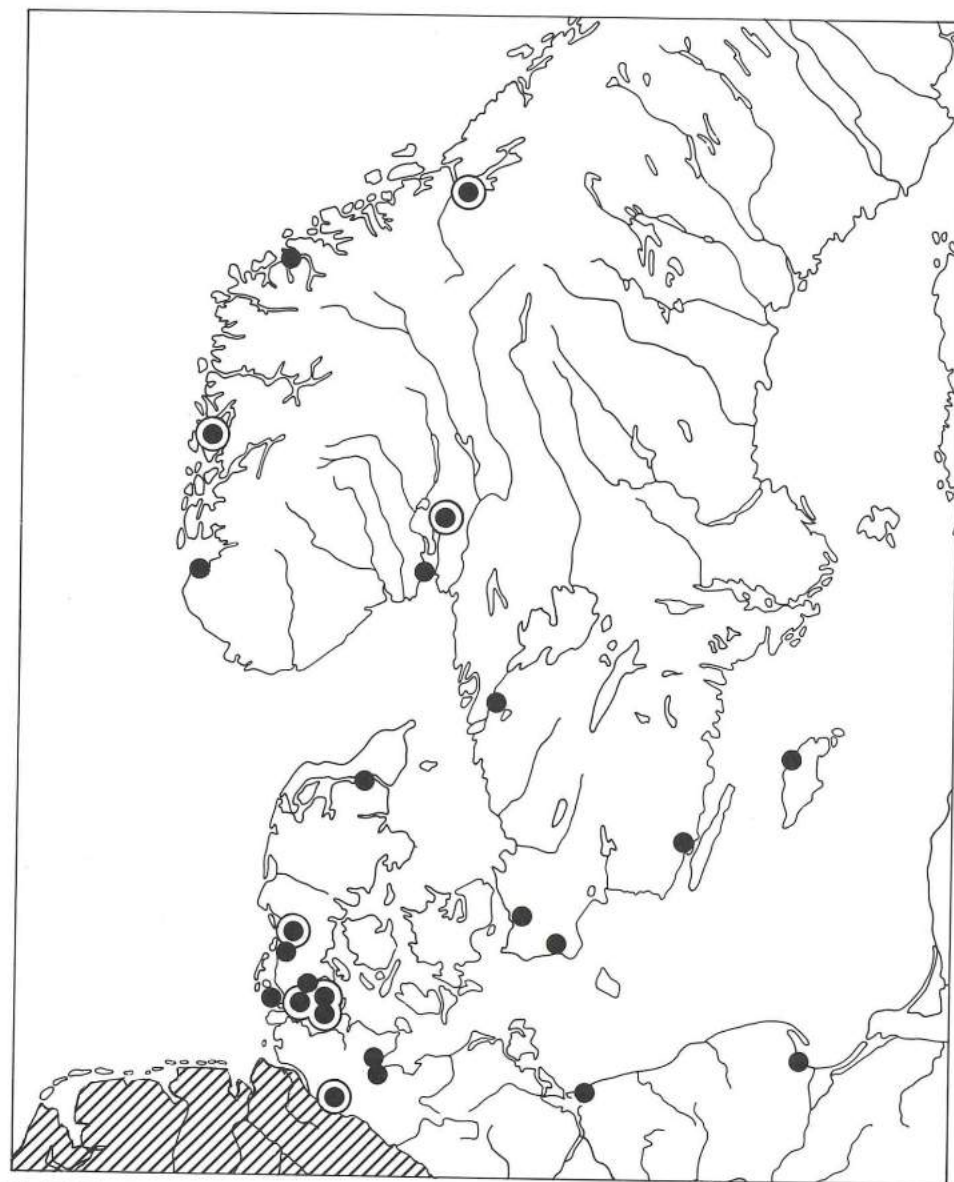


Fig 26 Distribution of Pingsdorf Ware in Scandinavia (cf table 9).
 Dot: few finds
 Ringed dot: Pingsdorf Ware forms more than 2% of the pottery found
 Shaded area: occurs frequently

show a market stretched across the entire southern and central Scandinavian area. If attention is paid to the quantities involved, that first impression fades. Indeed, relative quantities must be considered when analysing the trade traffic. Pingsdorf Ware's solid 10–15% at Bergen (diag 9) can certainly not be equated with a total of two fragments

amongst several tons of pottery found, for instance, at Gdansk. 'A symbol for a find location which is the same regardless of the amount found can under certain circumstances give a false impression' (Hübener 1951, 109). For this reason, the distribution map differentiates between quantities. A ringed dot is only used when the Pingsdorf Ware forms at least 2% of the material found. The locations Trondheim, Bergen, Oslo, Ribe, Hollingstedt and Hamburg are more or less to be considered part of the North Sea area. The group Haithabu / Schleswig assumes a middle position between the North Sea and the Baltic. Consequently the Pingsdorf Ware is well represented.

The same chronological causes are responsible for Borgund and Tønsberg not being in the higher quantity class. In both cases relatively early finds are scarce. The oldest parts of both these places have obviously not been dealt with, or perhaps there is simply not any ceramic evidence. At both locations the pottery indicates a beginning around 1200. Due to the lack of large excavation work, no judgment of the correlations at Stavanger is possible, which is why it is placed in the smaller category. It is another story with the Baltic area. Although many locations have yielded sizeable amounts of material, Pingsdorf Ware occurs so seldom that it is hardly worth mentioning. It could just have been that a larger percentage was found at Gdansk, Wollin, Lübeck, Lödöse or Kalmar. It is remarkable that even in Birka's harbour area no Pingsdorf Ware has come to light (Ambrosiani 1973). Considering the geographical limit of distribution, running from north to south across the Jutland peninsula, the absence of Pingsdorf Ware at Århus is striking, despite extensive finds from the high and late Middle Ages (Andersen *et al* 1971). Therefore, I conclude that Pingsdorf Ware did not reach the Baltic area to any notable degree. This fits well with Hübener's statement that Haithabu was the end point in the easterly flow of pottery (Hübener 1951, 108). Haithabu was probably more a consumer and distributor for its own vicinity than a transit point for foreign trade. On the one hand, the Pingsdorf Ware forms at least 2% of the ceramic finds in the North Sea area; on the other hand, it is almost totally lacking in the Baltic area. Similarly, the ware commonly distributed in the Baltic area did not reach the West (Lüdtke 1985, 126). The plotted trade traffic areas (based on the material from Schleswig) indicate that especially Haithabu and Schleswig played the role of mediator between East and West (Lüdtke 1985, 130).

The third aspect can only be dealt with in part, i.e. the possible function of a city as a centre for distribution. The finds at Bergen were examined to see whether the composition of types in the fire layers differed from that within the entire collected material. The thought behind this was that certain types were brought to Bryggen with the intention of re-sale and accordingly would seldom occur in the fire layers (being most representative of household use). The four defined types within the fire layers were compared with the respective total count (tab 10). The fire layers contain 40 Pingsdorf fragments whose type can be determined, making 1.87% of all Pingsdorf pieces. Type 1 forms 1.38%, type 2 forms 5.31%, whereas types 3 and 4 do not occur in the fire layers at all. One could quickly assume that types 3 and 4 were destined for further sale, but due to the small number of pieces I hesitate. As these two types form less than 2% of all Pingsdorf pieces, 2% of the 40 from the fire layers would mean 0.8, or less than one single vessel. Therefore, the only possible result is that no significant differences in the type range can be observed, and accordingly no type destined for further trade can be determined. Upon general consideration, one might guess that the Pingsdorf material in Borgund came via Bergen. Correspondingly, one may assume that the finds in Schuby came via middlemen at Haithabu or Schleswig. The lack of Pingsdorf Ware in Norway's interior does not allow any conclusions to be drawn concerning Bergen's role as a city for local trade.

The Hanse city of Lübeck is traditionally seen as having close ties to Bergen. The presence of Pingsdorf, Paffrath and Andenne wares at Bergen witnesses the city's

inclusion in the northwest European trade net during the 12th and at the beginning of the 13th centuries. Surprisingly, all three wares are largely lacking at Lübeck. Despite years of excavation in Lübeck there has been not one piece of Andenne or Paffrath Ware, and a mere two or three tiny pieces of Pingsdorf have recently been found (14). One should have expected at least some examples among the finds from the mid-12th century wells in Lübeck castle (Fehring 1979) or from the excavation in the area of the large 'Petersgrube' (Erdmann 1982a, 1982b), both sites with much material from the 12th century. One must conclude then that Lübeck did not participate in extensive extra-regional contact until after this ceramic had run its course, ie after the beginning of the 13th century.

During the course of the 12th and 13th centuries Lübeck replaced Schleswig as a centre of trade. Hoffmann (1983) has proposed that Lübeck's strong economic expansion should be dated to the beginning of the 13th century rather than, to the middle of the 12th century, as is traditionally done. The ceramic evidence would seem to agree with this. He sees especially the battle at Bornhöved (1227) and the death of Waldemar II, (1241) as indicating the decline of Schleswig's supremacy and the rise of Lübeck (Hoffman 1983, 44). This new dating would mean that Schleswig was more likely the continental partner of Bergen in its early phase: the 12th and beginning of the 13th centuries.

Indeed, in Schleswig – as in Ribe and Hamburg – we find the entire spectrum of pottery typical for Bergen's early phase. Helle is of the opinion that Lübeck merchants first established strong contacts with Bergen in the course of the 13th century (Helle 1982, 378). This would place close contact with Lübeck in Bergen's second phase, whereas in the 12th century Hamburg, Bremen or Cologne were probably the continental contacts. It would follow then that it was not Hanseatic or Lübeck merchants who established the original trade connection; they more likely jumped on to a train already set in motion during the 12th century by someone else. They helped to accelerate the train, while taking over control of the locomotive.

5 Olive Proto-stoneware

Olive Proto-stoneware is technically very similar to Pingsdorf Ware. It has thereby earned its own separate section here. Classification of ceramics using the degree of sintering was discussed within the scope of the Schleswig Colloquium's basic terminology (Erdmann *et al* 1984, 419). The threefold designation of Earthenware, Proto-stoneware and Stoneware was suggested. When a fabric is only partially or insufficiently sintered it is classified as Proto-stoneware. The ware is made on a fast rotating potter's wheel. The grain of temper is easily recognized by the naked eye. At 0.2–0.6mm it is classified as «fine». The temper particles appear slightly raised on the surface and produce a rough surface structure. The hardness (*Ritzhärte*) according to Mohs is 7 to 8. The wall thickness is 3–5mm on an average. The grey fabric has an olive-coloured surface which is very similar to the darker variation of the Pingsdorf Ware. On the Schleswig Colour Chart the colour corresponds to No.10, Olive Proto-stoneware (Lüdtke 1985, pl 41). The vessel shapes of the two types of ware are relatively easy to distinguish from one another. We are generally dealing here with small jugs with only one handle (pls 13 and 14). In no case is there any sort of spout. The frilled base (pl 15) is like the base of the Pingsdorf Ware. An impressed or rouletted decoration (pl 14, 7–8) is occasionally found. Using the rim shape, two types can be distinguished: type 5 (15) is characterized by a thick, almost squared off rim, type 6 by a thin, upright rim. The average diameter of the rim is 8cm (fig 27), making these jugs most comparable to Pingsdorf type 3. They are in any case larger than the Pingsdorf beakers. Calculating the minimum number of individual vessels on the basis of the rim sherds then there would be 27 vessels (tab 6), using the bases there would be 42 vessels (tab 7).

Due to the similarity of this ware to Pingsdorf Ware, I should think it possible that it also comes from the Rheinland. Other possible places of production have been presented by Stephan (1983, 96). The uniform jugs make it more difficult than with the Pingsdorf Ware to determine the place of production (made even more difficult by not being very well published). More so than with other wares, it is important with stoneware groups to employ the scientific method for determining the provenance. Otherwise we must wait for progress in studies on the various areas of production.

Just as with the other wares, the pattern of horizontal distribution of the Olive Proto-stoneware produces negative results (diag 10). There is no area of concentration divergent from the standard distribution of the total ceramic assembly (diags 1–4)). Plotting types 5 and 6 was no more useful (diags 17 and 18). The ware's vertical distribution (diag 10c) shows that it is represented with 0.5–1.0% from Period 4 onwards. The ware appears in the first half of the 13th century and remains constant. This consistent longevity is something that will have to be explained when the different stonewares are examined

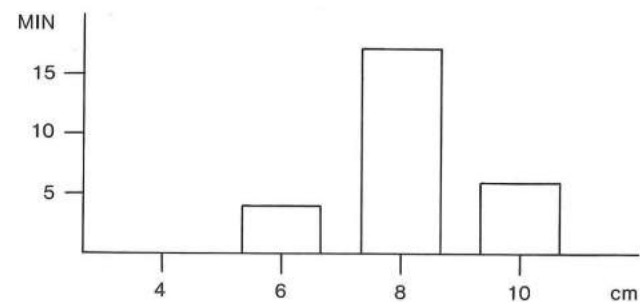


Fig 27 Olive Proto-stoneware: minimum number of vessels divided according to rim diameter (cf table 6)

more intensively. This distribution pattern is unusual, because the group itself is small in numbers but homogeneous. One can, therefore, hardly assume that subgroups are hidden within this longevity, each having a shorter life-span. The vessels of types 5 and 6 (diags 17 and 18) (especially 5) are so small in number that no reliable statement can be made. One possible explanation does occur to me however. Perhaps we have before us

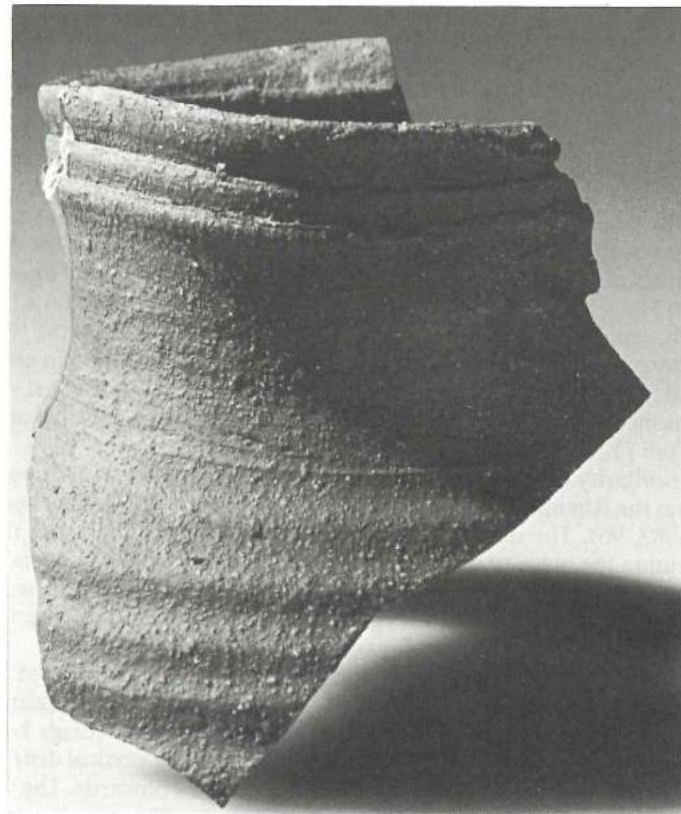


Fig 28 Olive Proto-stoneware: waster (1:1)

vessels which were ill-placed in the kiln and were therefore insufficiently fired. This would explain the ware's presence even in the 14th and 15th centuries, when primarily fully developed stoneware was produced. It is, admittedly, rather hypothetical. Perhaps further study of the stoneware at Bergen will one day provide an explanation.

Equivalent finds of this ware in the stratigraphy at Schleswig are clearly defined within the limits of the 13th century (Lüdtke 1985, tab 47-48). There are possible reasons to be seen in the development of trading connections, and the disappearance of the ware at Schleswig need not mean an end to its production altogether.

Not only well-made vessels occur. Definitely misfired products also found their way to Bergen (figs 28 and 29). These 'second-rate' pieces do not speak well for the Bergen consumer's attention to quality. Conspicuously, misfired products of just this ware appear at other sites, eg Schleswig (Lüdtke 1985, 39). These pieces are somewhat deformed but nevertheless useable.



Fig 29 Olive Proto-stoneware: waster (1:1)

6 Conclusion

At the beginning of this work a series of questions were presented. The answers have been sought by analysing the ceramic finds. At the centre of this analysis have been the ca 2500 excavated fragments of Pingsdorf Ware and Olive Proto-stoneware. In the first part, some of the main aspects of the Bryggen pottery in general were surveyed. Such a survey serves as an interim report; this is particularly important because the excavation first began some 30 years ago and the pottery analysis alone will continue for many years to come. Ten selected wares were juxtaposed as an aid in determining an absolute chronology for the Bryggen stratigraphy: this would not have been possible on the basis of the Pingsdorf Ware alone.

Besides the absolute chronology, the uses of the vessels in a household have been discussed, especially as table and kitchen ware. The provenances of the imported wares were integrated into an analysis of the horizontal distribution on the hope of discovering any tenement specialization. Arranged according to chronology and provenance, the ceramic material helps us learn about the changing trade relations of the city of Bergen.

The analysis of the Bryggen pottery is a promising enterprise for two reasons. For one thing we are dealing solely with imported pottery from all over Europe: there was no contemporary indigenous ceramic production in Norway. Secondly, captured in the fire layers is the complete household inventory at the moment of catastrophe. Therefore, relatively reliable statements can be made about the amounts of household objects in use. Consequently, it seemed advisable to analyse the finds of the fire layers separately, alongside the analysis of the pottery in general.

The pattern of horizontal distribution produced negative results. All the wares were evenly distributed among the merchant tenements; in other words, no specialization of any tenement on any region of Europe at any time was ascertainable. The same negative result followed a similar plotting of two contemporary English wares: no tenement specialized on any particular English harbour.

The vertical – ie chronological – distribution patterns were based on the excavated stratigraphy, which is, in turn, characterized by eight fire layers. The excavator assigned the fire layers respectively to a particular year by comparison with literary evidence (Herteig 1985). For further comparison, the quantities of the ten selected wares within the stratigraphy were examined. The beginning and end datings of these wares at other northern European locations (determined by numismatics and dendrochronology) were adopted to the extent to which the determination of the absolute chronology was aided. Alongside the Pingsdorf Ware, other wares were examined: Andenne Ware, Paffrath Ware, London-Shelly Ware, London-Brown (London-Type) Ware, Rouen Ware, Scarborough Ware, Langerwehe Stoneware, Siegburg Stoneware and Raeren Stone-

ware. Fire 5 can be dated 'ca 1250' because of the more or less parallel final occurrence of Pingsdorf, Andenne and Paffrath Wares. This corresponds to the suggested precise dating of Fire 5 to 1248. Fire 4 can be dated 'ca 1300' due to the last occurrence of London-Shelly Ware and London-Brown Ware in this fire layer along with a strong presence of Siegburg Stoneware in the layers above Fire 4: these facts can be compared with the dating of the fire to 1332. After Fire 2 there is an increase in Raeren Stoneware so that we can date the fire 'ca 1500'. This date corresponds to the historically dated fire of 1476.

The relative sequence of the ceramic wares within the periods is clearly identifiable. By comparing this order with the absolute datings from other excavations, an absolute chronology for the Bryggen stratigraphy can be established. Fortunately, the historically reported fire catastrophes correspond to the datings produced by archaeological analysis. This does not prove beyond doubt that the historical dating of the fire is absolutely certain. The statement is simply being made that the ceramic dating does not indicate that the historical dating is incorrect. On the basis of the contemporary occurrence of Pingsdorf, Paffrath and Andenne Wares in the earliest period, it can be said that the earliest archaeological evidence comes from a time about 1100 and that, in any case, there are no finds from the 11th century. It is, therefore, likely that there was a relatively sudden and rapid development of the settlement.

Possible middle and western European origins of the Pingsdorf Ware were discussed. On the basis of form and decoration, the provenance was decided to be the Rhineland – the greater Cologne/Bonn area. The fine tempered, thin walled vessels were made on a fast potter's wheel. It may have been the cartwheel type in the Roman tradition or a kickwheel; at least for the jugs the cartwheel is more likely. The high degree of uniformity and standardisation would indicate a professionalization of the handicraft. The approximately 112 vessels comprised four form types: three types of jugs and one type of beaker. Technically, there are two groups: a pale yellow, obviously oxidized group, and an olive-green group, often with a grey fabric, and obviously partly fired in a reduced atmosphere. It is remarkable that the vertical diagrams do not in any way show different distribution patterns. The two defined groups run chronologically parallel, just like the four types of form.

A close examination of the uses of the Pingsdorf vessels proved interesting. The mainly decorated jugs and beakers were for use at the table and not in the kitchen. The ratio of four jugs to one beaker corresponds with what is evidenced in contemporary literary and pictorial sources. At least two persons normally shared a beaker. Several jugs were needed to hold not only wine but also other contents for mixing, such as water.

The distribution map of the Pingsdorf Ware showed that this ceramic type appears all along the coast of western and southern Scandinavia. A consideration of the quantities involved clearly indicates the North Sea coast as the area of traffic. Around this coast there are several sites where at least 2% of the total pottery is Pingsdorf Ware, whereas in the western part of the Baltic area there are only traces of the ware. It is remarkable that in Lübeck not only Pingsdorf Ware but also Paffrath and Andenne Wares are almost completely absent. This reflects the fact that Lübeck first became strongly involved in the northern European trade network during the course of the 13th century. In Bergen Pingsdorf Ware had a strong phase already in the 12th century, at which time Schleswig was playing the most important role in the western Baltic area.

At the end of our investigation aspects were pointed out which must be dealt with in future analyses of the Bryggen pottery. The more than seventy different ceramic wares will have to be classified formally and functionally before their household uses can be adequately studied. The uses which may be distinguished include storage, meal preparation, and consumption of food and drink. Also important is the absolute number of

vessels in a household, as well as changes in the number over time. The chronology can only be determined by drawing on fixed points from stratigraphical contexts outside Bergen, as was done here for ten selected wares. Besides the question of chronology, future investigation of the Bryggen pottery must try to determine, as exactly as possible, the respective provenances. Use of other disciplines will be particularly helpful here because of the limitations of traditional archaeological methods, but the individual wares should first be analysed in the traditional manner. With those results one should decide on the specific questions to be answered and then plan the ceramic investigation using optimally selected specimens. In this way it will be possible to make the medieval pottery from the Bryggen excavations a reference collection for the entire north European area.

Notes

1) Since many but not all wares are available as data sets in the computer I have not been able to use the process described above of totalling the information on the data sheets, when making a quantitative analysis of all groups.

2) The possibility should be mentioned that a considerable number of 'diverse cooking pots' may after careful examination slightly increase the contribution of German provenances in the 13th and 14th century.

In this context, I should like to thank A Vince, London, for his kind advice concerning the English wares.

3) After the processing of all Bryggen pottery it will be feasible to elaborate on the subject raised here and to compare changes in the range of imports with the results obtained by the analysis of written sources (Nedkvitne 1983).

4) The levels are numbered – in contrast to Bergen – from top to bottom. Consequently level 1 is the most recent, level 13 the earliest.

5) For the distribution of Andenne Ware in Scandinavia see the respective distribution map in Lüdtke (1987, 70).

6) Information kindly provided by I Baart, Amsterdam, 1981. Reference should be made here to the 5th Colloquium on medieval ceramics at Schleswig in November 1986 which dealt especially with stonewares:

Supposed chronological differences proved mostly to be discrepancies in nomenclature. It was eventually agreed by common consent to date the beginning of the completely sintered 'temperless' Siegburg stoneware to the period shortly after 1300.

7) The relatively late appearance after 1332 of quantitatively relevant Langerwehe–Duingen pottery in particular is not in agreement with its reported early dating based largely on coin hoards. The rather late establishment of trade connections with the production areas of this ware may indeed be the reason for this. At the time when Langerwehe–Duingen Wares should first have emerged in Bergen, English wares presumably still dominated the Bergen trade.

8) In 1981 I was given the opportunity to examine material from Duingen at the Niedersächsisches Landesmuseum in Hannover, an honour for which I owe the director of the museum many thanks.

I should like here to refer back to the Schleswig Colloquium basic terminology which differentiates between Pingsdorf Ware and Duingen Ware (Erdmann *et al* 1984, 428). In November 1986 several illustrations of Pingsdorf vessels from Bergen were shown to S Schütte, the city archaeologist at Göttingen. He was not acquainted with any comparable range of form and decoration from within the Göttingen area.

9) For the definition and differentiation between the fast and the slow wheels, see Erdmann *et al* (1984, 421). Only the fast wheel has an adequate momentum which allows the potter to shape the wall by 'lifting' the clay.

10) As an example of a horizontal kiln, mention should be made of the Hitzacker, Elbe, report (Lüdtke 1981). A kiln found in Lübeck was first reconstructed as horizontal type (Meyer 1980); at present other researchers are attempting an updraught reconstruction (Buchin & Erdmann 1986). An overview of the excavated medieval pottery workshops in northern Germany is given by Stephan (1982b, 120).

11) For example, there is some evidence that a local pottery production organised as a professional handicraft in Schleswig only developed relatively slowly in the course of the 13th and the beginning of the 14th century. Before that, the predominant existence of domestic production seems very likely.

12) Everyday life in the Middle Ages, especially the eating and drinking habits, has so far received varied attention. At the end of the 19th century a number of at times very comprehensive works appeared, concentrating on the analysis of literary rather than pictorial sources. Reference to these may be very rewarding even still today. Above all the works by Schultz should be mentioned, who first published a remarkable study about everyday life (including nutrition habits) in the 12th and 13th centuries (Schultz 1879), succeeded by a similar study dealing with the 14th and 15th centuries (Schultz 1892). Following this tradition, Heyne contributed two works dedicated to household life (Heyne 1899) and to 'food' (Heyne 1901). Also specialized examinations, such as those by Fuhse (1891) and Pieth (1909) should be referred to. Soon after the turn of the century academic interest in this subject ceased for a long time. Numerous, archaeological studies investigating medieval pottery are, even to the present day, often characterized by their extremely brief consideration of questions concerning the uses of a vessel in a household. Here we are faced with a considerable backlog. Schiedlausky's often-quoted study was for a long time the only specialized work (Schiedlausky 1956). Only recently new interest has arisen in medieval nutrition habits, as well as cooking facilities and kitchen equipment. Hence, a number of examinations deal either especially with nutrition, such as Tannahill (1973), Henisch (1976) or Erdmann (1985a), or more extensively with customs of everyday life, such as Bumke (1986). It is in the nature of sources that all of the respective examinations mostly deal with life at court. However, it should be pointed out when critically considering the sources, that these analyses may certainly be applied to life within the Bergen merchant tenements. I should like to thank very much W Erdmann, Lübeck, for his information and kind advice concerning this subject.

13) The analysis made by Dunning (1960, 59) corresponds largely to the one by Hübener (1951, 107); it was updated eight years later only (Dunning 1968, 36) by the addition only of some more locations, yet without quoting Hübener's work. I regret to say that this otherwise creditable study by Dunning (1968) which has accordingly become a classic in the meantime, lacks the list of sites marked on some of the distribution maps for the different ceramic wares.

14) Information kindly provided by W Erdmann, Lübeck, November 1986.

15) The counting of the types continues from the four types of Pingsdorf Ware, thus becoming numbers 5 and 6 for the Olive Proto-stoneware.

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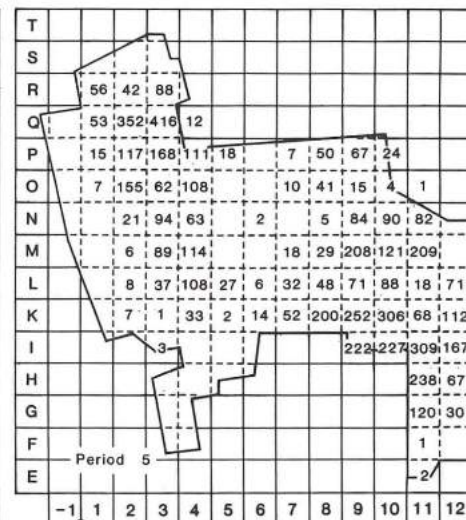
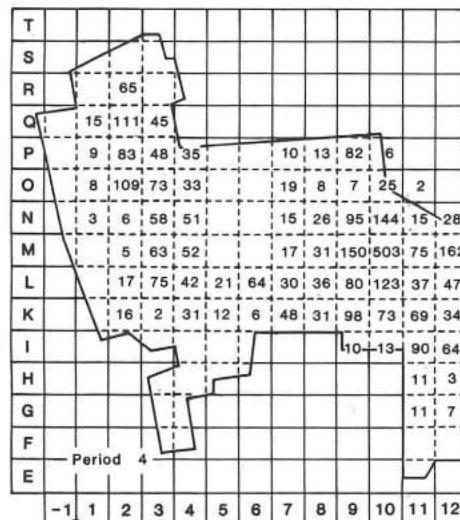
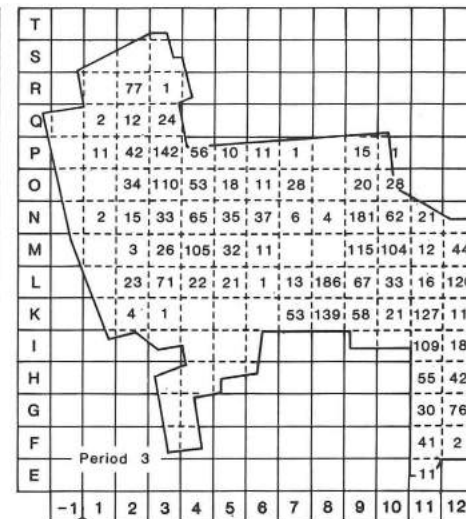
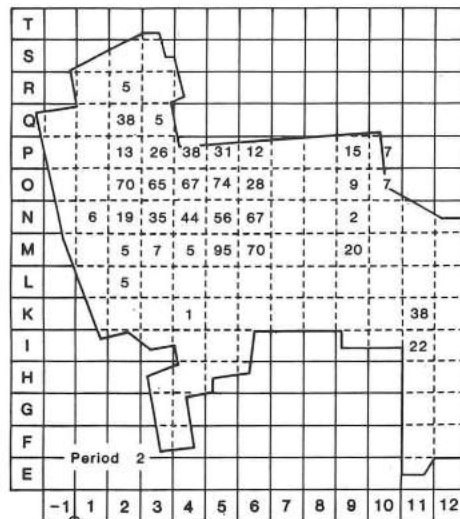
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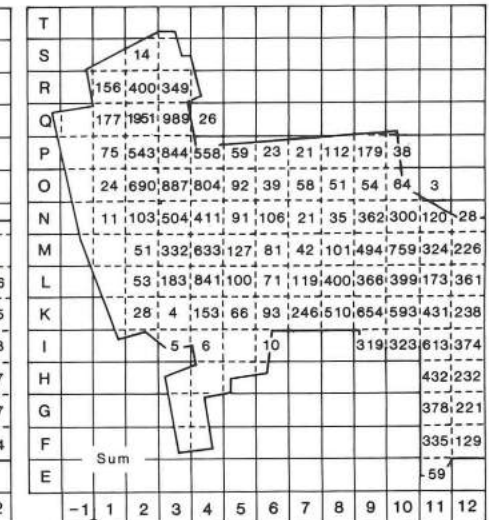
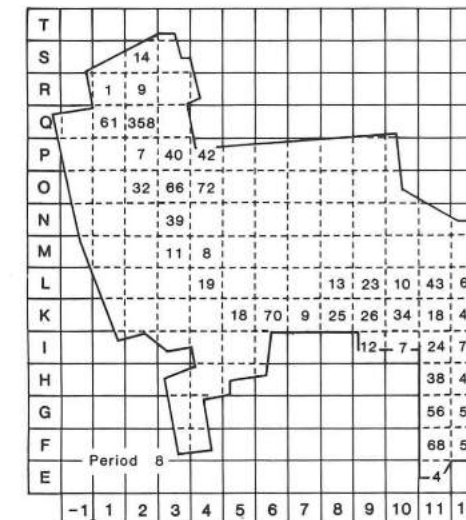
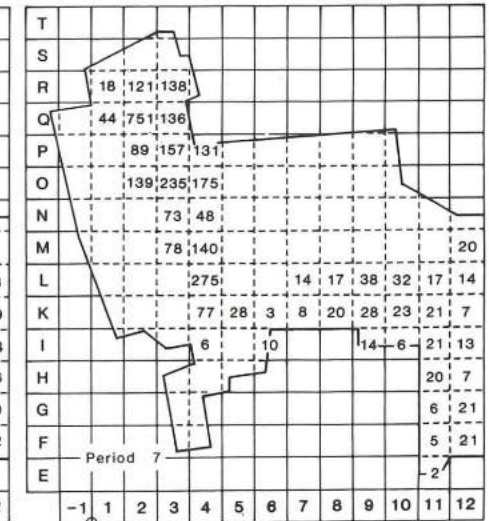
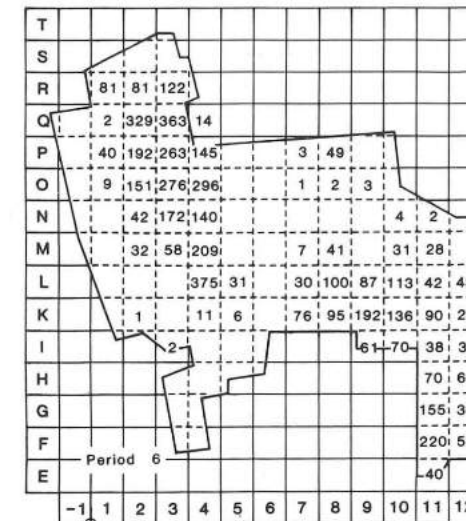
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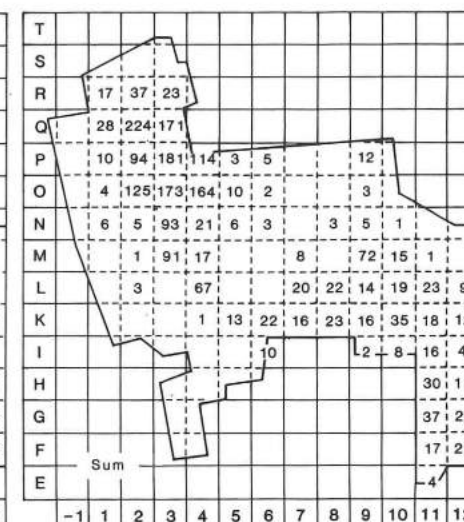
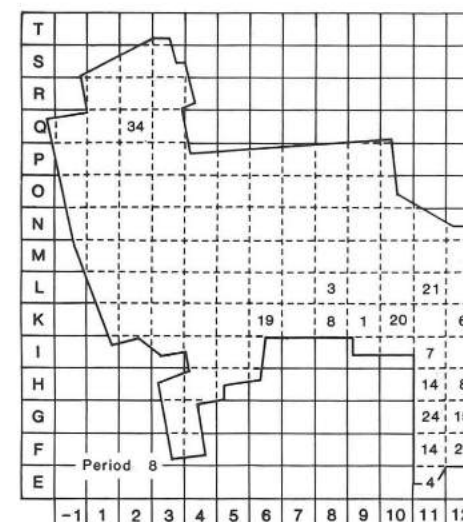
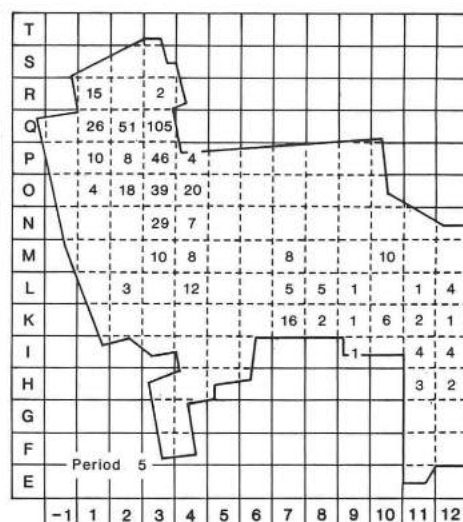
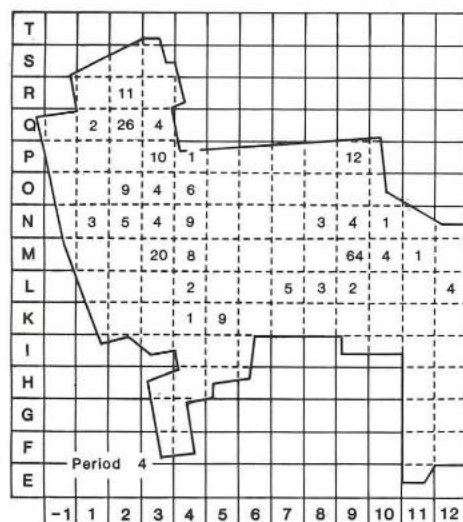
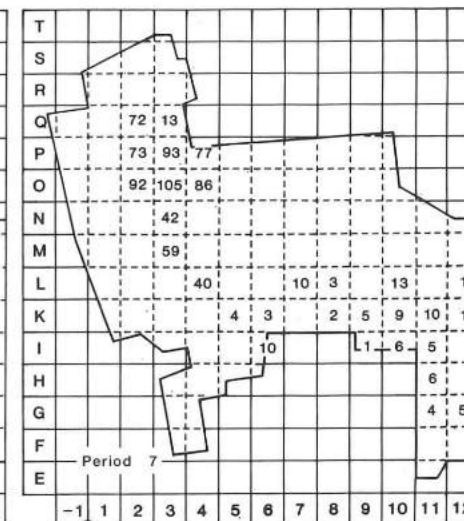
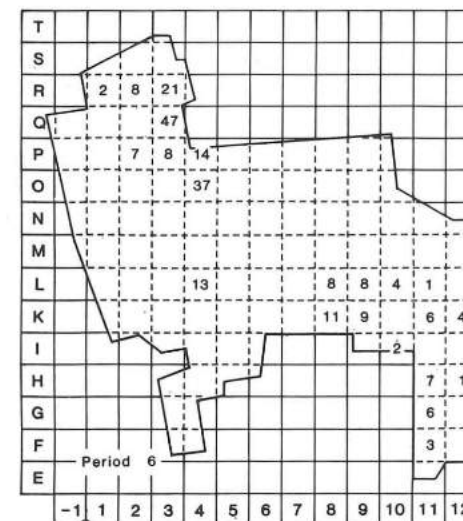
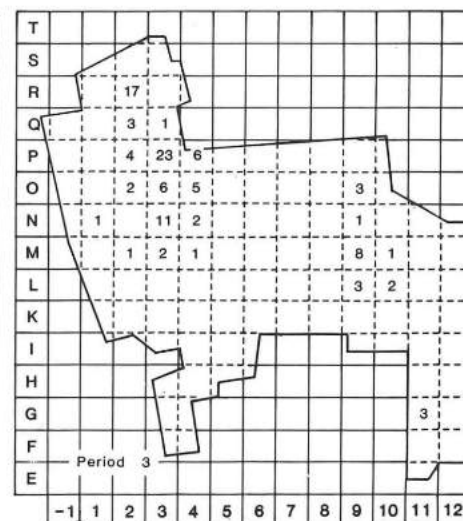
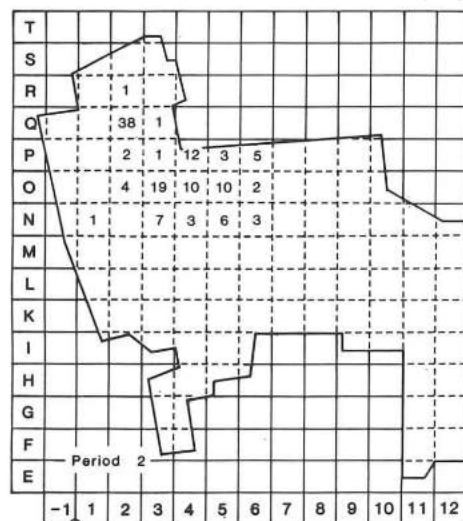
Diagrams



Diag 1 All wares, periods 2-5

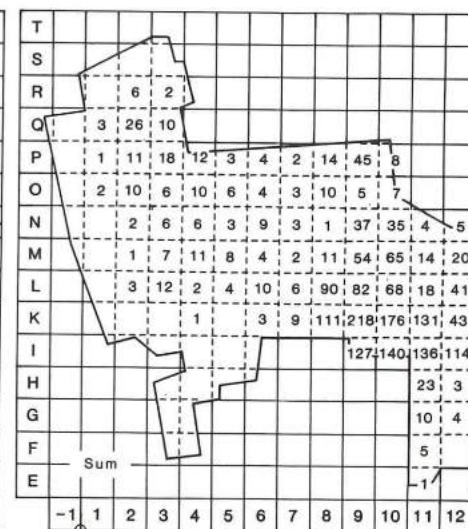
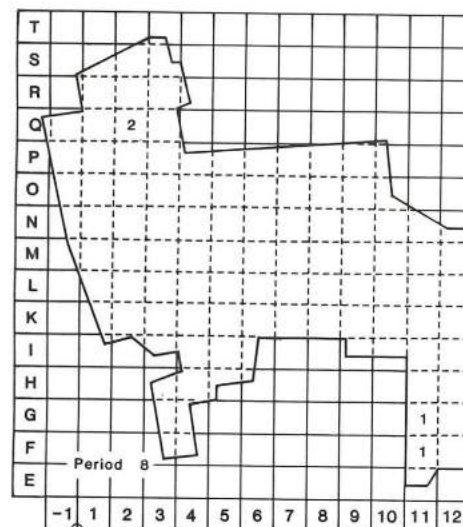
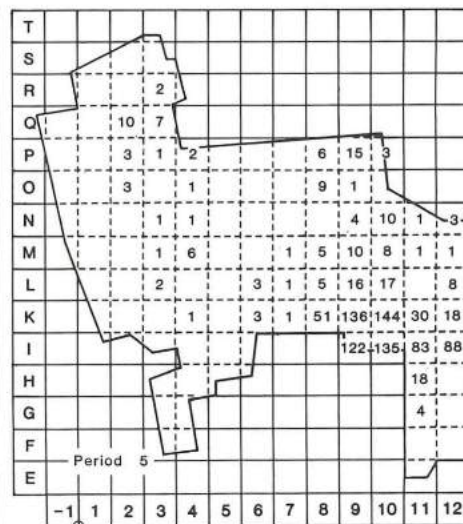
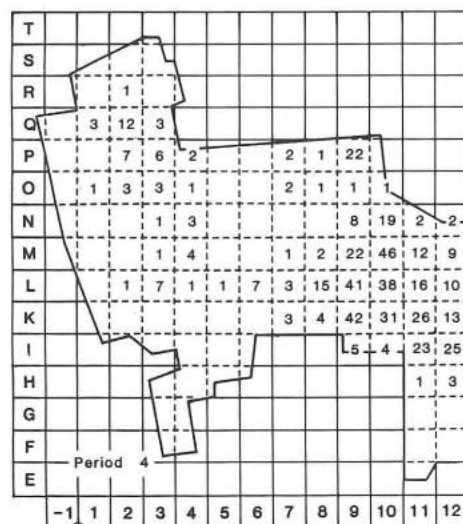
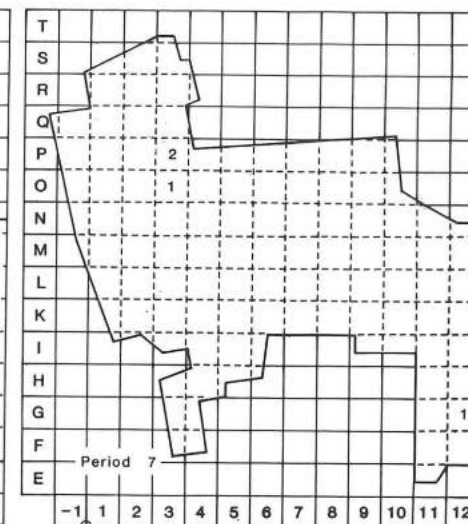
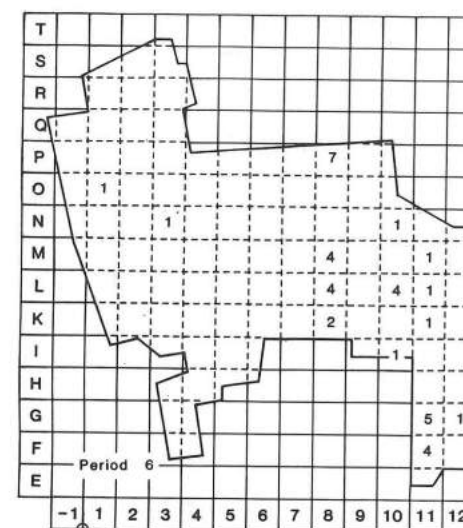
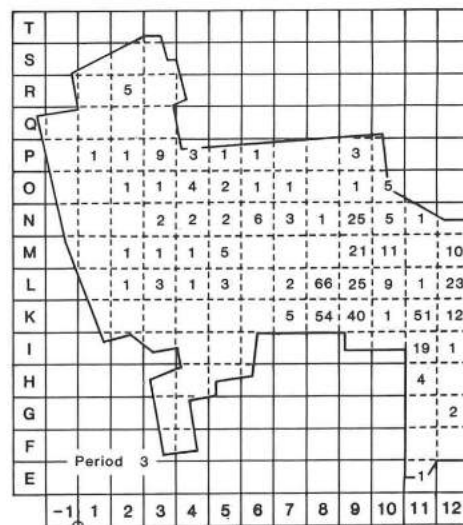
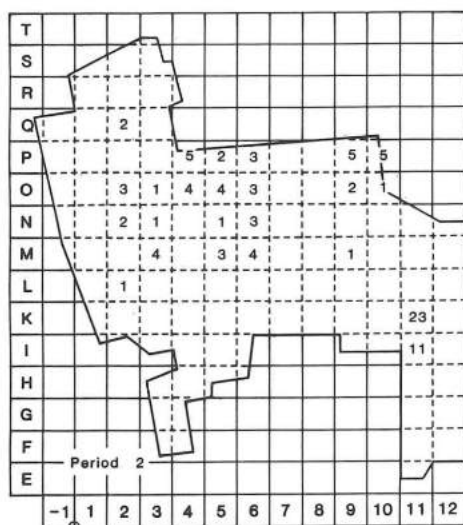


Diag 2 All wares, periods 6-8 and total



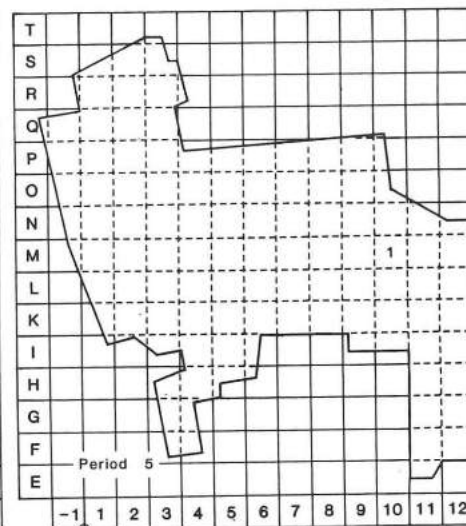
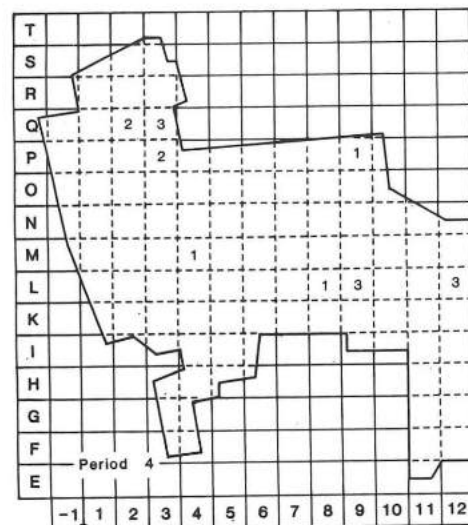
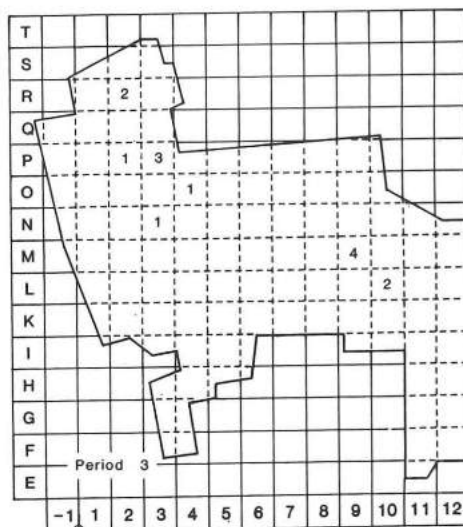
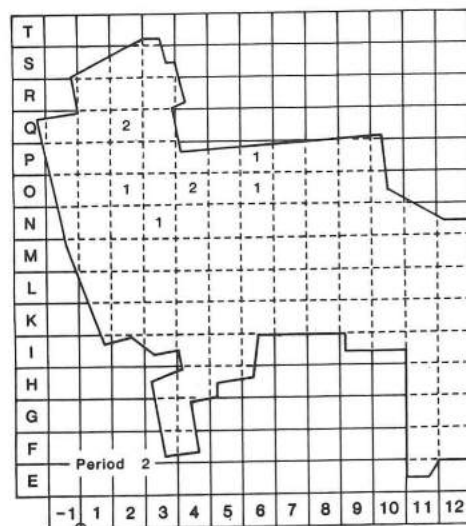
Diag 3 All wares, fire layers only, periods 2-5

Diag 4 All wares, fire layers only, periods 6-8 and total

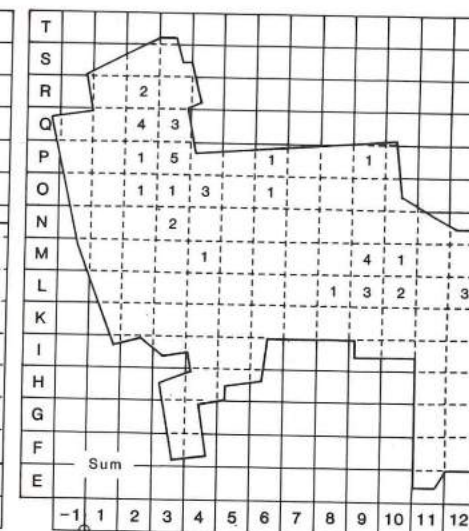
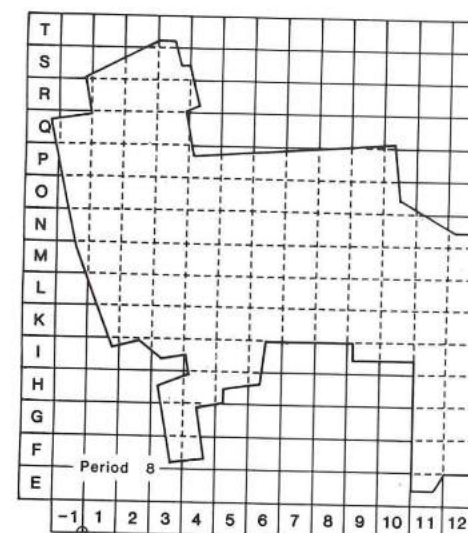
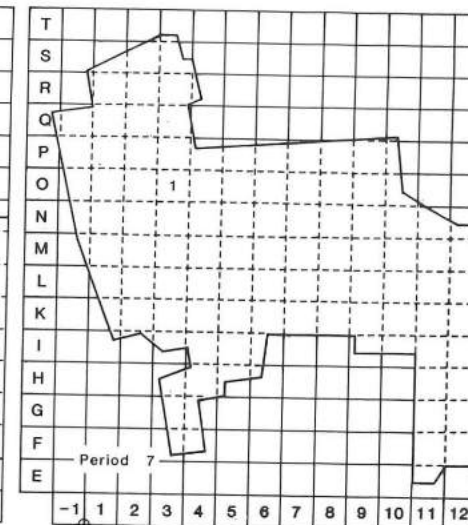
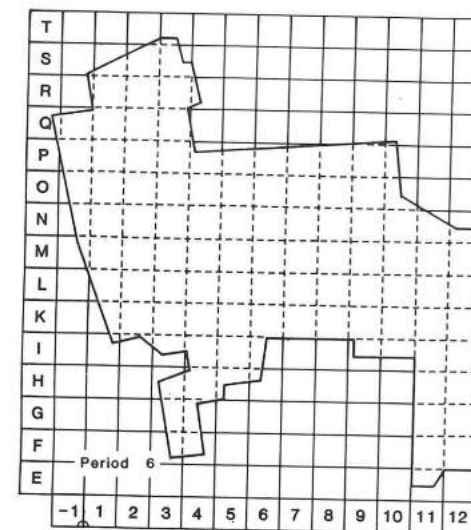


Diag 5 Pingsdorf Ware, periods 2-5

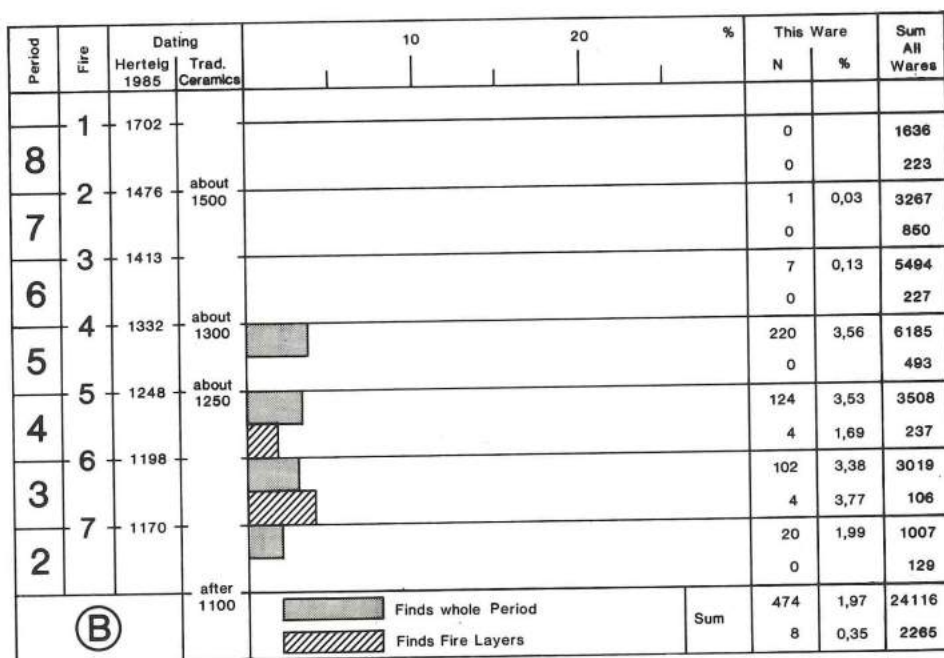
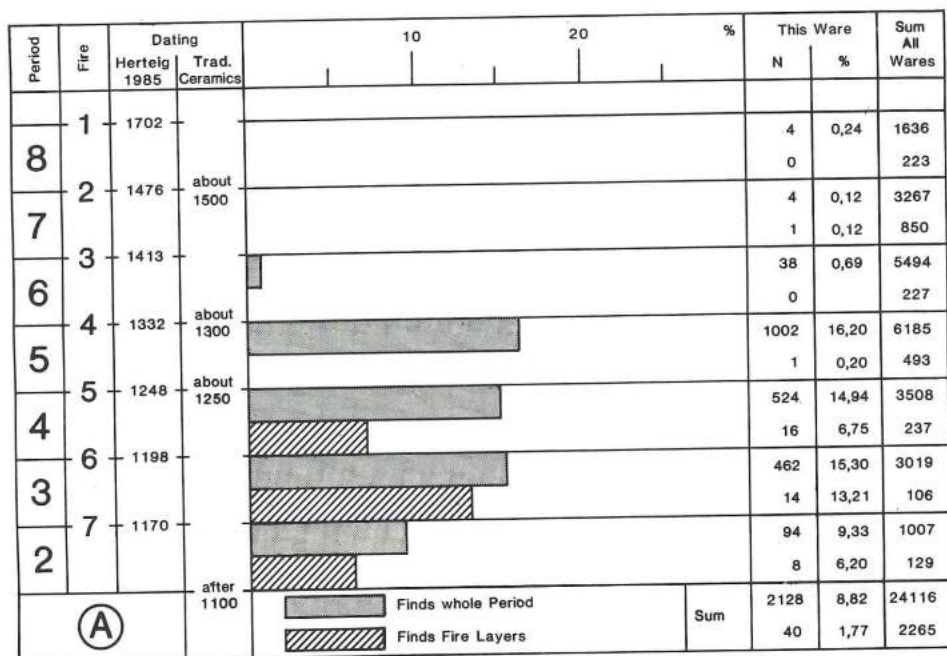
Diag 6 Pingsdorf Ware, periods 6-8 and total



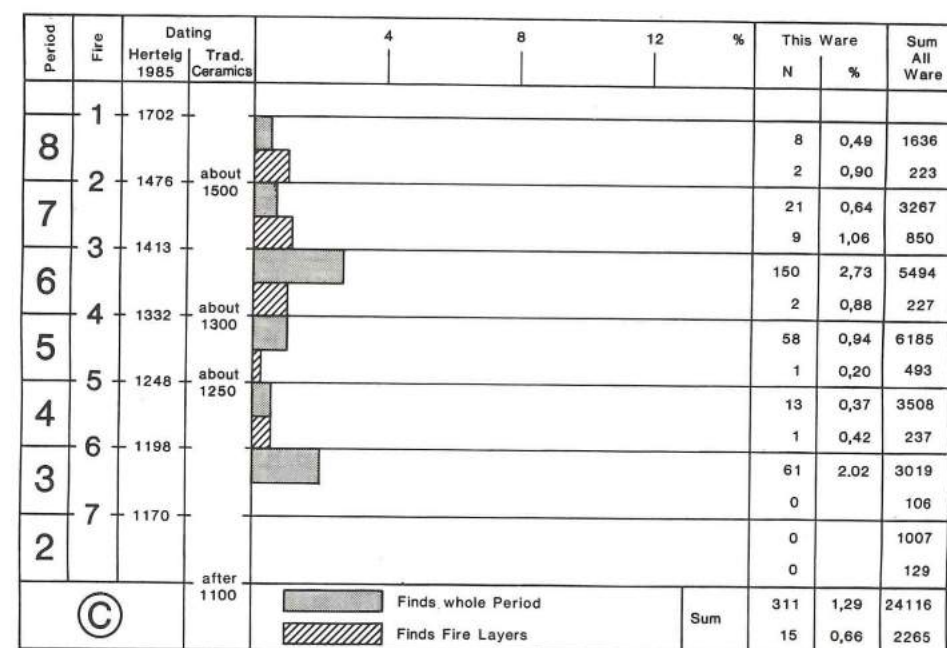
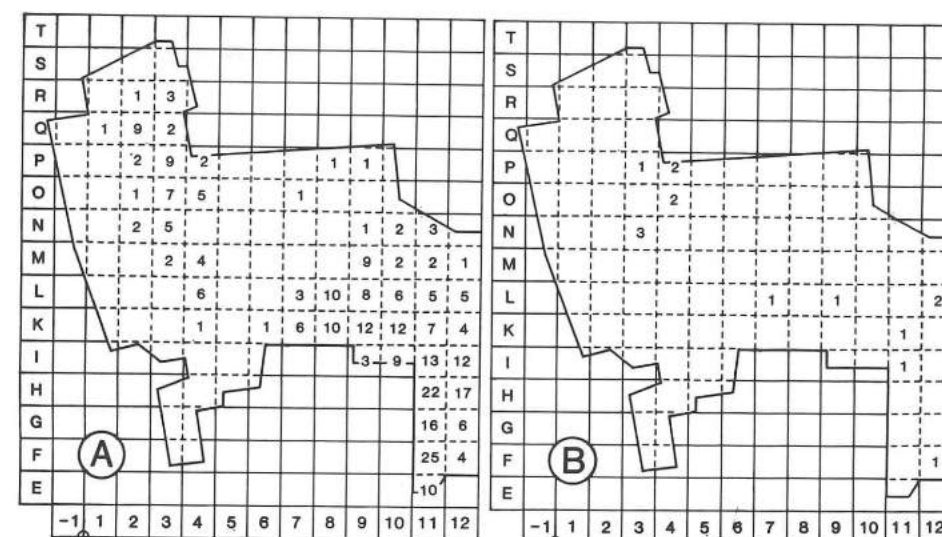
Diag 7 Pingsdorf Ware, fire layers only, periods 2-5



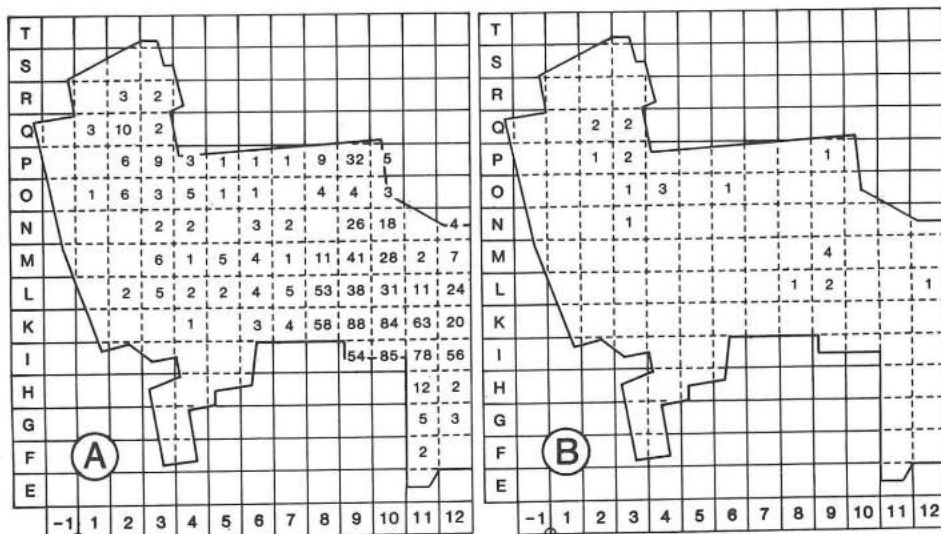
Diag 8 Pingsdorf Ware, fire layers only, periods 6-8 and total










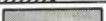

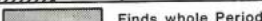



Diag 9 Pingsdorf Ware: proportional distribution per period, included fire layer (upper bar) and in fire layer only (lower bar). A: All Pingsdorf Ware. B: Red-painted Pingsdorf Ware

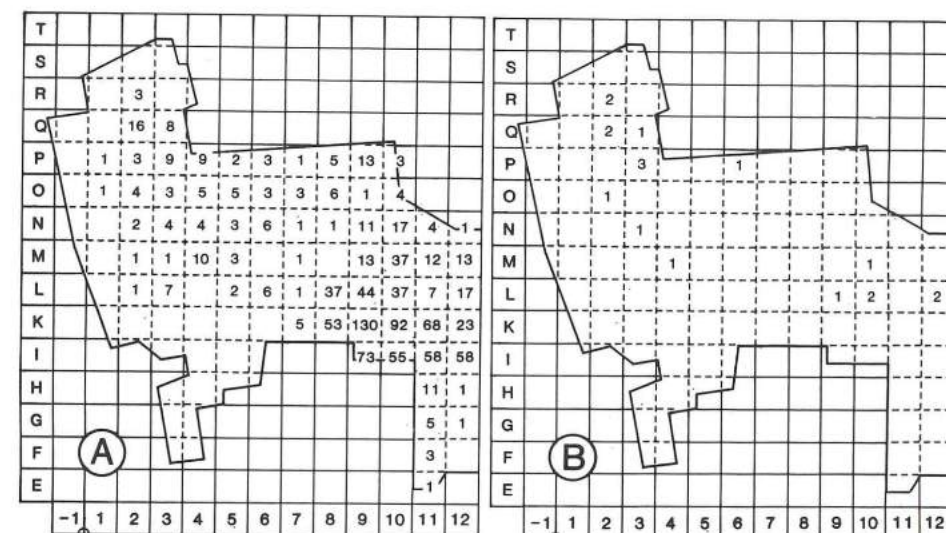


Diag 10 Olive Proto-stoneware
 A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



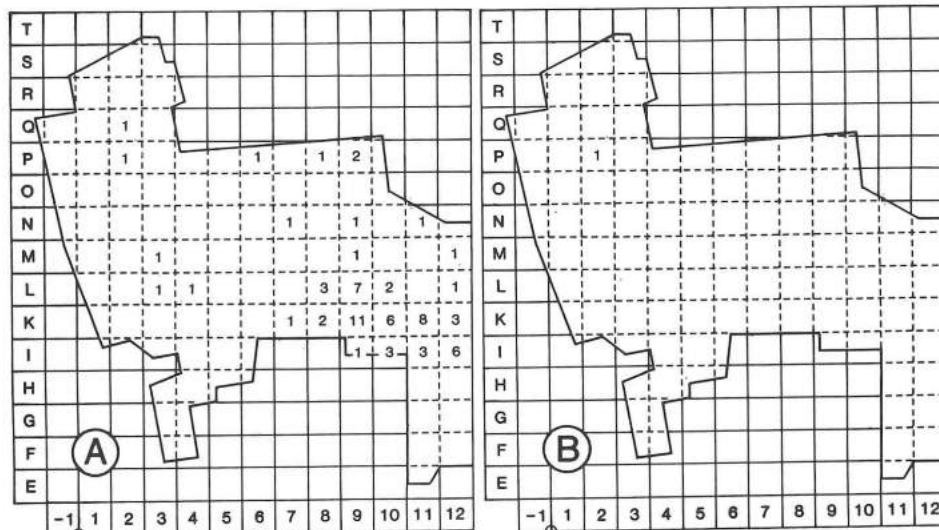
Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						4	0,24	1636
								0		223
7	2	1476		about 1500				4	0,12	3267
								1	0,12	850
6	3	1413						21	0,38	5494
								0		227
5	4	1332		about 1300				511	8,26	6185
							0		493	
4	5	1248	about 1250				258	7,35	3508	
							11	4,64	237	
3	6	1198					228	7,55	3019	
							7	6,60	106	
2	7	1170					48	4,77	1007	
							3	2,33	129	
©		after 1100					Sum	1074	4,45	24116
								22	0,97	2265
										
										

Diag 11 Pingsdorf Ware, group 1 (pale fabric)
 A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						0		1636
	2	1476	about 1500					0		223
7	3	1413						0		3267
	4	1332	about 1300					0		850
6	5	1248	about 1250					17	0,31	5494
	6	1198						0		227
5	7	1170						491	7,94	6185
	8							1	0,20	493
4	9							266	7,58	3508
	10							5	2,11	237
3	11							234	7,75	3019
	12							7	6,60	106
2	13							46	4,57	1007
	14							5	3,88	129
©		after 1100								

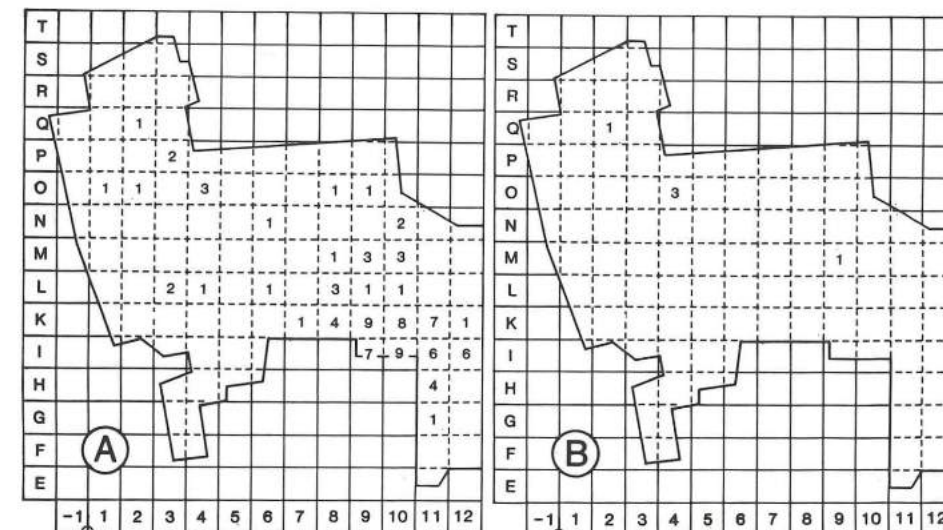
Diag 12 Pingsdorf Ware, group 2 (dark fabric)
 A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					0		3267
	4	1332	about 1300				0		850
6	5	1248	about 1250				1	0,02	5494
	6	1198					0		227
5	7	1170					24	0,39	6185
	8						0		493
4	9						21	0,60	3508
	10						0		237
3	11						22	0,73	3019
	12						1	0,94	106
2	13						4	0,40	1007
	14						0		129
C	after 1100						72	0,30	24116
	Sum						1	0,04	2265

Diag 13 Pingsdorf Ware, type 1

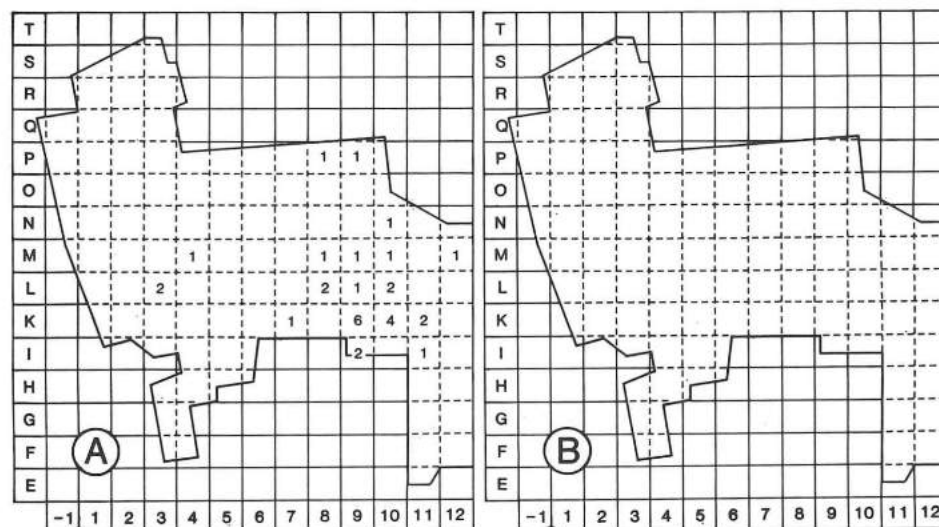
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					0		3267
	4	1332	about 1300				0		850
6	5	1248	about 1250				2	0,04	5494
	6	1198					0		227
5	7	1170					57	0,92	6185
	8						0		493
4	9						19	0,54	3508
	10						1	0,42	237
3	11						11	0,36	3019
	12						2	1,89	106
2	13						4	0,40	1007
	14						2	1,55	129
C	after 1100						93	0,39	24116
	Sum						5	0,22	2265

Diag 14 Pingsdorf Ware, type 2

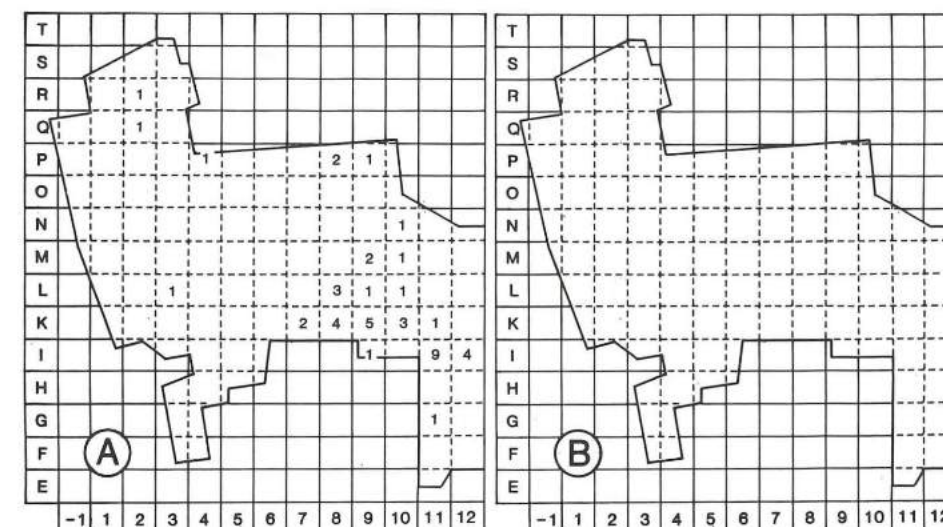
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					0		3267
	4	1332	about 1300				0		850
6	5	1248	about 1250				1	0,02	5494
	6	1198					0		227
5	7	1170					12	0,19	6185
	8						0		493
4	9						10	0,29	3508
	10						0		237
3	11						7	0,23	3019
	12						0		106
2	13						1	0,10	1007
	14						0		129
C		after 1100					31	0,13	24116
							0		2265

Diag 15 Pingsdorf Ware, type 3

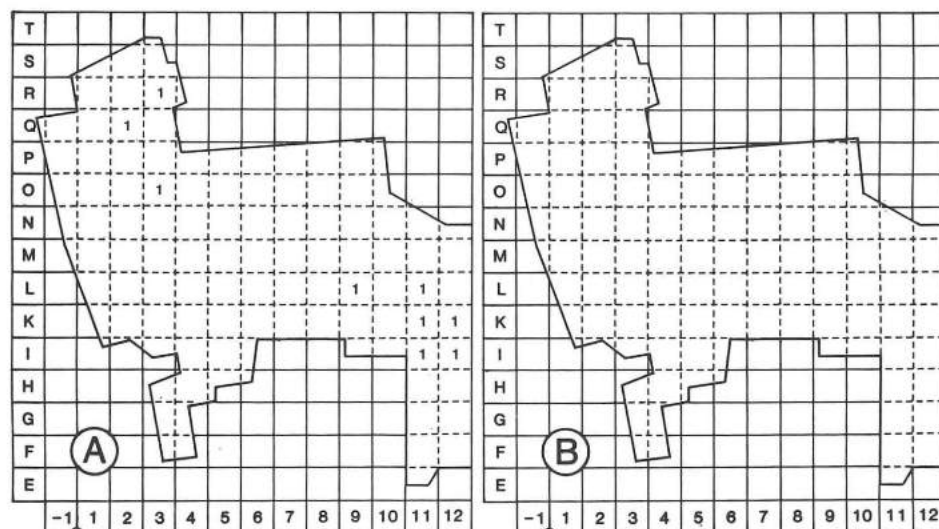
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					0		3267
	4	1332	about 1300				0		850
6	5	1248	about 1250				1	0,02	5494
	6	1198					0		227
5	7	1170					27	0,44	6185
	8						0		493
4	9						10	0,29	3508
	10						0		237
3	11						8	0,26	3019
	12						0		106
2	13						0		1007
	14						0		129
C		after 1100					46	0,19	24116
							0		2265

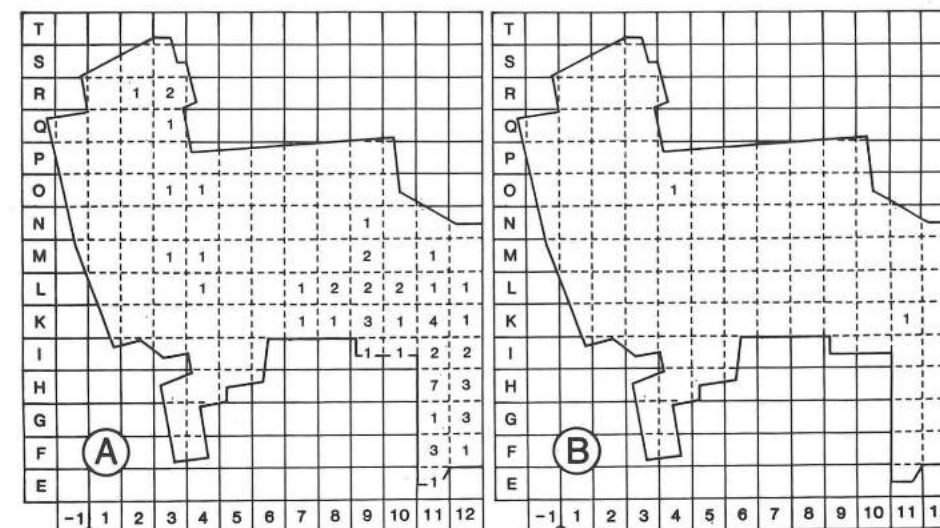
Diag 16 Pingsdorf Ware, type 4

- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



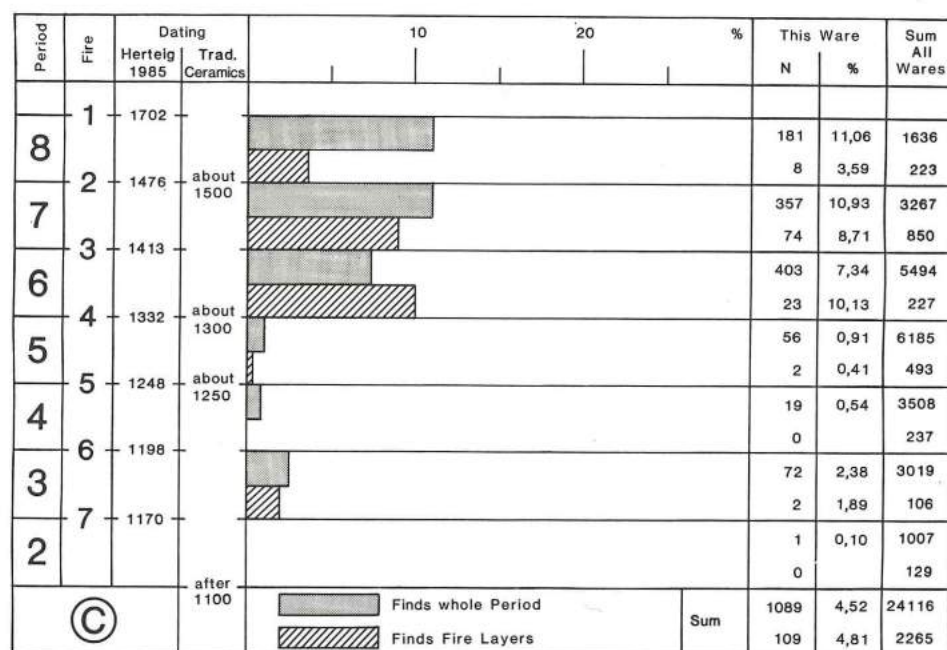
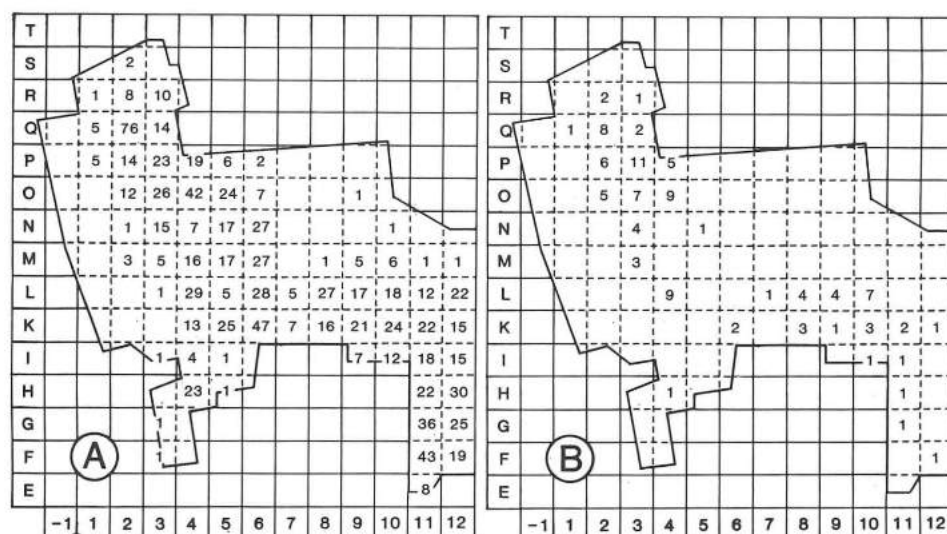
Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					1	0,03	3267
	4	1332	about 1300				0		850
6	5	1248	about 1250				4	0,07	5494
	6	1198					0		227
5	7	1170					4	0,06	6185
							0		493
4							0		3508
							0		237
3							0		3019
							0		106
2							0		1007
							0		129
C		after 1100					9	0,04	24116
							0		2265

Diag 17 Olive Proto-stoneware, type 5
 A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					2	0,12	1636
	2	1476	about 1500				0		223
7	3	1413					3	0,09	3267
	4	1332	about 1300				2	0,24	850
6	5	1248	about 1250				30	0,55	5494
	6	1198					0		227
5	7	1170					10	0,16	6185
							0		493
4							0		3508
							0		237
3							13	0,43	3019
							0		106
2							0		1007
							0		129
C		after 1100					58	0,24	24116
							2	0,09	2265

Diag 18 Olive Proto-stoneware, type 6
 A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).

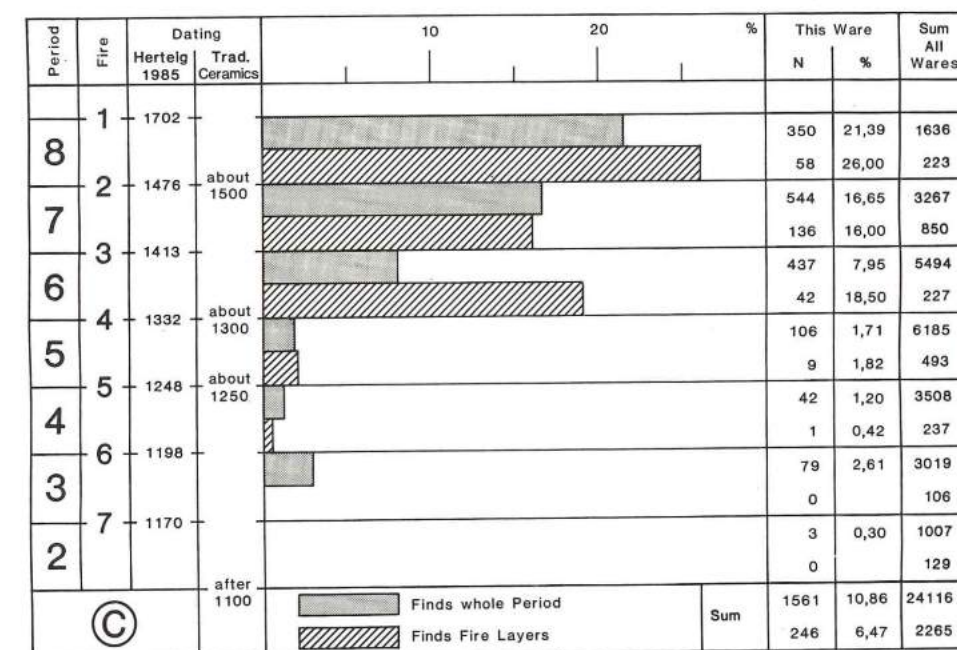
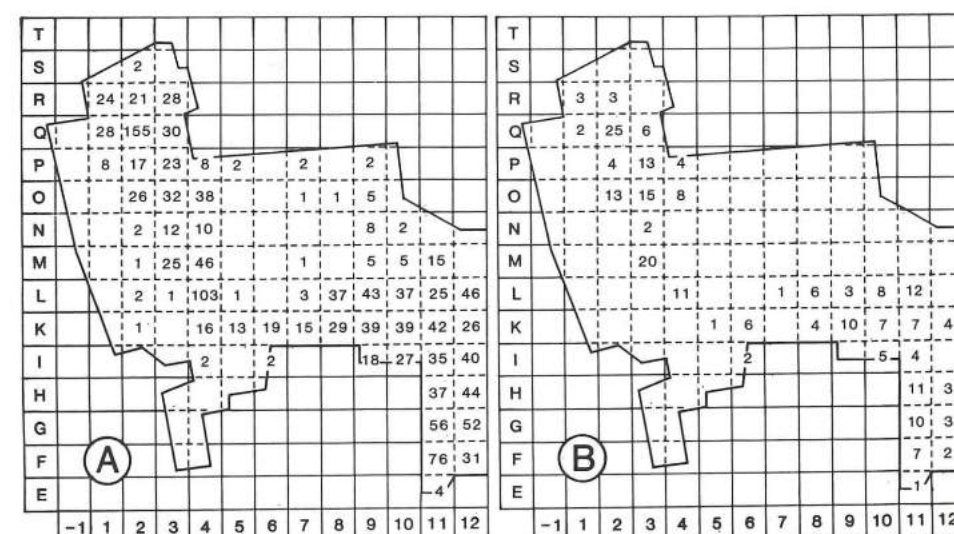


Diag 19 Langerwehe-Duingen (red-slipped proto-stoneware and stoneware)

A) horizontal distribution, all periods, included fire layers

B) horizontal distribution, fire layers only

C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).

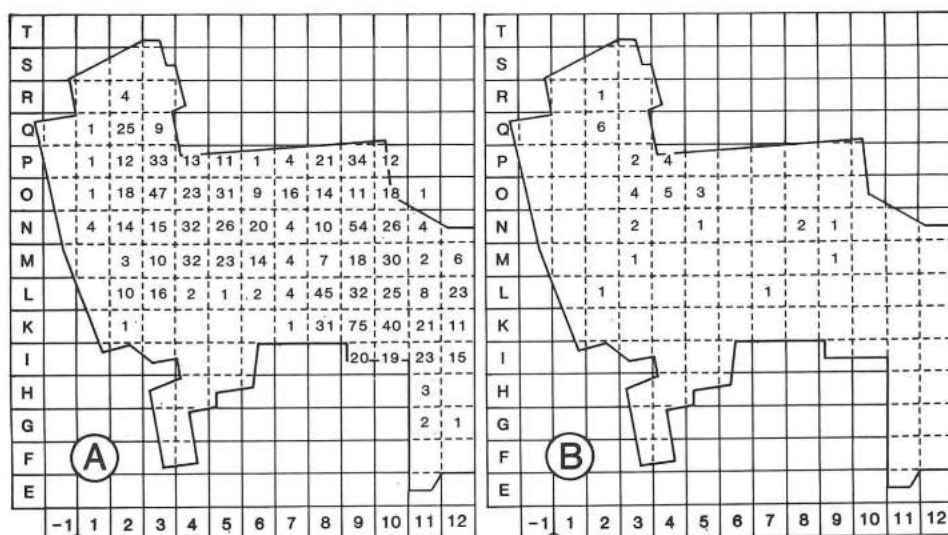


Diag 20 Siegburg Stoneware

A) horizontal distribution, all periods, included fire layers

B) horizontal distribution, fire layers only

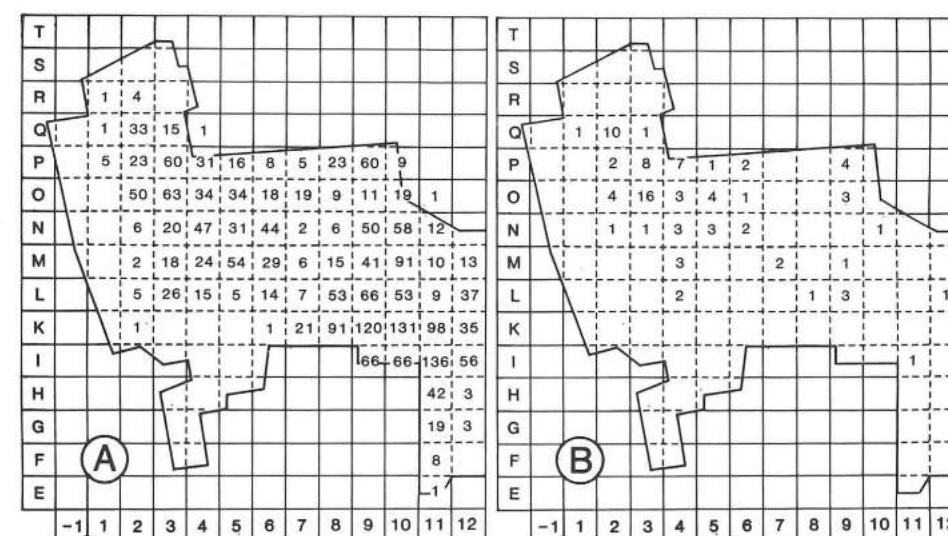
C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		12	24	36	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						1	0,06	1636
								0		223
7	2	1476	about 1500					0		3267
								0		850
6	3	1413						9	0,16	5494
								0		227
5	4	1332	about 1300					233	3,77	6185
								1	0,20	493
4	5	1248	about 1250					279	7,95	3508
								6	2,53	237
3	6	1198						415	13,75	3019
								8	7,55	106
2	7	1170						222	22,05	1007
								20	15,50	129
C		after 1100						1159	4,81	24116
								35	1,55	2265

Diag 21 Andenne Ware

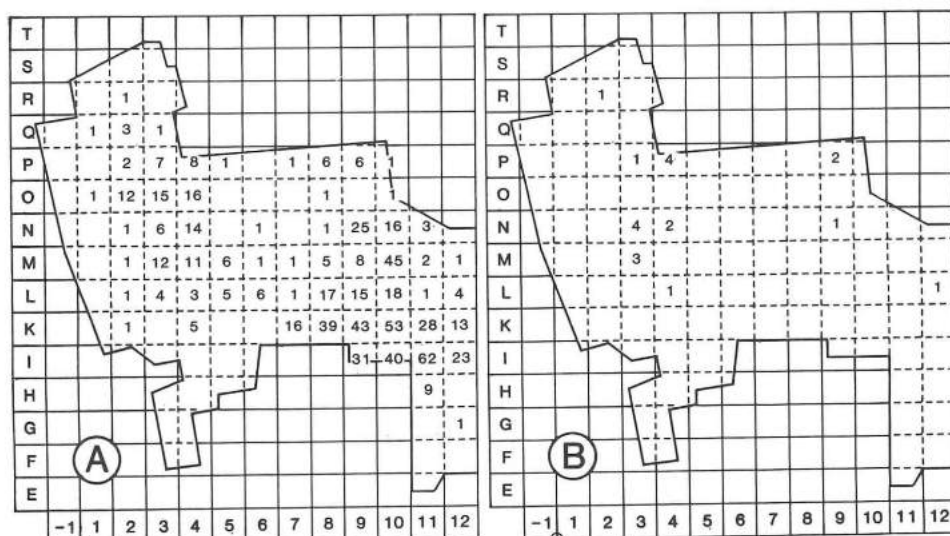
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		12	24	36	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						3	0,18	1636
								0		223
7	2	1476	about 1500					5	0,15	3267
								1	0,12	850
6	3	1413						41	0,75	5494
								0		227
5	4	1332	about 1300					703	11,37	6185
								4	0,81	493
4	5	1248	about 1250					547	15,59	3508
								17	7,17	237
3	6	1198						619	20,50	3019
								19	17,92	106
2	7	1170						403	40,02	1007
								51	39,53	129
C		after 1100						2321	9,62	24116
								92	4,06	2265

Diag 22 Paffrath Ware (Blue-grey Ware)

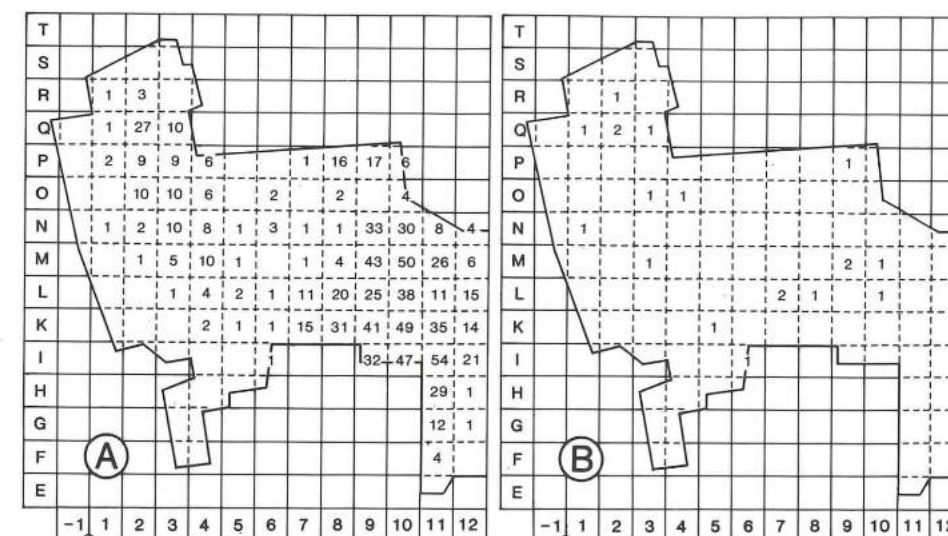
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						0		1636
	2	1476	about 1500					0		223
7	3	1413						1	0,03	3267
	4	1332	about 1300					1	0,12	850
6	5	1248	about 1250					10	0,18	5494
	6	1198						0		227
5	7	1170						244	3,95	6185
	8							3	0,61	493
4	9							207	5,90	3508
	10							6	2,53	237
3	11							186	6,16	3019
	12							3	2,83	106
2	13							35	3,48	1007
	14							7	5,43	129
		after 1100						683	2,83	24116
								20	0,88	2265

Diag 23 London-Shelly Ware

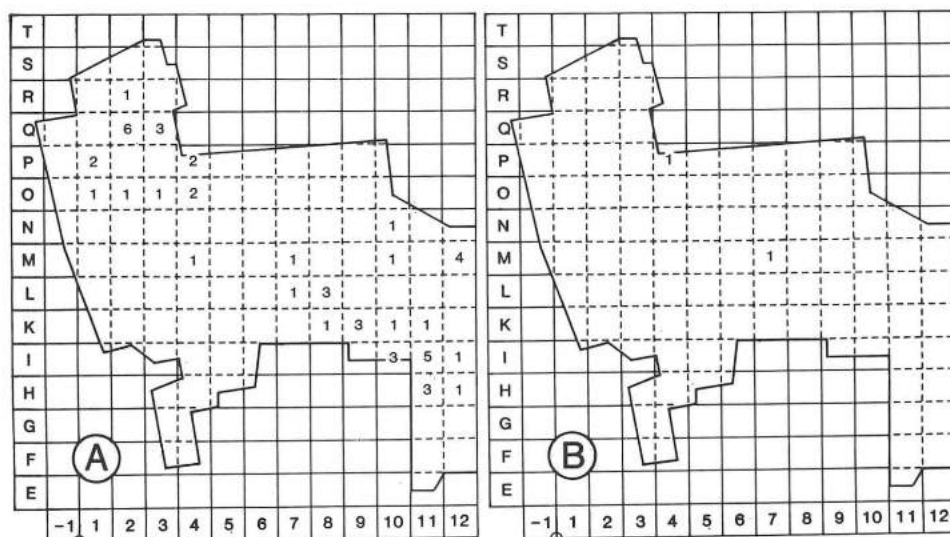
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						1	0,06	1636
	2	1476	about 1500					5	0,15	3267
7	3	1413						1	0,11	850
	4	1332	about 1300					33	0,60	5494
6	5	1248	about 1250					412	6,66	6185
	6	1198						5	1,00	493
5	7	1170						246	7,01	3508
	8							8	3,77	237
4	9							203	6,72	3019
	10							4	3,38	106
3	11							35	3,48	1007
	12							7	5,43	129
2	13							10	0,99	1007
	14							1	0,77	129
		after 1100						910	3,77	24116
								19	0,84	2265

Diag 24 London-Brown Ware (London Type)

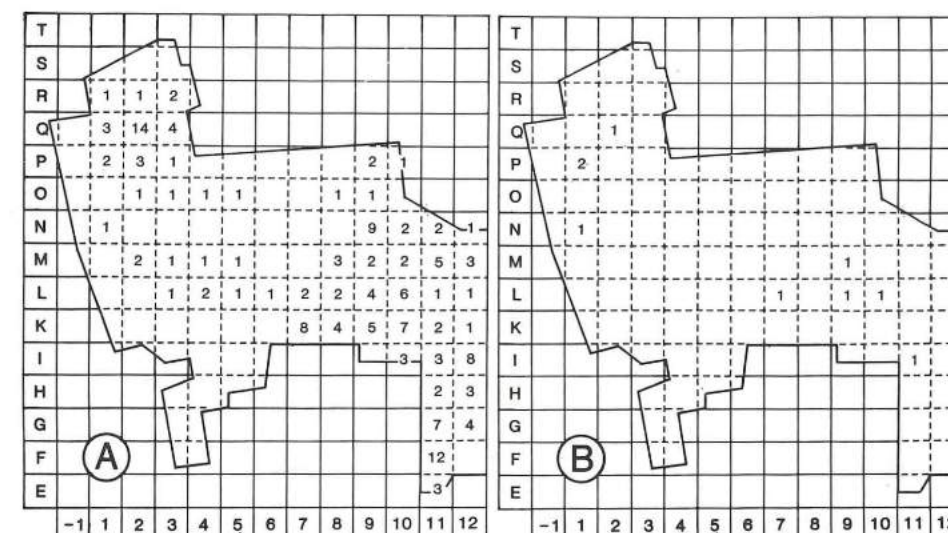
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					0		1636
	2	1476	about 1500				0		223
7	3	1413					2	0,06	3267
	4	1332	about 1300				1	0,12	850
6	5	1248	about 1250				5	0,09	5494
	6	1198					0		227
5	7	1170					28	0,45	6185
	8						1	0,20	493
4	9						15	0,43	3508
	10						0		237
3	11						1	0,03	3019
	12						0		106
2	13						0		1007
	14						0		129
C		after 1100					51	0,21	24116
							2	0,09	2265

Diag 25 Rouen Ware

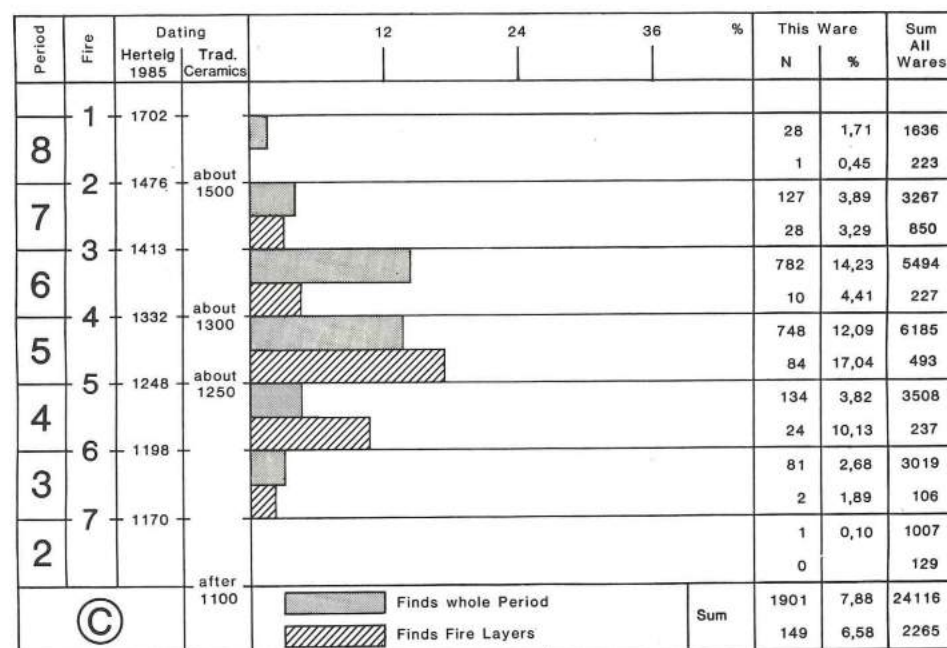
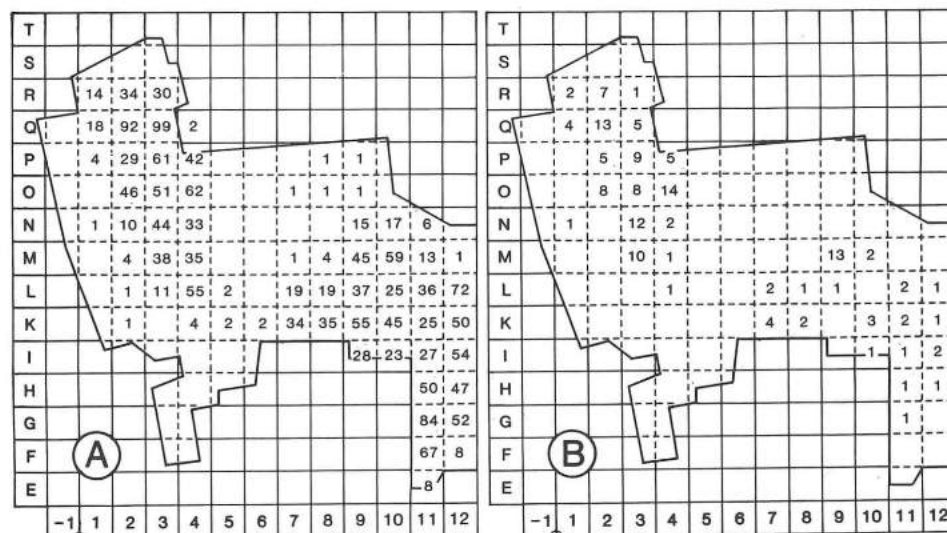
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Period	Fire	Dating		1	2	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics				N	%	
8	1	1702					5	0,31	1636
	2	1476	about 1500				0		223
7	3	1413					7	0,21	3267
	4	1332	about 1300				1	0,12	850
6	5	1248	about 1250				47	0,86	5494
	6	1198					1	0,44	227
5	7	1170					70	1,13	6185
	8						3	0,60	493
4	9						20	0,57	3508
	10						2	0,84	237
3	11						16	0,53	3019
	12						1	0,94	106
2	13						5	0,50	1007
	14						1	0,78	129
C		after 1100					170	0,70	24116
							9	0,40	2265

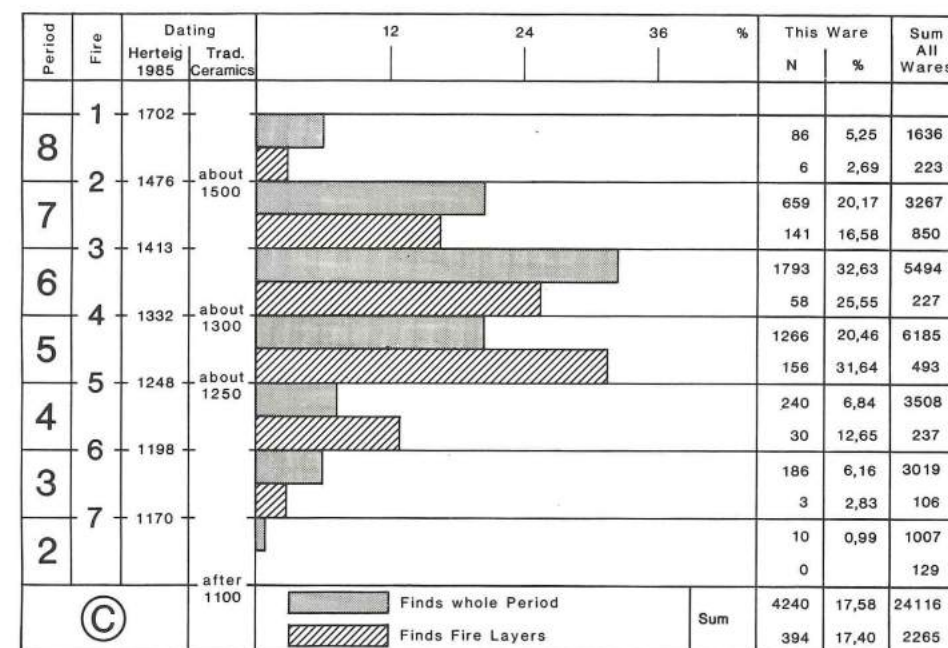
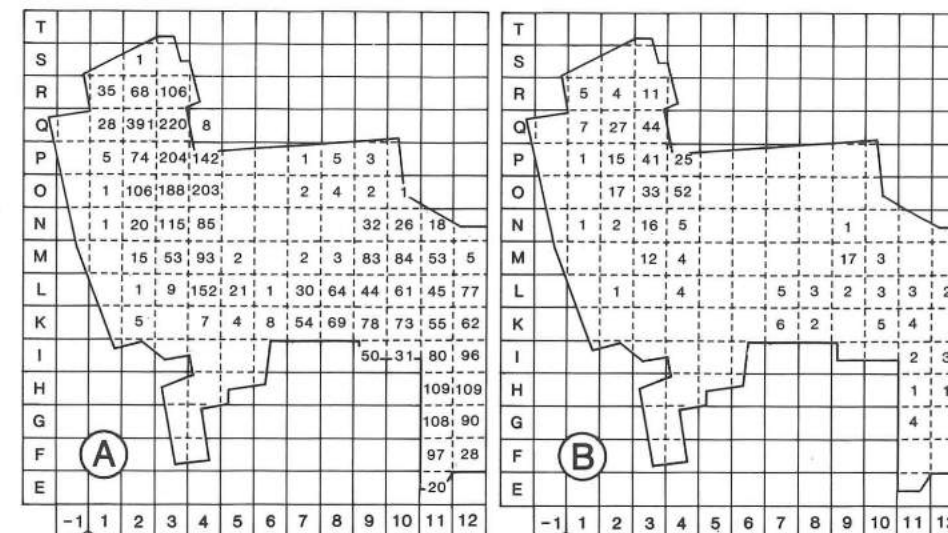
Diag 26 Saintonge Ware

- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



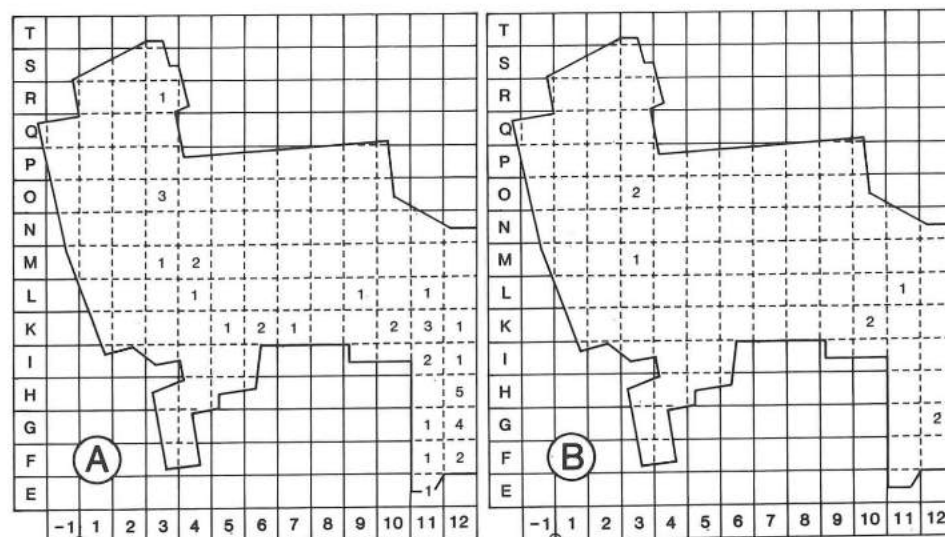
Diag 27 Scarborough Ware

- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



Diag 28 Grimston Ware

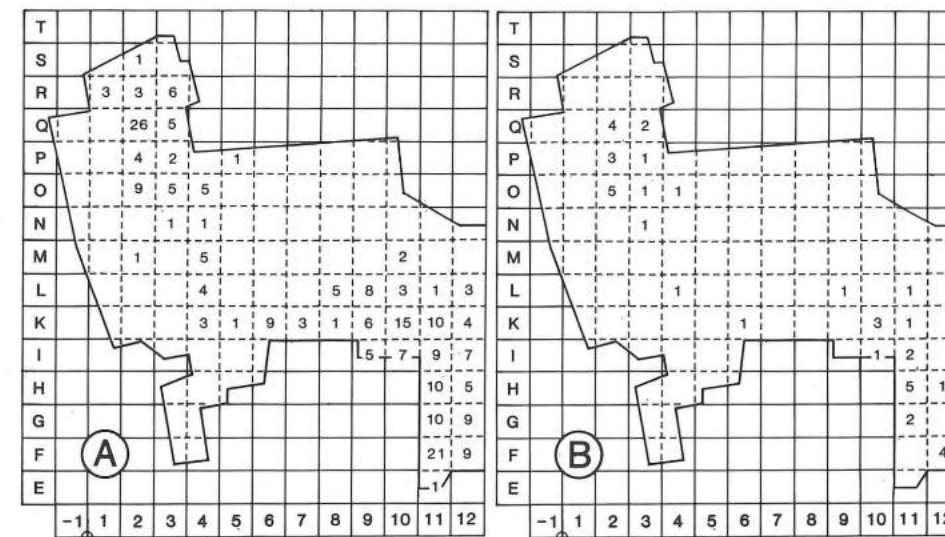
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).











Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares
		Hertelg 1985	Trad. Ceramics					N	%	
8	1	1702						25	1,52	1636
	2	1476	about 1500					7	3,13	223
7	3	1413						4	0,12	3267
	4	1332	about 1300					1	0,11	850
6	5	1248	about 1250					5	0,09	5494
	6	1198						0		227
5	7	1170						0		6185
								0		493
4								0		3508
								0		237
3								3	0,09	3019
								0		106
2								0		1007
								0		129
C		after 1100								
								37	0,15	24116
								8	0,35	2265

Diag 29 Westerwald Stoneware

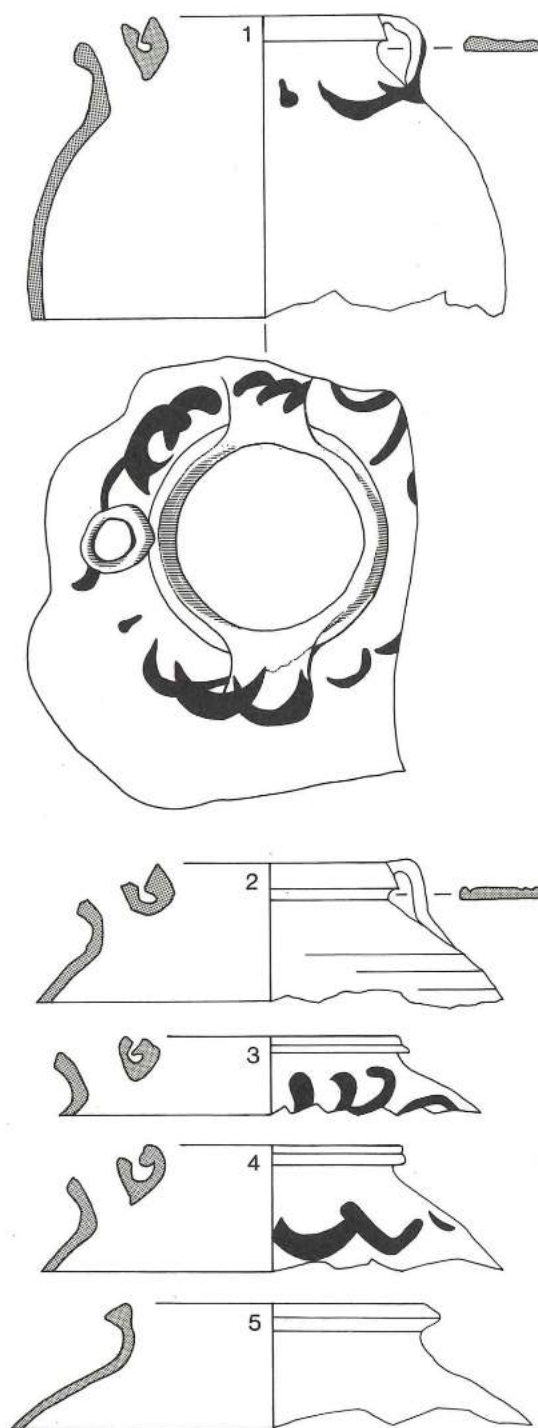
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



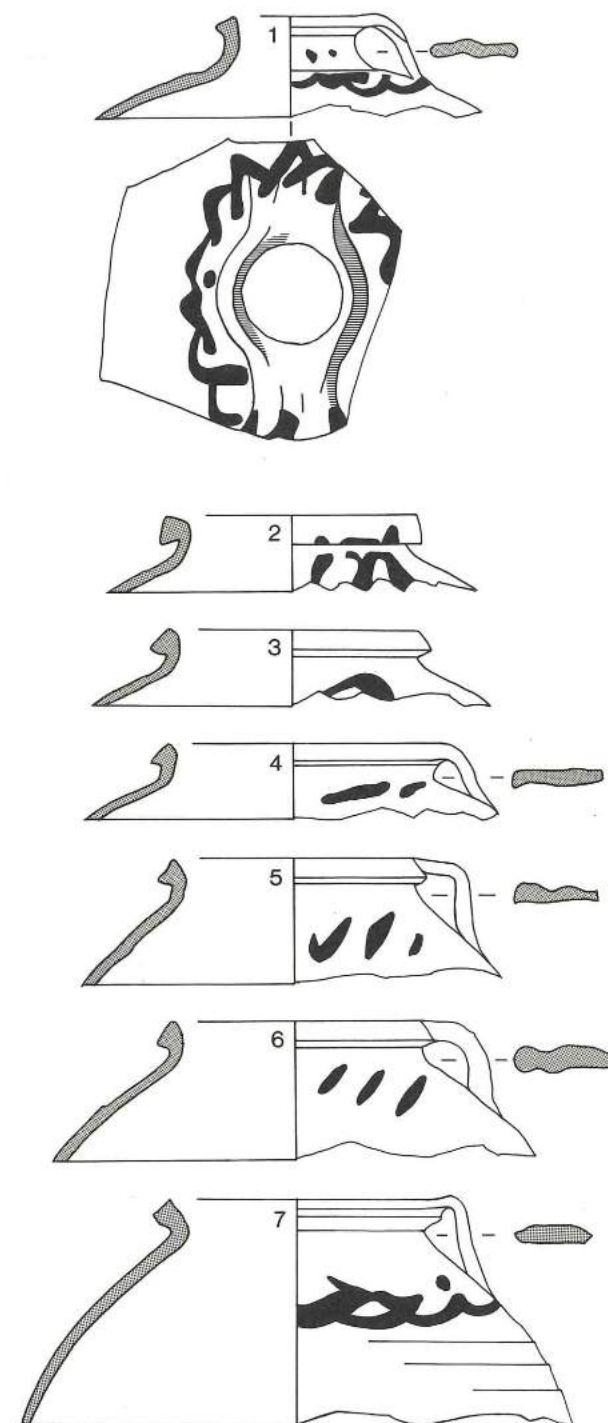
Period	Fire	Dating		4	8	12	%	This Ware		Sum All Wares	
		Herteig 1985	Trad. Ceramics					N	%		
8	1	1702						112	6,84	1636	
	2	1476	about 1500					30	13,45	223	
7	3	1413						60	1,83	3267	
6	4	1332	about 1300					9	1,05	850	
	5	1248	about 1250					49	0,89	5494	
5	6	1198						2	0,88	227	
	7	1170						7	0,11	6185	
4								0		493	
								8	0,22	3508	
3								0		237	
								13	0,43	3019	
2								0		106	
								0		1007	
©		after 1100						Sum	249	1,03	24116
									41	1,81	2265

Diag 30 Raeren Stoneware

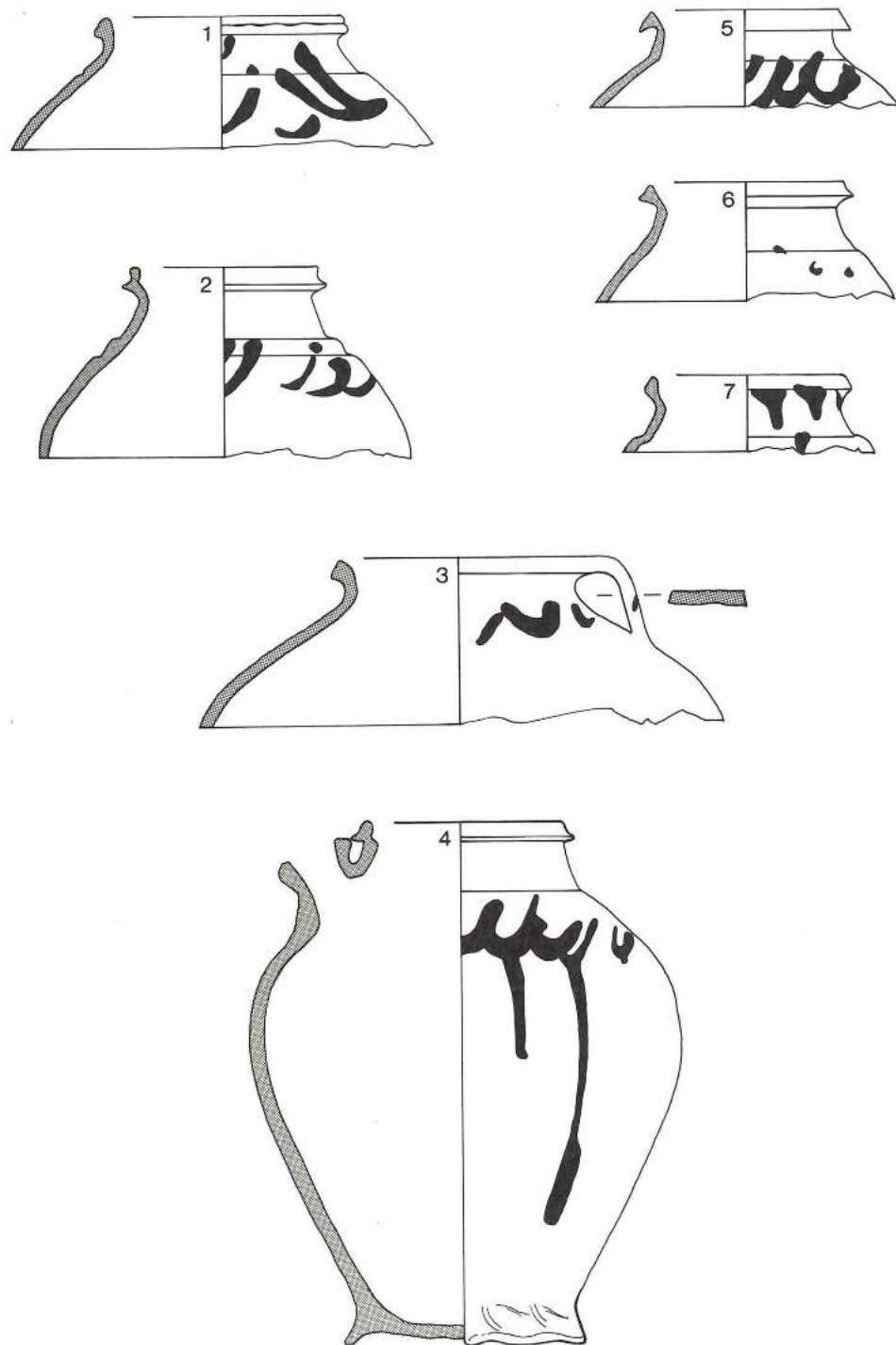
- A) horizontal distribution, all periods, included fire layers
 B) horizontal distribution, fire layers only
 C) proportional distribution per period, included fire layers (upper bar) and fire layer only (lower bar).



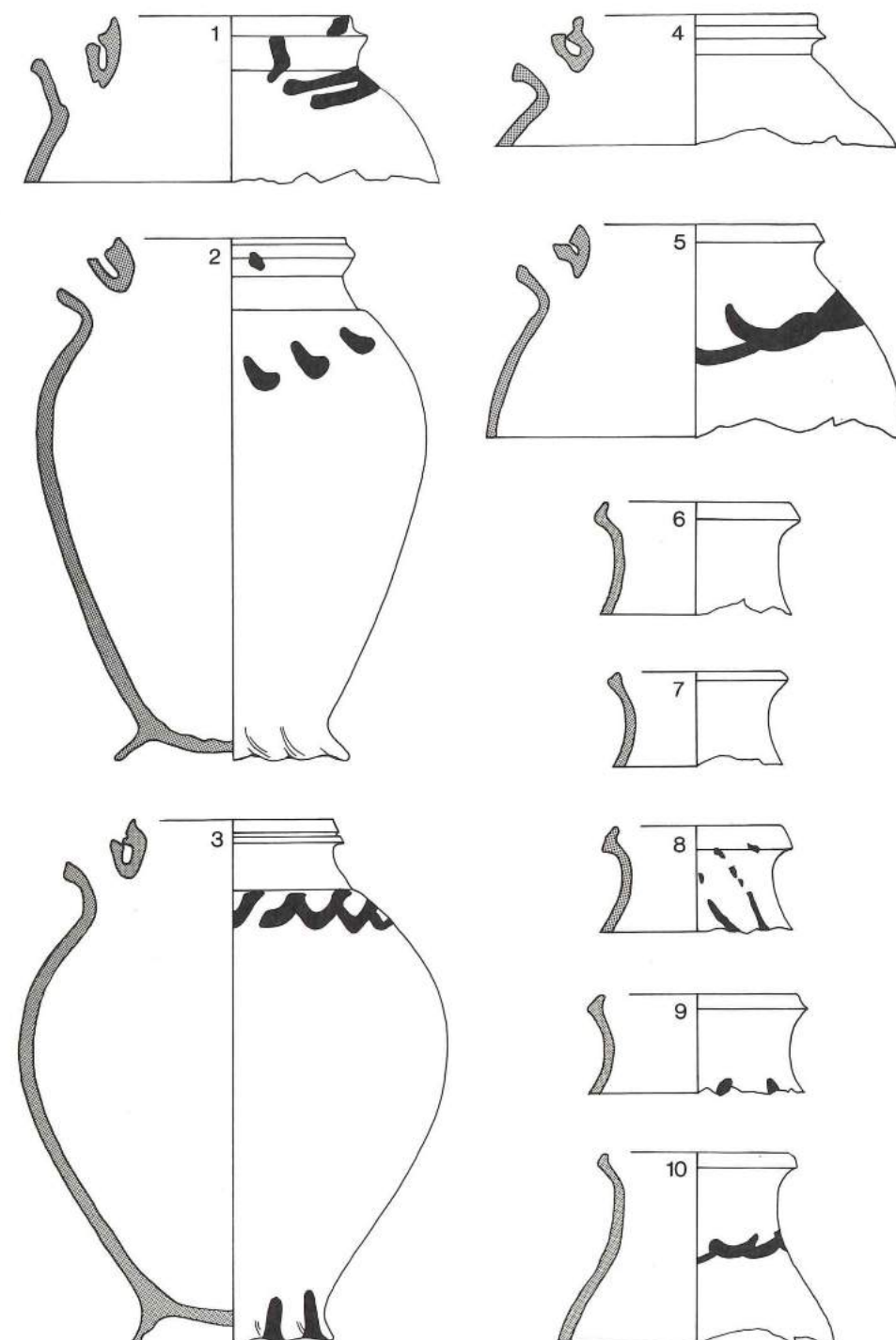
Pl 1 Pingsdorf Ware
Group 1, type 1, (1:3)



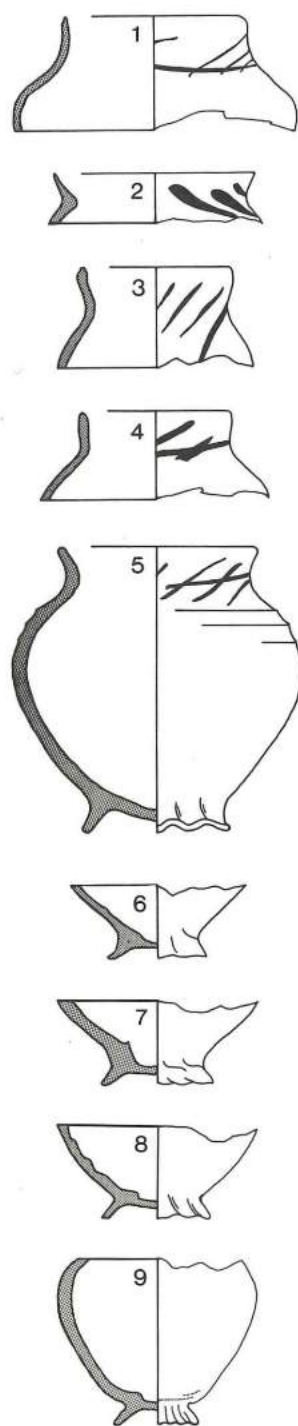
Pl 2 Pingsdorf Ware
Group 1, type 1, (1:3)



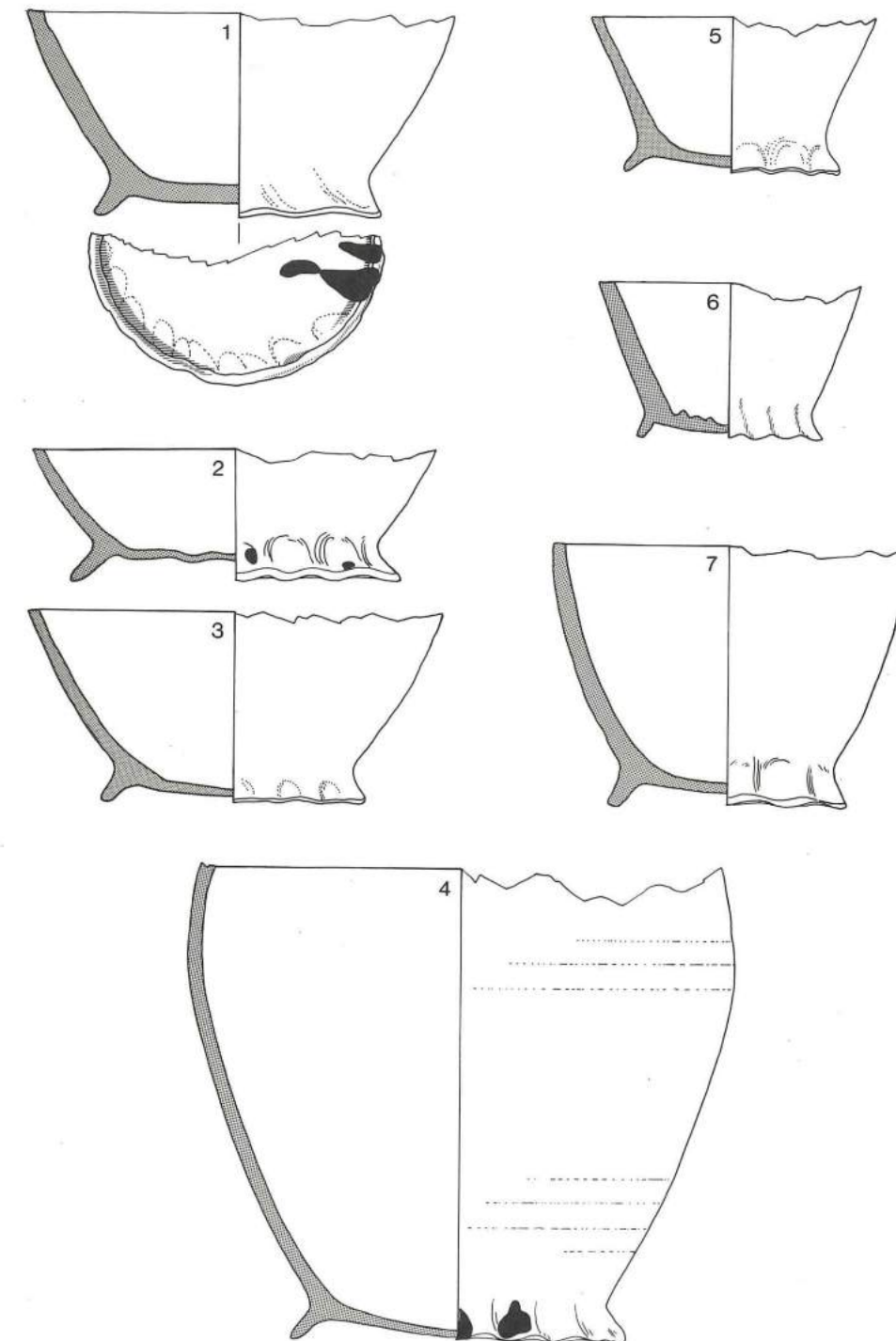
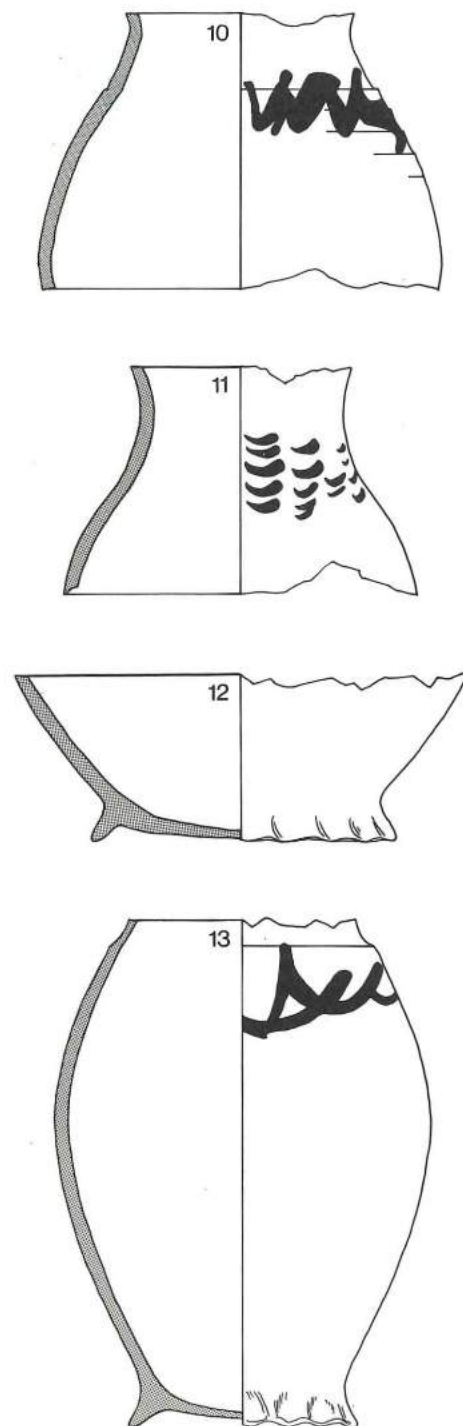
Pl 3 Pingsdorf Ware
Group 1, 2, 4-7 type 2, 3 type 1, (1:3)



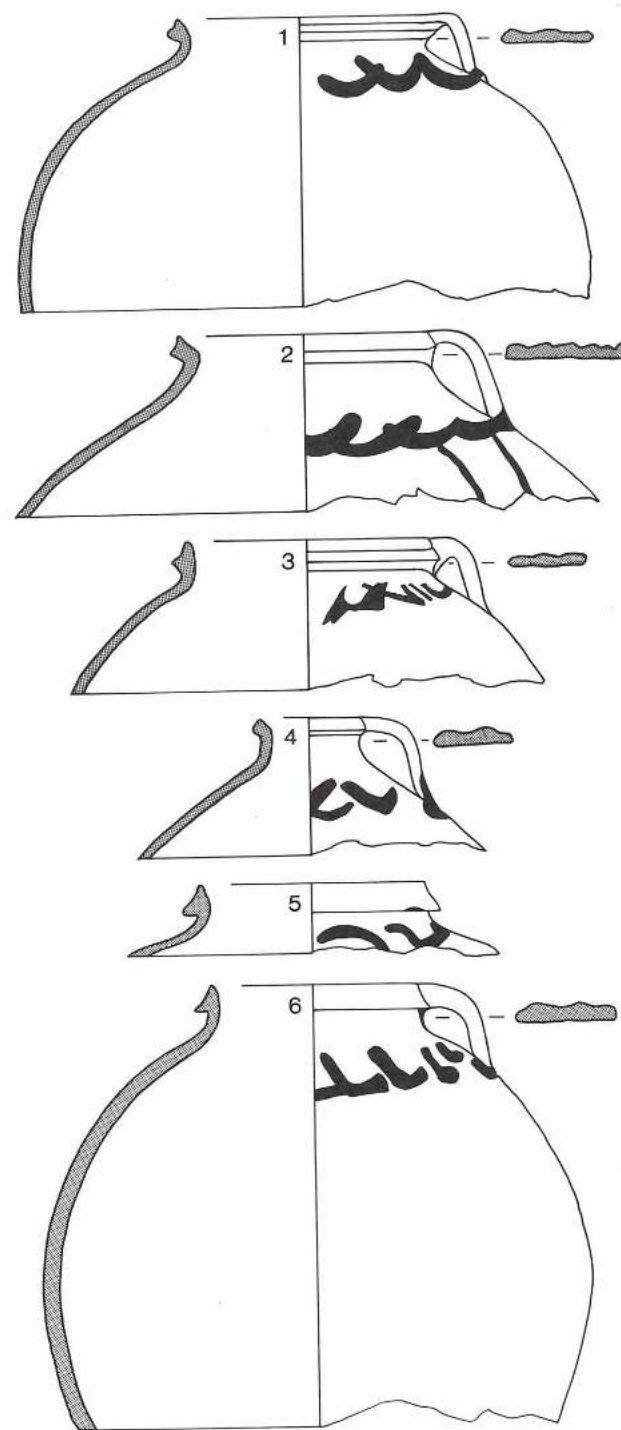
Pl 4 Pingsdorf Ware
Group 1, 1-5 type 2, 6-10 type 3, (1:3)



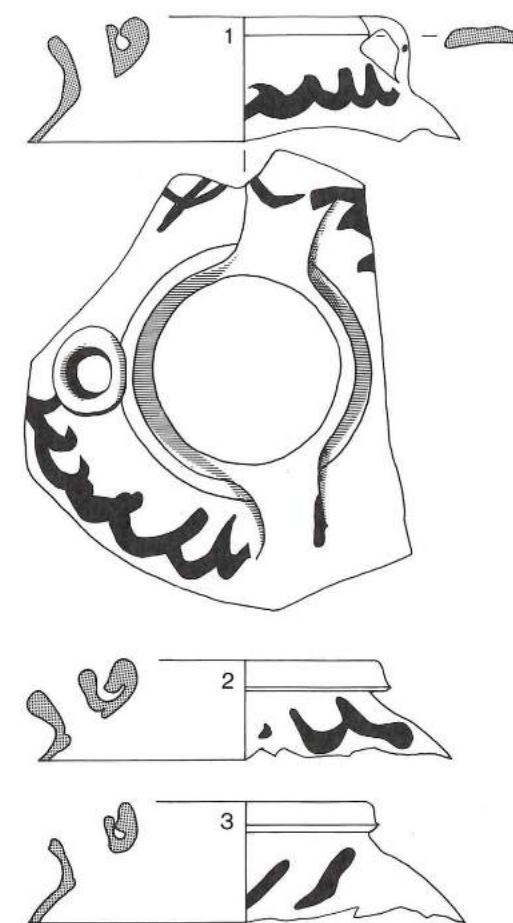
Pl 5 Pingsdorf Ware
Group 1, 1-9 type 4, 10-13 not defined, (1:3)



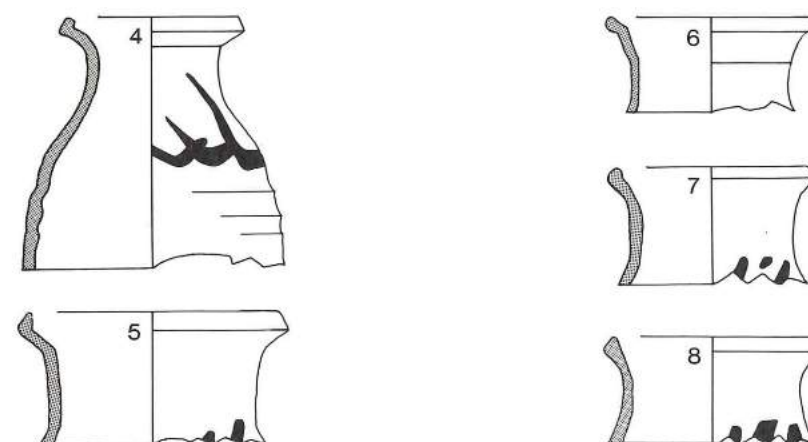
Pl 6 Pingsdorf Ware
Group 1, bases, (1:3)

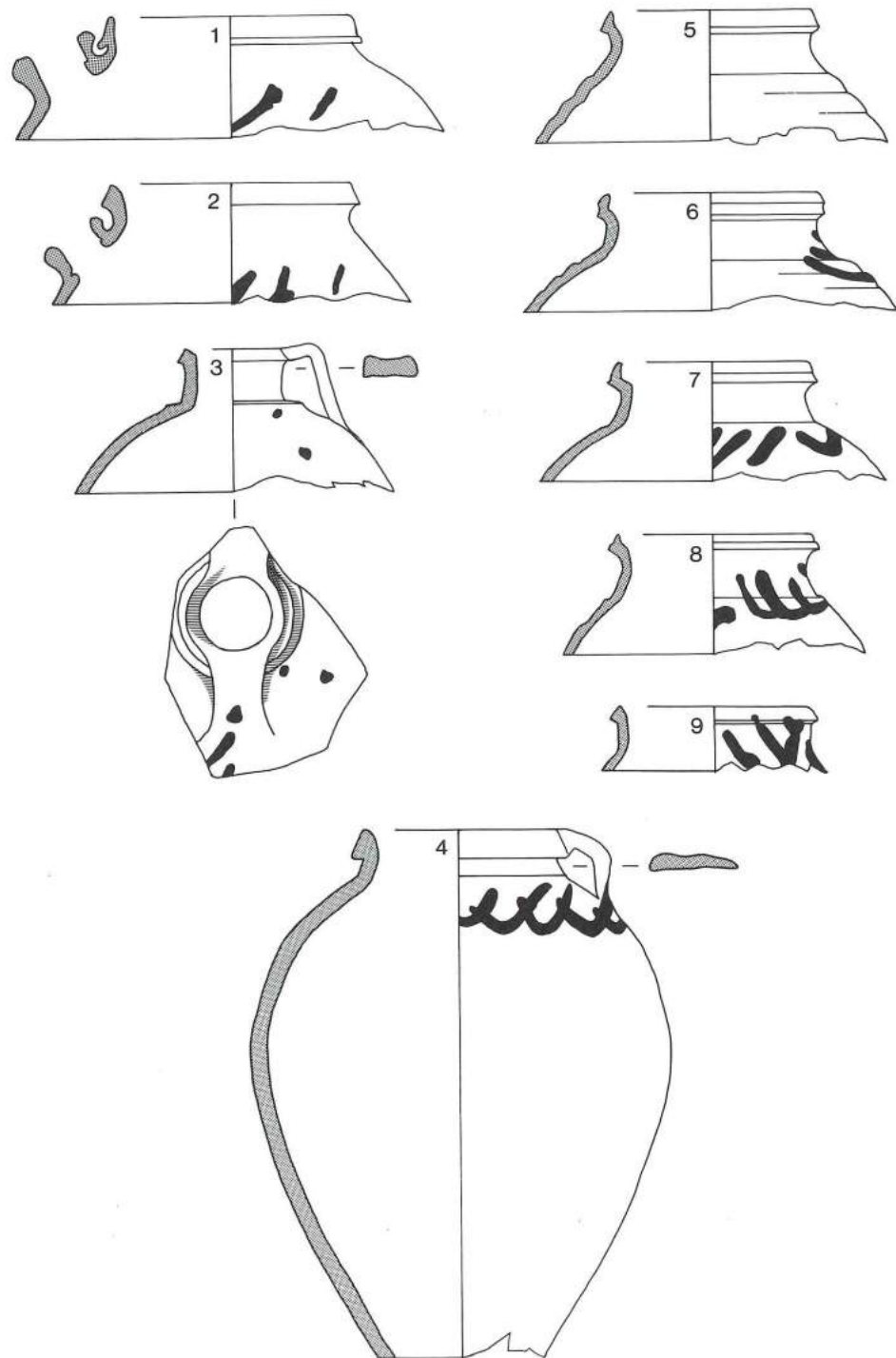


Pl 7 Pingsdorf Ware
Group 2, type 1, (1:3)

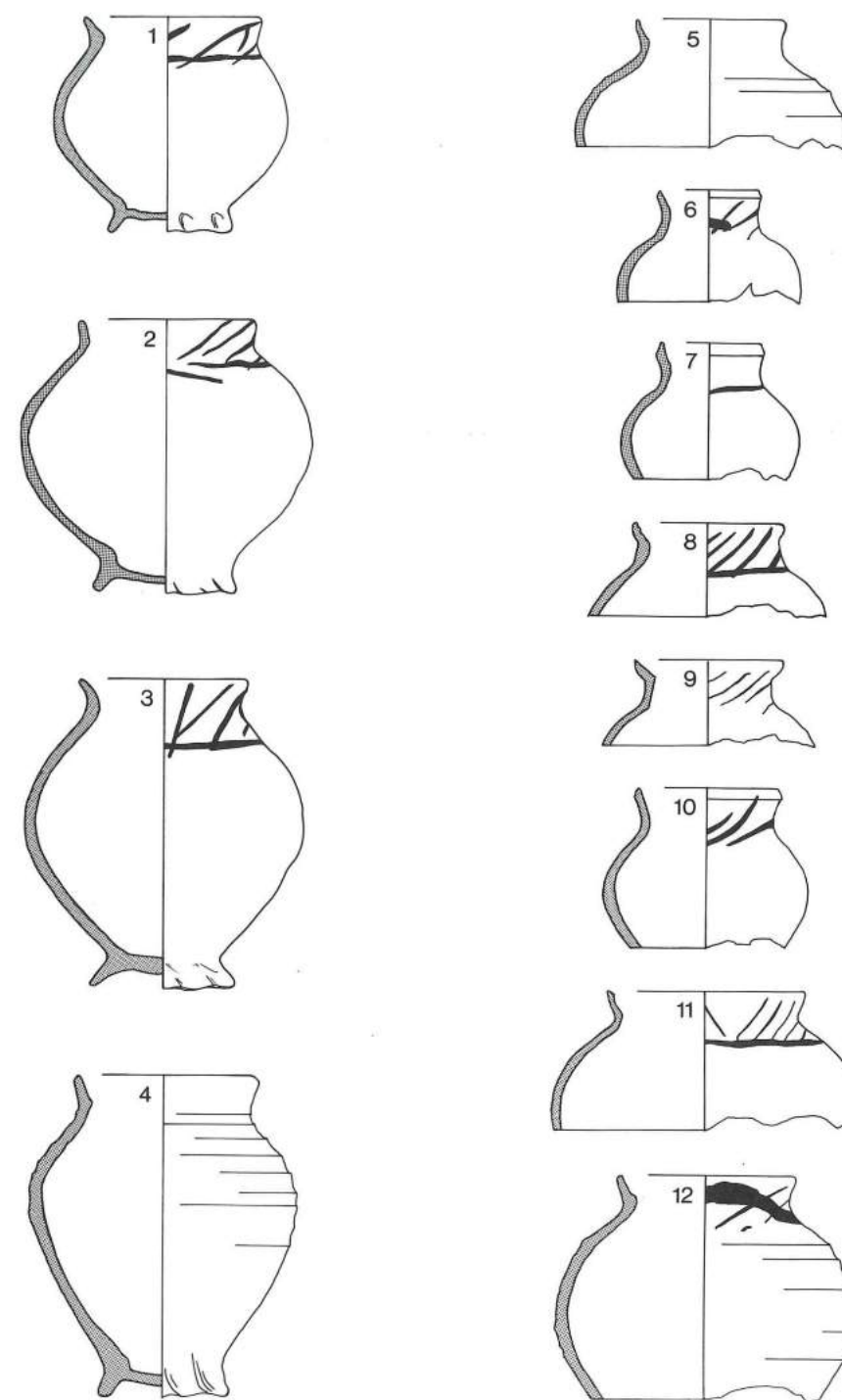


Pl 8 Pingsdorf Ware
Group 2, 1-3 type 1, 4-8 type 3, (1:3)

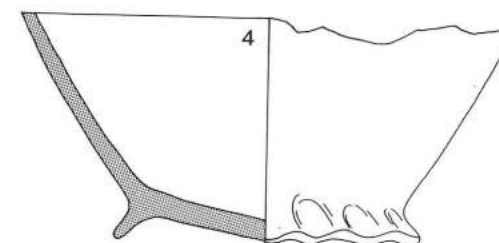
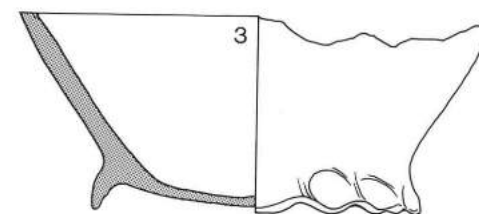
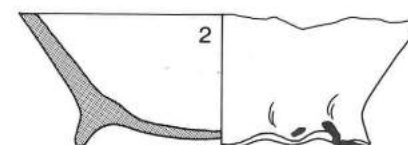
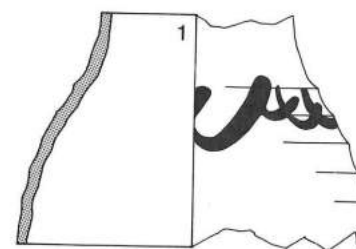
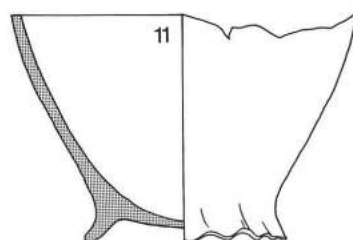
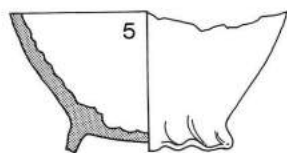
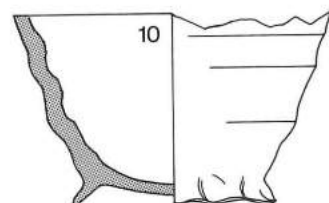
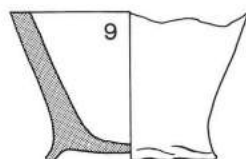
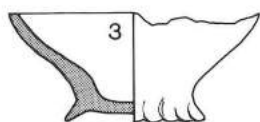
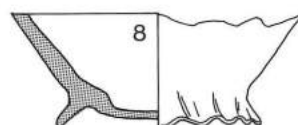
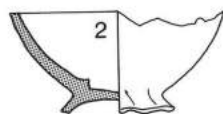
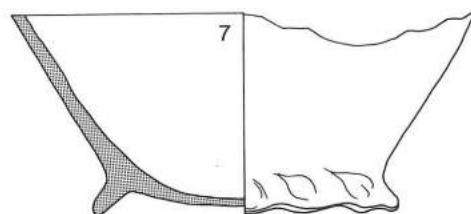
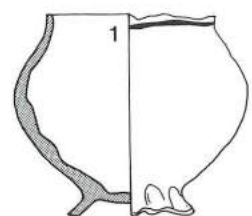


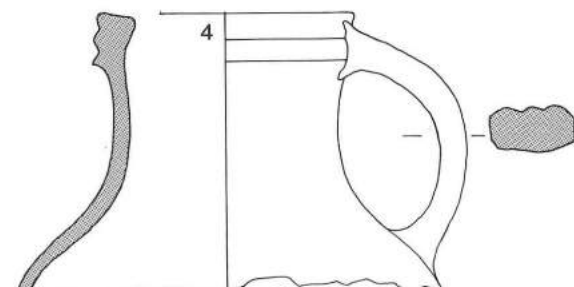
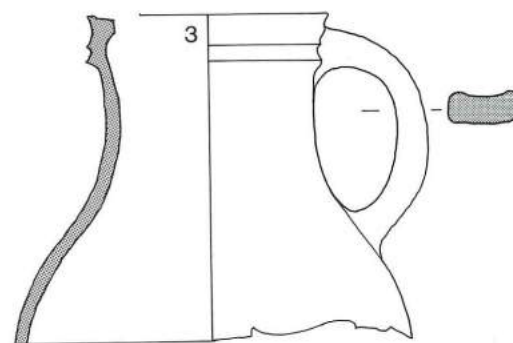
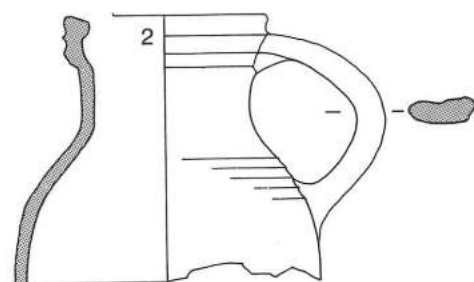
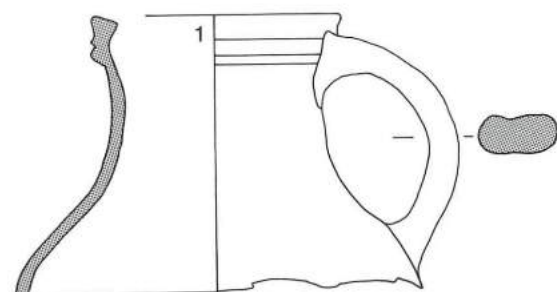


Pl 9 Pingsdorf Ware
Group 2, type 2, (1:3)

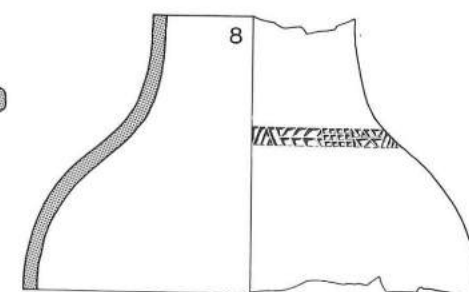
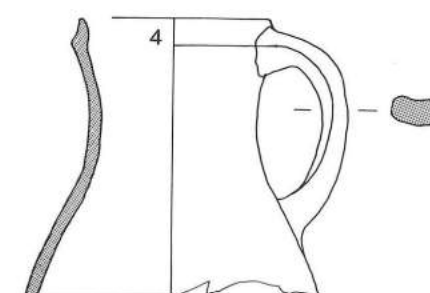
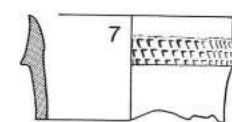
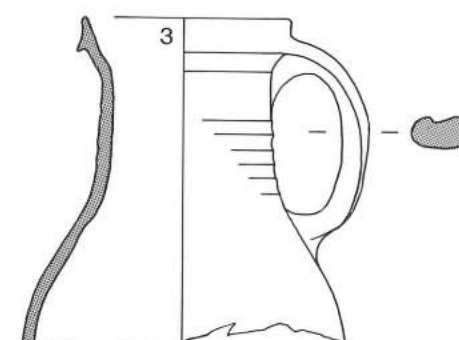
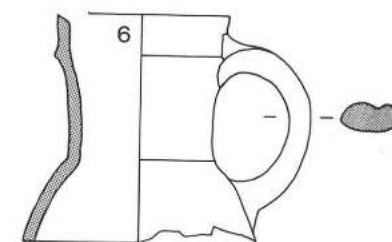
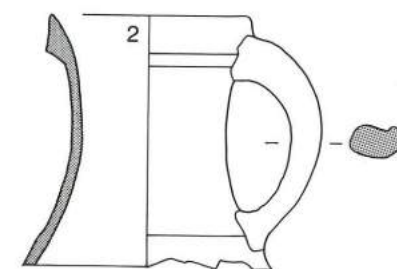
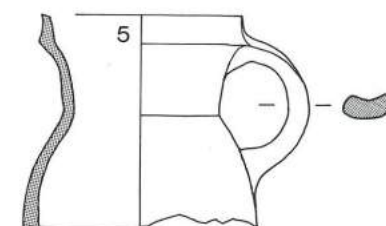
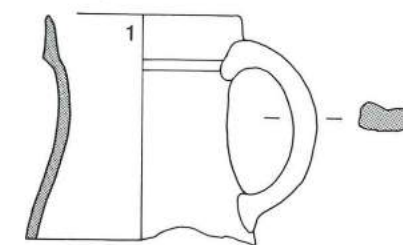


Pl 10 Pingsdorf Ware
Group 2, type 4, (1:3)

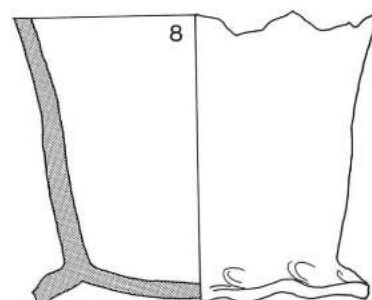
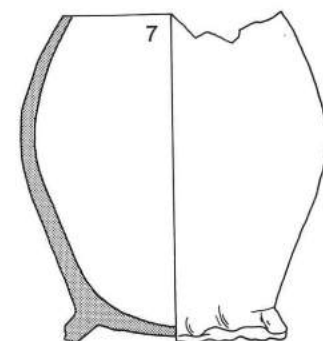
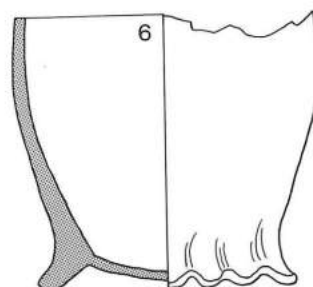
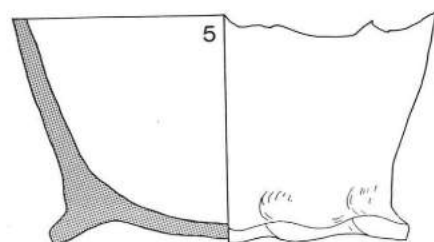
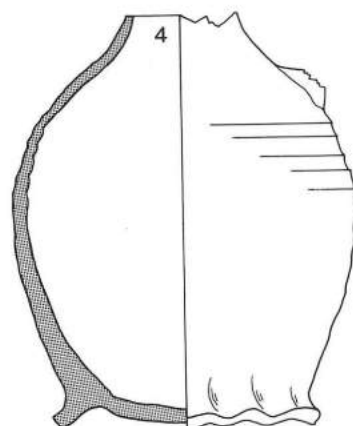
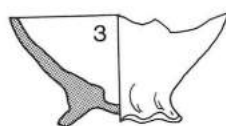
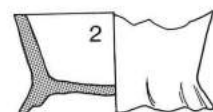
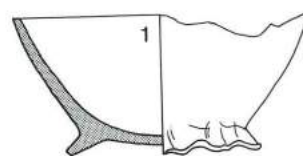




Pl 13 Olive Proto-stoneware
Type 5, (1:3)



Pl 14 Olive Proto-stoneware
Type 6, (1:3)



Pl 15 Olive Proto-stoneware
Bases, (1:3)

Tables

Table 1

Key-list for data processing system of Pingsdorf Ware and Olive Proto-stoneware

1) Number of pieces

2) Group

- 1 Pingsdorf Ware, pale fabric
- 2 Pingsdorf Ware, dark fabric
- 3 Olive Proto-stoneware

3) Object

- 1 rim
- 2 rim and handle
- 3 rim and spout
- 4 rim, handle and spout
- 5 handle
- 6 spout
- 7 wall
- 8 base
- 9 complete

4) Decoration

- 1 red-painted
- 2 rouletted

5) Form

- 1 flat shoulder
- 2 steep shoulder
- 3 long neck
- 4 globular beaker
- 5 thickened rim
- 6 steep rim

6) Rim diameter
given in cm

7) Rim sherd as a percentage of whole circumference

- 1 10%
- 2 20%

10 100%

8) Base diameter
given in cm

9) Base sherd as a percentage of whole circumference

- 1 10%
- 2 20%

10 100%

Table 2

Bryggen Pottery: horizontal and vertical distribution of the main groups (cf also fig 6)

1100-1250:	
London Shelly	(GB)
London Brown	(GB)
Andenne	(B)
Bluegrey (Paffrath)	(D)
Pingsdorf	(D)
Blackware	(DK)
1250-1400:	
Grimston	(GB)
Scarborough	(GB)
Humber Type	(GB)
York White	(GB)
Dev Stamford	(GB)
York Grey	(GB)
West Kent	(GB)
Saintonge	(F)
Rouen	(F)
Beauvais	(F)
Aardenburg	(NL)
Langerwehe	(D)
Proto-stoneware	(D)
Olive Proto-stoneware	(D)
Glazed earthenware	(DK)
1400-1600:	
Dutch Redwares	(NL)
Siegburg	(D)
German Redwares	(D)
Misc. Stonewares	(D)
Raeren	(D)
Weserware	(D)
Cologne stoneware	(D)

NB The special fact that Siegburg stoneware in this case should belong to the period after 1400 refers to the stratigraphy at Bryggen. Siegburg occurs in fire layer 3 (1413), but it is mainly absent in fire layer 4 (1332) (cf fig 8).

Table 3

List of conjoining sherds of Pingsdorf Ware and Olive Proto-stoneware which were accessed separately. Each sherd is indicated with its accession number, grid square and relationship with a numbered fire (over, in, adjacent to, under) if known. (See also fig 3 which only shows conjoining sherds from different grid squares and/or different periods).

Pingsdorf Ware			
19146	(I, 10, u4)	20335	(I, 10, u4)
20694	(K, 10, u4)	18786	(K, 9, u5)
25810	(K, 8, a6)	25946	(K, 8, o5)
22902	(K, 9, u6)	22864	(K, 9, a6)
61935	(P, 4, o5)	63639	(O, 4,)
10139	(8, 11, a6)	04948	(I, 12, u5)
10855	(I, 11, u6)	10804	(I, 11, u6)
17185	(L, 10, o5)	18588	(K, 11, o6)
09552	(I, 11, o5)	09989	(K, 11, o5)
04237	(I, 12, o5)	04199	(I, 12, o5)
09515	(I, 11, o5)	09552	(I, 11, o5)
			09550 (.....)
Olive Proto-stoneware			
00896	(F, 12, o2)	00948	(.....)
08430	(H, 11, u4)	10687	(H, 11, o4)
15589	(K, 8, u3)	15849	(.....)
56952	(P, 4, i1)	49093	(M, 4, u2)
06012	(K, 11, o4)	05973	(K, 11, o4)
07572	(F, 11, u6)	07820	(F, 11, u6)

Table 4
Pingsdorf Ware: range of rim diameter

Type	Rim diam in cm	Group 1 sherds	MIN	Group 2 sherds	MIN	Sum sherds	MIN*
1	4	2	2	1	1	3	3
	6	—	—	—	—	—	—
	8	10	3	9	3	19	6
	10	24	7	17	5	41	12
	12	5	1	6	2	11	3
	14	1	1	—	—	1	1
	Sum	42	14	33	11	75	25
2	4	—	—	1	1	1	1
	6	1	1	2	1	3	2
	8	24	7	11	3	35	10
	10	37	7	18	5	55	12
	12	4	1	—	1	4	1
	14	—	—	—	—	—	—
3	Sum	66	16	32	10	98	26
	4	—	—	—	—	—	—
	6	—	—	—	—	—	—
	8	7	3	10	3	17	6
	10	6	1	5	1	11	2
	12	—	—	1	1	1	1
4	14	—	—	—	—	—	—
	Sum	13	4	16	5	29	9
	4	—	—	—	—	—	—
	6	4	1	16	7	20	8
	8	7	2	16	4	23	6
	10	—	—	2	1	2	1
Sum	12	—	—	1	1	1	1
	14	—	—	—	—	—	—
	Sum	11	3	35	13	46	16
	4	2	2	2	2	4	4
	6	5	2	18	8	23	10
	8	48	15	46	13	94	28
Sum	10	67	15	42	12	109	27
	12	9	2	2	4	11	6
	14	1	1	—	—	1	1
	Sum	132	37	110	39	242	76

* MIN = Minimum number of individual vessels

Table 5
Pingsdorf Ware: range of base diameter

Base diam in cm	No. of sherds	MIN*
4	21	20
6	33	24
8	32	19
10	82	21
12	54	18
14	24	9
16	1	1
Sum	247	112

* MIN = Minimum number of individual vessels

Table 6
Olive Proto-stoneware: range of rim diameter

Rim diam in cm	Type 5 Sherds	MIN*	Type 6 Sherds	MIN*	Sum Sherds	MIN*
6	—	—	15	4	15	4
8	10	5	48	12	58	17
10	5	1	24	5	29	6
Sum	15	6	87	21	102	27

* MIN = Minimum number of individual vessels

Table 7
Olive Proto-stoneware: range of base diameter

Base diam in cm	No. of sherds	MIN*
4	4	4
6	7	6
8	21	11
10	35	11
12	21	6
14	8	4
Sum	96	42

*MIN = Minimum number of individual vessels

Table 8

Pingsdorf Ware: dimensions of completely preserved vessels (cf also fig 24)

1	2	3	4	5	6	7	8	9	10
accession number	type	volume (litres)	height (cm)	max width (cm)	height of max width (cm)	sum cols 4-6	% col 4	% col 5	% col 6
54661	2	2.7	22	18	13	53	42	34	24
9597	2	2.4	22	18	12	52	42	35	23
unnum	4	2.6	22	17	14	53	42	32	26
9846	4	0.6	13	12	7	32	41	38	21
12467	4	0.4	13	11	8	32	41	34	25
9548		0.4	11	12	6	29	38	41	21

Table 9

Pingsdorf Ware: distribution in Scandinavia

Norway		
Trondheim		(Reed, info 1986)
Borgund		(Myrvoll 1977, 47)
Bergen		
Stavanger		(Lillehammer 1971, 66)
Tønsberg		(Reed 1979)
Oslo		(Molaug 1977 103)
Sweden		
Lödöse		(Carlsson 1982, 34)
Lund		(Wahlöö 1976, No. 230)
Tommarp		(Thun 1967, fig 30)
Kalmar		(Selling 1968)
Visby		(Forsström 1976, 140)
Denmark		
Aalborg		(Kock/Vegger 1982, 121)
Ribe		(Bencard 1970, 15)
Okholm		(Bencard 1970, 14)
Poland		
Gdansk (Danzig)		(Dekowna 1973)
Wollin		(Wojtasik, info 1981)
West Germany		
Schleswig		(Lüdtke 1985, 60)
Haithabu		(W Janssen 1987)
Hollingstedt		(Lüdtke 1987)
Alt-Lübeck		(Kempke 1988)
Hamburg		(Schindler 1952, 126)
Schuby		(Kühn 1986)
Pellworm		(Hoffmann <i>et al</i> 1984)
Lübeck		(Erdmann 1985b)

Table 10

Pingsdorf Ware: occurrence of types with regard to periods and fire layers

row		type 1	type 2	type 3	type 4	Sum
1	number of fragments all periods	72	94	31	41	2132
2	number of fragments in fire layers only	1	5	0	0	40
3	relationship of row 2 to row 1 (row 1=100%)	1.35%	5.31%	0	0	1.87%
4	share of the 4 types in the sum in row 1	3.37%	4.40%	1.45%	1.92%	-
5	share of the 4 types in the sum in row 2	2.50%	12.5%	0	0	-

Table 11

Accession nos of illustrated pottery

Pl 1	1 - 4791 2 - 10855 3 - 44391 4 - 76474 5 - 43527	Pl 5	1 - 36050 2 - 21043 3 - 35247/01 4 - 21536 5 - 9515 6 - 20830
Pl 2	1 - 4749 2 - 80462 3 - 21536 4 - 35628 5 - 4613 6 - 63120 7 - 4749		7 - 20694 8 - 21360 9 - 22891 10 - 20701 11 - 45563/2 12 - 86701/01 13 - 32885/01
Pl 3	1 - 9727 2 - 12331 3 - 11352 4 - 54661 5 - 4749 6 - 4749 7 - 88299	Pl 6	1 - 3954 2 - 36472 3 - 10548 4 - 11001 5 - 88337 6 - 62047 7 - 77873
Pl 4	1 - 18836 2 - unnum 3 - 9597 4 - 30215 5 - 9735 6 - 25617 7 - 79406 8 - 21405 9 - 22697 10 - 11011	Pl 7	1 - 21144 2 - 10659 3 - 32538 4 - 20616 5 - 19666 6 - 9695

PI 8
1-10551
2-21004
3-21043
4-9894
5-35334
6-82472/01
7-80335
8-77598

PI 9
1-41521
2-46341
3-77692
4-10978
5-4143
6-4100
7-21550
8-10053
9-18620

PI 10
1-10004
2-9548
3-9846
4-12467
5-30242
6-25030
7-11663/01
8-77324
9-25946
10-22426
11-22864
12-17185

PI 11
1-88945
2-25327
3-4104
4-21054
5-9989
6-19966
7-36497
8-26161
9-12355
10-41966
11-35755

PI 12
1-18201
2-10139
3-11606
4-25710

PI 13
1-58458
2-8232
3-7954
4-2420

PI 14
1-57072
2-25412
3-896
4-58314
5-15788
6-38809
7-26820
8-7820

PI 15
1-37066
2-7140
3-86607/01
4-10687
5-68007
6-7821
7-35364
8-1713

THE BRYGGEN PAPERS is a series of publications giving a scholarly presentation of the archaeological finds from the excavations at Bryggen – The German Wharf – in Bergen, which took place between 1955 and 1968. Bryggen was the economic centre of the old Norwegian capital. Later – in Hanseatic times – Bergen became one of the largest and most important seaports and commercial centres in Northern Europe. The excavations at Bryggen have revealed extensive material which gives valuable information about the development of the city as well as European cultural history in general.

In this volume Dr Hartwig Lüdtke presents the Pingsdorf Ware and Olive Proto-Stoneware from the excavations at Bryggen. While practically every country in Europe in the Middle Ages had its own pottery production, there is not a single sherd amongst the vast amount of Bryggen pottery which is of Norwegian origin. Yet pottery was also in ordinary daily use in medieval Norway, at least in the towns and larger rural centres. The Bryggen ceramic material generally is very rich and varied, with imports from over seventy production centres in Northern and Western Europe, as well as from the Western Mediterranean. Ten ceramic wares from Germany, England, France, and Belgium are examined in detail, so that the author is able to draw general conclusions about the absolute chronology and thereby obtaining a further corroboration of the locally established chronology based on historically recorded fires in the Bryggen area. The analysis of the material has also thrown light on production techniques, provenance, distribution patterns, the different uses of the table and kitchen wares in particular, and naturally on the widespread and changing trade relations of the city of Bergen in the Middle Ages.

The Author

Hartwig Lüdtke: Dr Phil Hamburg University 1982. *Akademischer Rat*, Archaeologisches Landesmuseum der Christian-Albrechts-Universität, Kiel

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