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A quantitative approach to the amphorae from Xanten: a more comprehensive view of the long-distance Roman trade

In July 2002, a first stage of the study on the Roman amphorae from the Colonia Ulpia Traiana (Xanten) was carried out. This initial analysis covered the whole unearthed amphorae coming from four selected areas in the town: Insula 39, Ostmauer (76/29), Hafengrabung (93/16; 93/24) and Insula 15 (2000/06; 2000/07). The reasons of such selection were to obtain a representative spatial and temporal sample of amphorae consumed in the city of Xanten. At least, the four excavations provide excellent chronological horizons from the early Augustean-Tiberian period to the second half of the second century A.D.

Despite the fact that quantification may seem a paramount effort, it allows to obtain some useful data for any researcher, once they are published. Then, a revision of the preliminary work is not required, since new hypothesis can be built up from existing data. In the past, archaeology only cared about the presence and absence of a specific artefact in a particular context or site. However, the more sites and contexts have been studied, the same object have been turning up in most of them. Therefore, this information is no longer relevant.

Nowadays, questions put forward by archaeologists are more accurate, for instance why this artefact appears in this context in this amount or less in the following phase, in which other artefact increases its presence. They are the kind of questions that a modern economist may formulate before a statistic report on consumption. Since scholars of antiquity do not have these statistics available for the ancient period, they must resort to archaeology in order to create statistics on the basis of material culture (p.e. coins, pottery, inscriptions). In this sense, a whole school of archaeologists in the beginning of the 1970s pursued the best quantification methods for archaeological objects[1]. They took into account that some of these objects have arrived broken to us and after complex postdepositional processes[2]. The resultant advantage of this methodological revolution is that today we dispose of some excellent archaeological quantified databases in some countries and regions, which gives more chances to carry out analyses on detail.

Amphorae statistics: relative quantities and individuals

Any archaeologist knows, for its own experience, that pottery is the most common artefact in any human settlement from the Neolithic onwards[3]. This is due to the almost non-destructive nature of ceramic. A fired pot can be broken in many sherds to infinite, but it will never disappear as the years go by[4]. For this reason, pottery has become the director fossil of most periods from Neolithic to the present, and also it permits to generate the most complete statistics that any can obtain from material culture.

On the other hand, its fragmentary nature makes its identification and quantification occasionally dif-

[1] Doran / Hodson 1975; Orton 1980; Orton / Tyers / Vince 1993.

[2] A good analysis of these depositional processes, which affect the formation of archaeological layers an preservation, appears in Butzer 1982, 98–122.

[3] Peacock 1982, 1.

[4] With reference to the types of human residues and preservation, the book by Rathje / Murphy 1992 provides interesting insights about experiments on current residues.

ficult. In any archaeological context there is always a part, a fragment of some ones, of which before was a complete ceramic object, an individual. Therefore, there are two approaches to the pottery quantification: to obtain relative quantities of an object or calculate the number of complete ancient ceramic objects, in other words individuals[5].

First of all, when an artefact is broken it becomes difficult to recognize its shape and then, classify it. As alternative, it can be identified according to its fabric, which origin, and sometimes even the typology. In the case of amphorae, since the 1970s tables for fabrics and typologies are well-known, as well as the amphora production centres[6]. As it was said before, there is a myriad of methods for quantifying archaeological pottery and ceramic individuals[7]. In this case, number of sherds, weight, number of handles and spikes and percentage of rim proportion (EVE) were applied. Besides, other values were calculated on the basis of these measures such as EVR (estimated vases represented or minimum or maximum number of individuals, average sherd size). However, an analysis of the features of those different quantification measures is required in order to understand the reasons behind their choice and their advantages.

a Measures to determine the amount of an archaeological object

1. Number of sherds: It consists basically of counting the diverse sherds with the same fabric and / or known typology. The method is with no doubt very simple, but it has the inconvenience that sherd numbers vary according to the way the ware was broken and the time involved in its layer creation. The longer the time involved in layer creation, more chances that pottery was on the surface, thereby it may be subsequently broken (p. e. human action, animals or climate). The measure may be useful when combined with weight, since dividing the total weight by sherd number, an average value for sherd size can be obtained (p. e. average sherd size of Gauloise 4). This value may be useful to compared times of layers formation and degree of residuality[8], that is why the measure has been included. In Monte Testaccio (Rome), whose layers are supposed to be of quick formation, amphora sherd size are usually large. Therefore, it is relatively easy to join sherds and reconstruct amphorae with sherds from the same context.

2. Weight: It consists of weighting sherds with a kitchen scale, mechanical or electronic. The method represents a major time investment, but it does not vary according to neither pottery breakage processes nor time of layer formation. However, no direct comparison between different amphorae can be made, since each typology has its own overall weight. An imaginative way to sort out this problem is to calculate number of litres carried in each amphora type on the basis of their weight. Then, a table of equivalents between amphora content and weight is needed as the one defined by Peacock and Williams[9] and updated later on[10]. Nevertheless, if comparisons are always made between the same typology for different sites, excavations, periods or layers; no equivalences will be required. As Peacock and Williams pointed out[11], weight perhaps is the most suitable measure to quantify amphorae since the proportion of rims, handle and spikes is relatively small in the overall ware. Therefore, any body sherd may be well represented with this method. Personally, weight was chosen as one of the most relevant measures in our study because of its representativeness, as well as its invariability[12].

5 Tomber 1993.

6 Peacock / Williams 1986.

7 To understand the features of each method in detail, their advantages and inconveniences, is recommended the work by Orton 1975, Orton 1982, Millett 1979, Pollard 1991 and Carreras 2000, 47–54.

8 It is considered that any sherd that has a long history of alteration and redeposition in later layers normally is smaller in size. Therefore, size should indicate that a sherd is residual in a particular context (Bradley / Fulford 1980). However, it seems there is no specific relationship between time and size, according to experimental studies carried out (Evans / Millett 1992).

9 Peacock / Williams 1986, 19.

10 Carreras 2000, 51.

11 Peacock / Williams 1986, 19.

12 There are other measures to calculate amounts of pottery as adjusted weight, which takes into account each typology thickness (Millett 1979, 78) or surface taking into account the vase dimensions and its density, but both are complicated to apply and they do not enjoy any popularity. On the other hand, other measure is water displacement, but its application is also difficult.

b Measures to calculate number of individuals

3. Estimated vases represented (EVR or also MNI): It consists of calculating the maximum number of pots present after attempting to join as many sherds as possible. Once the process of joining sherds is finished, one may calculate the lowest number (Minimum number of individuals) or the maximum (Maximum number of individuals). In both cases, the final number depends on the people's efficiency in joining sherds as well as the time they may invest[13]. Monte Testaccio is a good example, since a lot of effort is put on joining sherds of amphorae coming the nearby layers in order to put together different epigraphs. However, a second revision is made after one year, and again new joints can be found amongst sherds. Despite the fact that the measure is commonly used, it has a high degree of variability. In our case, the number of handles, spikes and rims[14], these ones quantified with the measure EVE, will have a secondary role.

4. Estimated vessels equivalent (EVE): It consists of estimating the proportion of a complete vessels one has, on the basis of percentages of rims or spikes. A complete vessel means that the assemblage has a number of rim sherds that when added their percentage, they sum up 100 %[15]. In the case of amphorae, rim percentage is easier to calculate with the assistance of concentric circles templates. It is an invariable measure and very representative as show some lab experiments[16], however in the case of amphorae is not the most suitable, since rims are small proportions of overall amphora. Often some typologies are only documented by body sherds in excavations. In the present study, EVE was employed as complementary measure because of its qualities. With all these quantification measures, we pretend that all the obtained data from the amphora assemblages at Xanten could be compared with the major number of possible Roman sites. Nevertheless, in order that the comparison should be made, it is required that all the assemblages from other sites should be quantified with similar methods.

Nowadays, there are two schools in Europe that employ diverse methods of quantification for amphorae, whose data can be hardly exchanged. On the one hand, the Anglo-Saxon school (British, American, Canadian), which developed these methods during the great excavation seasons of UNESCO in sites such as Carthage, employs quantification by number of sherds, and chiefly, weights. On the other hand, a Central European tradition (French, Italian, Swiss) prefers calculation of Minimal Number of Individuals, sometimes, number of sherds and sherds with form (handles, rims, spikes). Therefore, every time that comparison has been carried out amongst amphorae of diverse sites, people have recurred to percentages. However, the use of percentages is prone to error, since vessels with different weights, volumes and fragmentation ratios cannot be compared straight; and, sites in amphorae production regions may bias percentages.

Perhaps one day people will use a standard measure in archaeology, or will quantify with the major number of measures as the case of this study. Meanwhile, the only alternative available is the conversion of measures with some formulae[17]. As example, table 1 shows the average sherd size of ten amphora typologies. This average size was obtained on the basis of quantifications from 31 Romano sites (21 British, two German, eight Spanish), whose individual values were collected by this author[18]. With this

[13] Some experiments were undertaken with amphora material in closed contexts of Guissona (seasons 1995 and 1996). The study showed that different values were documented depending on the person, his / her knowledge of the material, and above all, the time invested.

[14] The calculation of number of handles, spikes and rims is also complicated, since they are not recovered complete but a portion of the whole form.

[15] Apart from the method of quantifying rim portions, there are other more complex formulae to calculate EVE, which do not enjoy any popularity (Pollard 1991, 76).

[16] Orton 1982.

[17] None of the conversion formulae is good enough, because they come from average values or ratios that do not correspond to reality. However, nowadays it is the only alternative to compare values obtained by different measures.

[18] All the quantifications were carried out by the own author, and the average sherd size is the mean of all the means recorded in different excavations of the same site. For instance, more than 30 excavations have been accounted for Barcelona. The sites are Colchester, Stonea, Silchester, St. Albans, Ribchester, Purbeck, Ivy Chimneys, Kingsholm, Old Penrith, Lancaster, Chichester, Cirencester, Chelmsford, Canterbury, Caister-on-Sea, Carlisle, London, Leicester, Chester, York, Lincoln, Barcino, Aguacuit, Can Jofresa, Can Feu, Mataró, León, Rosinos, Astorga, Walheim and Xanten.

Typology	Average sherd size (grms)
Dressel 20	174,32
Gauloise 4	93,54
Dressel 7–11 (S.S)	161,54
Rodia	118,6
Haltern 70	172,28
Dressel 2–4 (Ital)	107
Carrot	49,16
Dressel 2–4 (Cat.)	131
Africana	98,33
Richborough 527	80,8

Table 1 Xanten, Colonia Ulpia Traiana. Average sherd size in grams of some amphora typologies.

equivalence table, values in number of sherds can be transformed in an approximate weight, and thereby two assemblages can be compared.

Standardization practices of quantities

Quantifications recorded in different sites or excavations cannot be directly compared, except if features of the context they come are taken into account. In other words, the larger the area excavated in a site, the more sherds of amphorae can be found. Therefore, amphorae quantities should be divided by the extent of area excavated[19]. Perhaps it becomes easy to understand it using an example. If an hectare was excavated in site A providing a total amount of two tons of ceramics, this amount is smaller than the one obtained in a site B, in which one ton was recovered from only an excavated area of 50 m². Dividing two tons (2000 kg) by one hectare (10 000 m²) a density of 0,2 kg/m² of ceramic from site A is obtained, while the ton (1000 kg) of ceramic divided by 50 m² from site B provides a density of 20 kg/m². When quantities are standardized according to area excavated, any site can be compared even if they are far apart.

Originally, this type of standardization was developed by Sidrys[20] in his study of the distribution of obsidian in Mesoamerica, and later adapted by Rice and by Millett for pottery[21]. All these authors standardize the amount of pottery obtained by the volume of earth excavated, which is quite logical, but it has same practical problems. Therefore, we prefer to use only two spatial dimensions that correspond to the area for commodity, and because it does not affect much the final results.

A second problem of standardization appears in archaeological assemblages when compared different sites with different occupation spans. In theory, a site with a longer occupation will have more chances to document archaeological material. Therefore, it is recommended to neutralize the time effect by dividing quantities obtained according the number of years of occupation for each site[22]. However, the application of this correction in practice, as demonstrates the amphorae from Britannia[23], may generate secondary effects in sites of short occupation, which produce higher densities by year.

In the present work, it was not neutralized such temporal, since Xanten and its surroundings received and produced amphorae in the same period. Thereby, the area of study as a whole had the same chances to document any kind of pottery. On the contrary, some stratigraphic contexts well dated and preserved were selected in order to have a suitable sample to compare the evolution of the city (cluster sampling[24]).

Distribution of amphorae quantities: GIS

Any effort in quantifying obtains a final reward when compared quantities amongst sites or with third values. Therefore, all the quantities recorded for diverse typologies and excavations allows to compare similarities and differences between as-

19 Carreras 2000, 54–58.

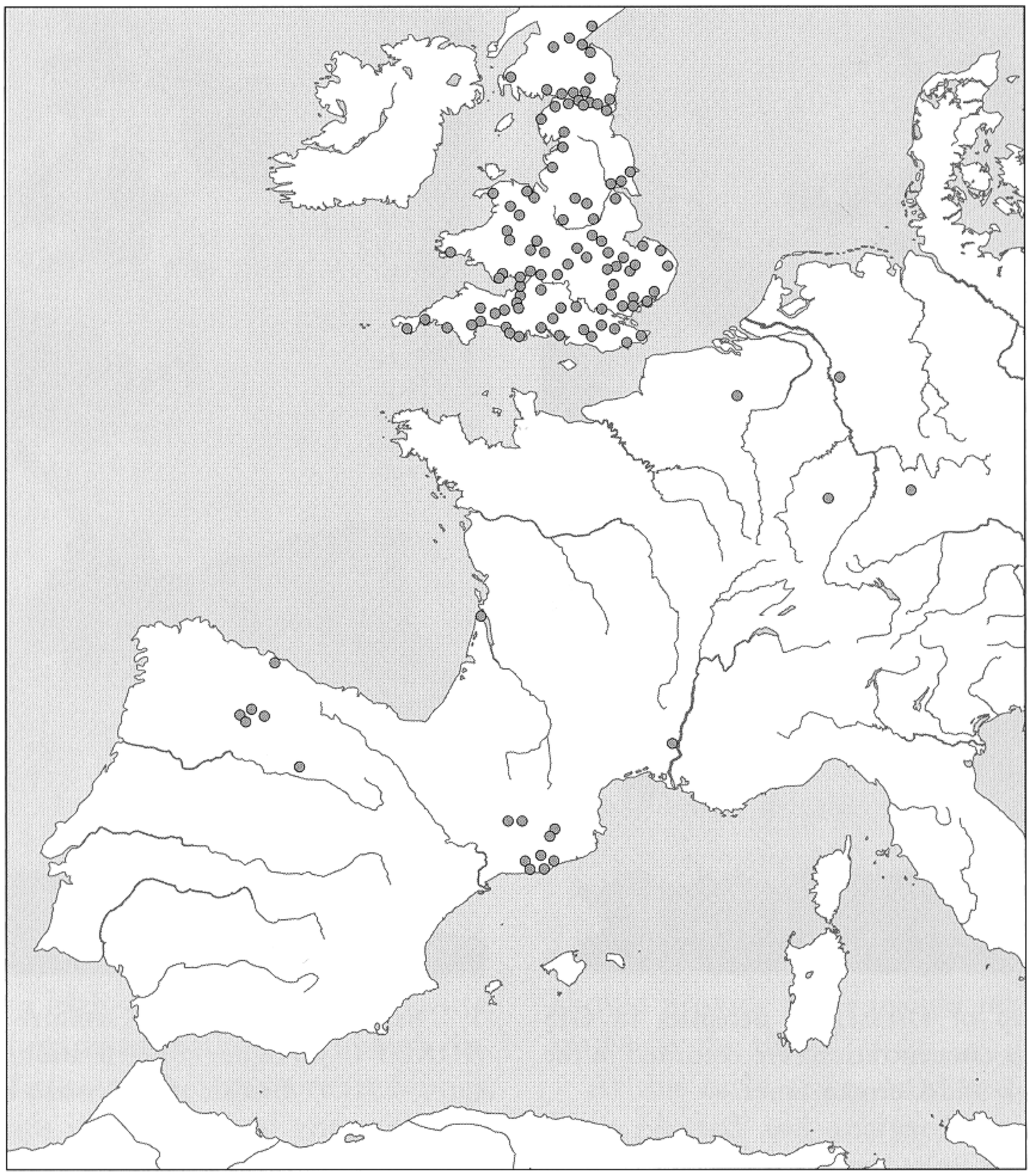
20 Sidrys 1977.

21 Rice 1987, 289; Millett 1991, 238.

22 Carreras 2000, 56–58.

23 The Roman occupation of Britannia was carried out in three stages. The northern regions of the Isles hardly documented the Roman presence. When calculating amphorae densities of places such as Inschtuthill, which was a military depot for supplying the Agricola legions in campaign, produced very high values due to the fact that they were only occupied by few years.

24 This type of sampling only pretends a selection of layers with the minimal conditions of dating and quantity, which could not be obtained in another type of random sampling (Shennan 1988, 318 f.).



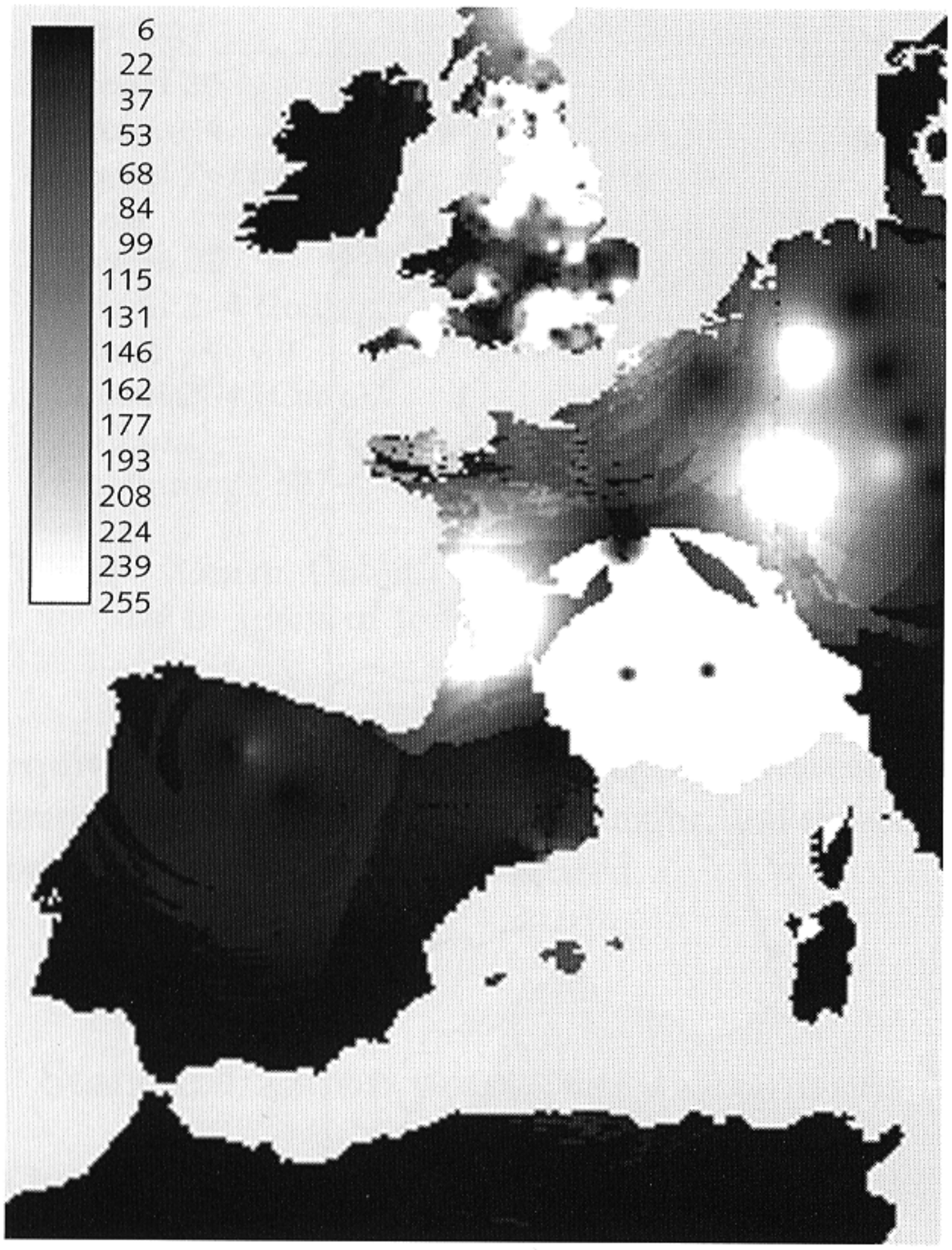
1 Sites with quantified amphorae assemblages that allow us to generate distribution maps with GIS.

semblages, as well as analyse amphora circulation in a territory and between other centres of the Western Roman Empire. In this case, the city values are the result of calculating mean densities of different excavations; in other words, the sum of all the densities divided by the number of excavations.

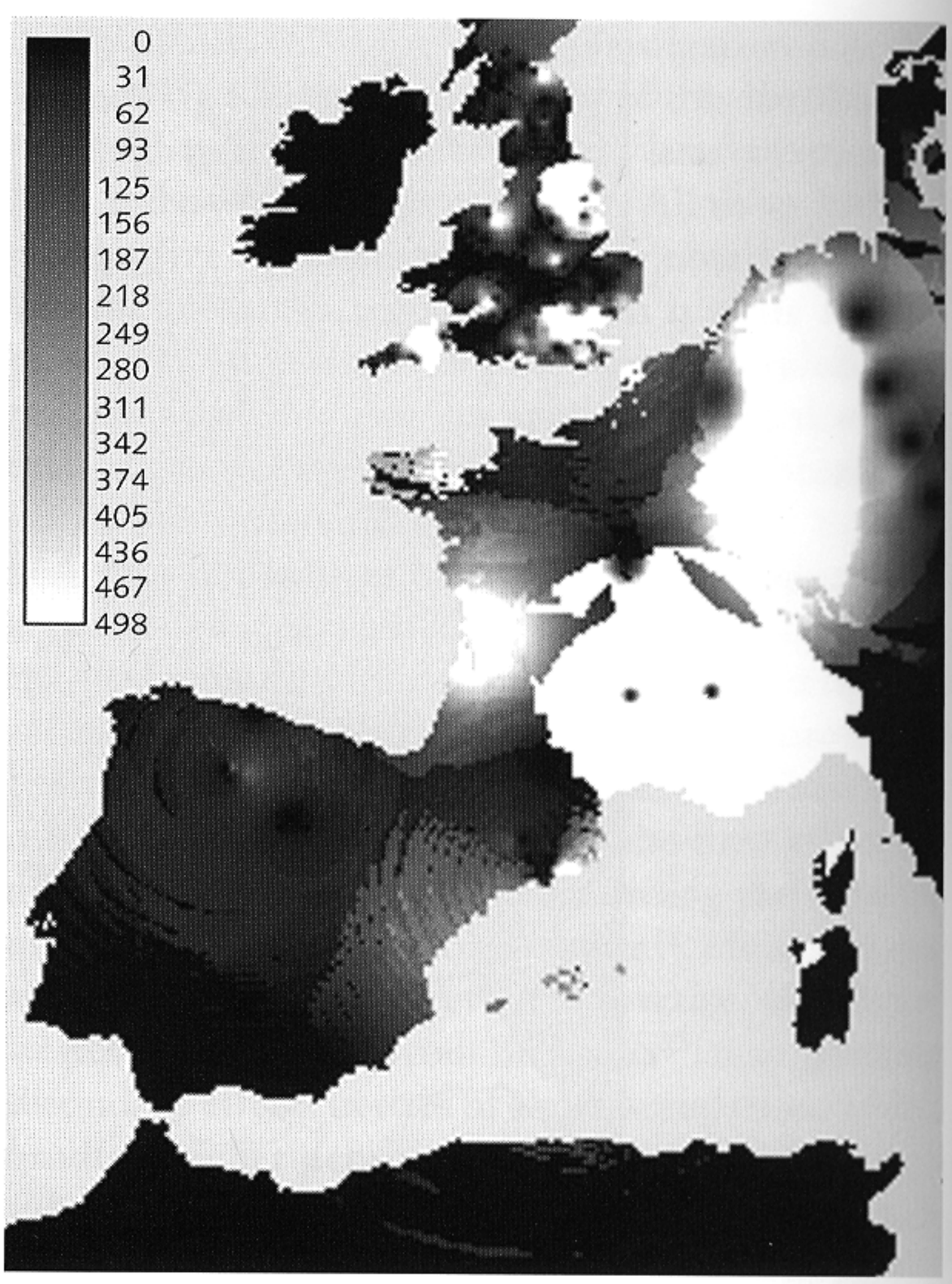
So far, comparisons between excavations and urban sites were made on the basis of simple statistics and graphic representations. However, it was believed from the beginning that these type of data was better analysed by Geographic Information Systems (GIS), and chiefly, visualize distributions of amphora in maps (figs. 1–5). A myriad of GIS applications reveal how different amphorae typologies are distributed in the city, on the basis of the excavation data documented in Xanten. In this case, the aim of the distribution analysis is to understand if densities were affected by the city topography, reuse of vessels or patterns of rubbish disposal[25]. In order to obtain a clearer picture of data obtained from excavations, the method triangulation of irregular network (TIN) was used for interpolation of values. The method calculates intermediate values according to a triangular network as well as the nearer values and distance[26]. Of course, it is only an hypothetical representation that will achieve better quality with a major number of data, in this case quantified excavations.

[25] Carreras 1998; Dupré / Remolà 1999.

[26] Wheatley / Gillins 2002, 184–199 advise about the potential dangers which appear when interpolating values, since methods such as Trend Surface Analysis may generate images which are not related with the original values.



2 Distribution map of Dressel 20 densities in GIS (IDRISI 4.1). Higher concentrations are recorded in the British and German limes.



3 Distribution maps of Gauloise 4 densities in GIS (IDRISI 4.1). Higher concentrations are recorded in the British and German limes.

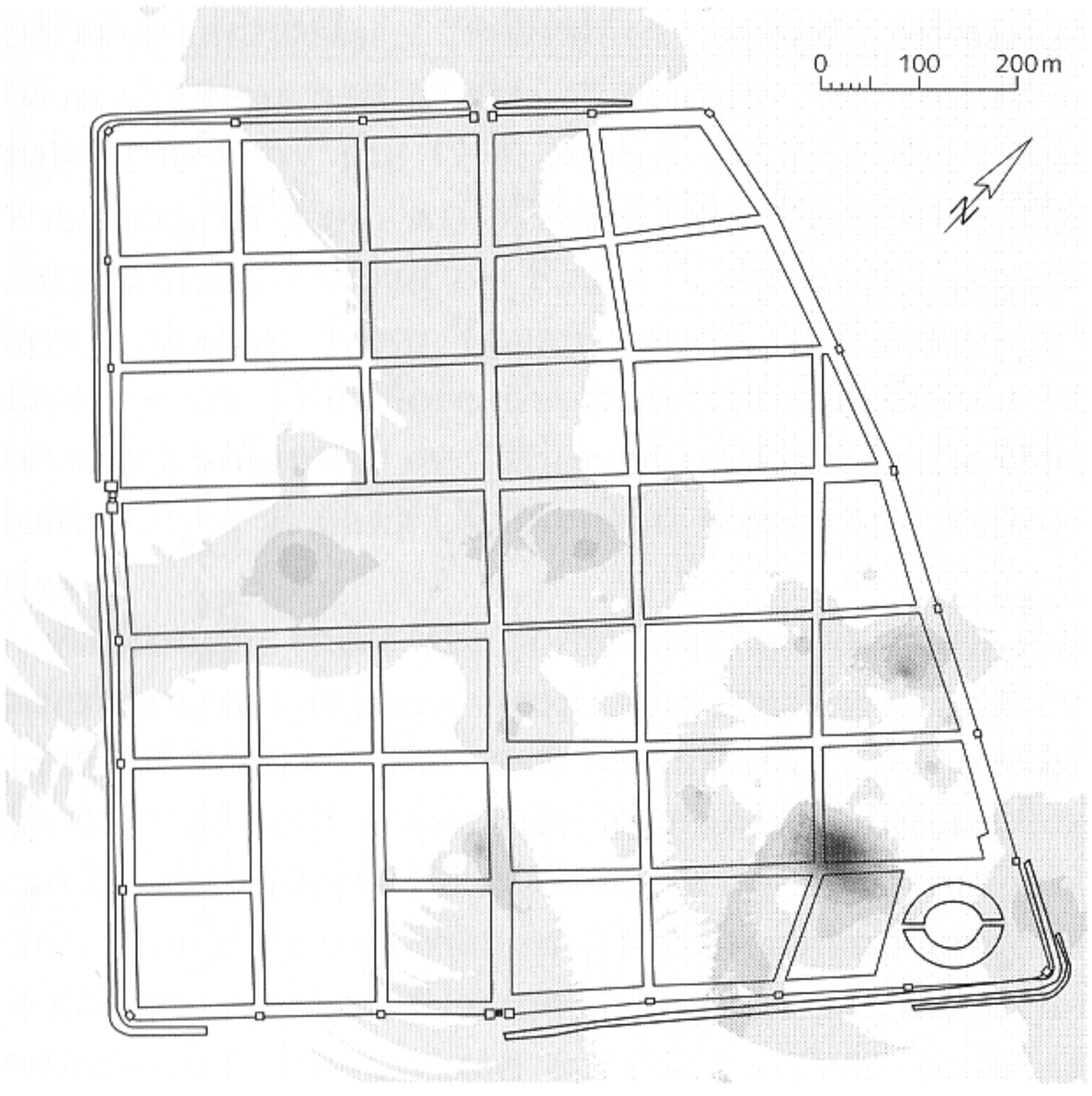
Quantification at Xanten

With regards to methodology, amphorae were classified initially according to the fabric with the help of a × 20 hand lens, and compared to a reference collection. However, fabrics unrecognized at first sight were sampled to undertake physic-chemical analyses in the lab. Actually, there are only 14 samples collected that may help to sort out some doubts about origins and fabric composition. Secondly, sherds were classified according to known typologies, when this was possible. No new typologies have been documented in this first stage, but variations of forms with different fabrics.

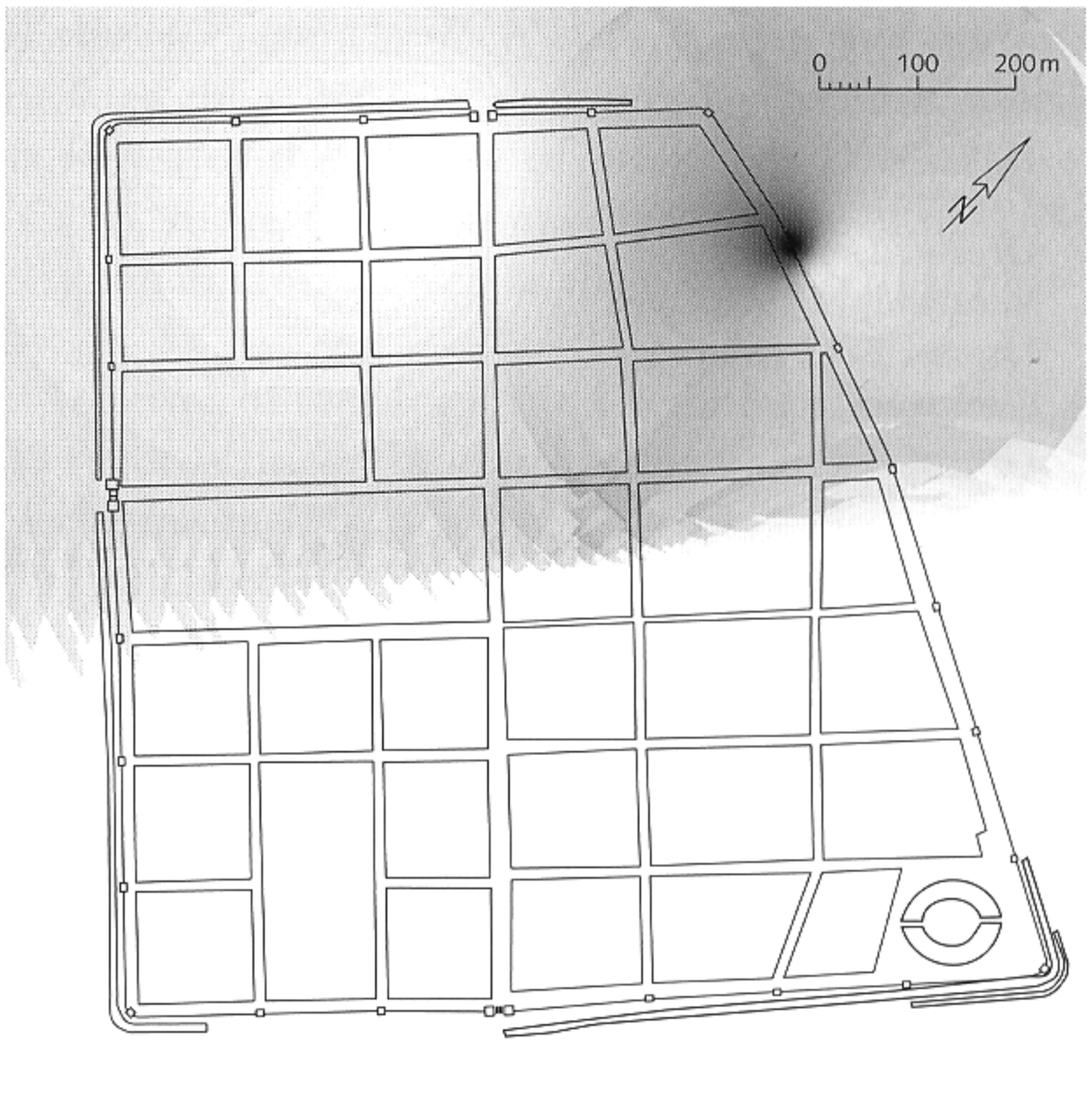
Once, every single sherd was classified according to fabric and form, then it was quantified in different manners so as to allow us a further intrasite study and to compare to other assemblages in the Roman Empire. Measures used for the quantification were number of sherds, weight, EVE (estimated vessel equivalent), spikes and handles[27]. Since the obtained quantities also depend on size of area excavated, values were divided afterwards according to excavation size to provide a standard density. For instance, the excavation of Insula 39 covered an extension of 5184 m², Ostmauer (Schnitt 76/29) 24 m², Hafengrabung (Schnitt 93/16 and Schnitt 93/24) 60 m² and Insula 15 (Schnitt 2000/06 and Schnitt 2000/07) 288 m², while total densities were 17556 cg/m² in Insula 39, 1795666 cg/m² in Ostmauer, 255366 cg/m² in Hafengrabung and 59642 cg/m² in Insula 15. Therefore, the average amphora density for Xanten is 532057 cg/m², a value extradinariously high similar to densities from mediterranean sites[28]. Ampho-

[27] A complete discussion on quantification measures in archaeological ceramics can be followed in Carreras 2000, 46–57 where they have been compared according to their invariability, see also Orton 1982.

[28] Carreras 2000. – The density from the Ostmauer is actually disguising the real average value for Xanten, however with more amphorae densities obtained from other excavations in the site the average will become more representative.



4 Distribution map of Dressel 20 stamps at Xanten. Values range from 12 stamps in Insula 39 (SE) to 1.



5 Distribution map of amphora densities at Xanten. It shows the highest density of Ostmauer (76/29) excavation.

ra densities show a high variability within the site, which reveals an organized method of rubbish disposal in the occupied area, whereas there are fillings, deposits and dumps in peripherical zones such as Ostmauer and Hafengrabung. As soon as more amphora from excavations in Xanten are studied, a more clear picture will turn up of rubbish disposal in the colony. Furthermore, the standard sherd amphora size was compared to the one from other sites in order to observe the degree of residuality of each individual excavation or layer may have had. In this case, sherd size did not make evident any high residuality[29], despite residuality was detected in few layers chiefly from Insula 39.

Notwithstanding the painstaking toil, quantification of amphora assemblages allow us to study in some detail how this heavy material was disposed within the Colonia once it was discarded. Amphorae are quite voluminous material, so it becomes a nuisance for everyday life if it was thrown away with any care. Therefore, distribution of amphorae should provide some insight into the urban evolution over the time.

At this early stage, only two distributions have been plotted and analysed by surface interpolation[30]: amphora stamps with a complete sample of the whole site and total amphorae densities according to the data of only four excavations. The results from stamps distribution can be quite consistent due to the sample quality. On the contrary, results on total amphora densities should be taken with care since more excavation densities should be recorded in order to have a rigorous picture.

Apart from the systematic classification of all amphorae from the four excavations, a selection of forms was drawn as partial documentation. Besides, amphora epigraphy, either stamps or painted inscriptions have been thoroughly recorded and studied. The following tables show the composition of individual assemblages of each excavation, which the correspondent description of every typology and fabric.

[29] Only in the excavation of Stonea (Cambridgeshire), the sherd size revealed that amphorae were all residual, so they did not belong chronologically to the date of layer from which were recovered (Keay / Carreras 1996).

[30] Surface interpolation of densities and statistical analyses were undertaken with Idrisi version 2, a GIS developed by Clark University.

Typologies	Weight (gr)	Sherds	EVE (degrees)	Spikes	Handles	Density (cg/m²)
Africana I	1 030	7	54	1	3	19
Haltern 70	3 130	20	53	1	7	60
Dressel 20	746 660	2 940	3 798	27	184	14 403
Dressel 2–4 (Bet)	200	1	–	–	1	3
Verulamium 1908 (Bet)	150	1	18	–	–	2
Dressel 7–11 (Maris)	400	1	20	–	1	7
Campania	3 650	23	–	1	1	70
Dressel 2–4 (Cam)	11 340	40	140	1	8	218
Oriental	800	6	–	–	–	15
Fabrik 1 (Oriental)	300	3	–	–	–	5
Dressel 2–4 (Orient)	2 850	24	47	–	1	54
Rodia	2 500	9	32	1	4	48
South Spain	43 210	93	–	6	7	833
Dressel 7–11 (S.S)	2 710	12	224	–	–	52
Beltran II-A (S.S)	1650	4	57	1	–	31
Beltran II-B (S.S)	600	1	–	1	–	10
Pompei VII (S.S)	190	2	23	–	–	3
Dressel 14 (S.S)	210	1	24	–	–	4
Gallia	100	1	–	–	–	1
G-3	650	5	76	–	1	12
G-4	71 620	521	900	24	40	1 381
G-4 (Marseille)	100	1	–	–	–	1
Dressel 2–4 (Gaul)	230	1	–	–	1	4
Dressel 28 (Gaul)	590	1	–	–	–	11
London 555	150	2	31	–	–	2
Fabrik – 3	150	1	–	–	–	2
Carrot	50	1	–	–	–	1
Dressel 20 (Germ)	1 120	3	–	–	2	21
G-3 (Germ)	1 580	3	218	–	2	30
G-4 (Germ)	9 830	42	193	1	5	189
Tarraconense	860	2	–	1	–	16
unknown	1 470	22	–	–	1	28
total	910 130	3 883	5 930	66	269	17 556

Table 2 Xanten, Colonia Ulpia Traiana. Amphorae quantification from Insula 39.

Insula 39

Table 2 shows quantities of different fabrics and typologies documented in this area. Descriptions of those types and fabrics appear below. The amphora assemblage from Insula 39 stands out by its consistency in terms of dating as well as the origin of vessels. Besides, it shows some degree of residuality since there are amphorae dating before the earliest layers of the excavation. According to Kraus[31], the earliest phase of Insula 39 comes from the Trajan period, however there are types and amphora variants, which are from the mid 1st century AD. For instance, Dressel 20 rims are documented that typologically, following Martin-Kilcher classification[32], belong to earlier periods. Such as layer 34160 (MK-8: AD 40–60), 35584 (MK-8: AD 40–60), 34308 (MK-8: AD 40–60), 34309 (MK-7: AD 40–60), 36322 (MK-15: AD 50–70). Similar chronological data can be gathered from the Dressel 20 stamps recovered, some of which can be dated in the Claudian or Flavian period such as MAR, CANTONIQVIETI, EROTIS, MIM, POROCODV, SISEN, or SATVRNINI (see catalogue).

With regards to typologies present in the assemblage, most of them show a long production span from late 1st BC to 2nd and 3rd century. Only Gaul-

[31] Kraus 1999.

[32] Martin-Kilcher 1987.

ish G-3 and Dressel 28 seem to be produced mainly in the first half of the 1st century AD, and then substituted by the G-4, which became the main wine export from AD 50 onwards. Following the date range provided by Kraus[33], the insula covers layers that go from Trajan period to the mid 3rd century AD. Therefore, the material from Insula 39 reveals a complete evolution of imports in the Colonia Ulpia Traiana (Xanten) in these three centuries.

Although, there are some similarities with the amphora assemblage from the nearby military camp of Vetera I (Xanten), for instance presence of Dressel 20 and fish-sauce amphorae, differences can be also inferred[34]. So a more detailed comparison should be undertaken. The three main amphora contents, olive-oil, wine and fish-sauce, are well-represented by diverse amphora types such as Dressel 20 for olive-oil with the highest percentage, Dressel 2–4 (Cam) and G-4 for wine and South Spain and Dressel 7–11 (S.S) for fish-sauces. However, the volume of Dressel 20 and Gauloise 4 appear to be higher in volume than the remaining amphora types, which suggests a special public supply for those vessels *(annona militaris)*.

Densities of amphorae provide us with an excellent mean to compare the volume of Xanten imports to other site. In the case of Insula 39, the total densities are relatively low compared to the average from Xanten. It reveals that the living areas such as Insula 39, where people used to inhabit, were cleaned up systematically. Most amphorae of early date seem to be fillings of the Trajanean buildings, so they can not be considered as rubbish but building material, a second use of amphorae after being discarded as container. The Insula 39 density is similar to medium-size settlements in Roman Britain such as Lancaster, Ribchester, Vindolanda or Chichester[35]. Nevertheless, it does not identify the density of the colony as a whole that is extraordinariously high (532 057 cg/m²).

The wide variety of amphorae present in the assemblage, some of which come from distance places such as the Eastern Mediterranean (Dressel 2–4, Rodia, Carrot), reveals a thriving trade in the colony comparable only to large urban centres in the northern provinces such as Nijmegen or London. Besides, the volume of such exotic products as well as wines of the quality of *falernum*, Dressel 2–4 (Cam), suggests a good purchase power of the colony inhabitants as well as the soldiers settled nearby.

In terms of typology, the assemblage from Insula 39 records uncommon types such as London 555, Verulamium 1908, Carrot, Dressel 7–11 (Maris) or Dressel 28 (Gaul). Data gathered from this excavation may help to complete the information for these typologies. Most amphorae from Insula 39 come from very limited regions in the Roman Empire such as Baetica (either coastal or Guadalquivir valley), Gaul and Italy. Actually, more than 75 % of the amphorae come from any of these regions, which demonstrates the dependence between interprovincial markets.

Nevertheless, the assemblage also registers some local productions (Dressel 20, local variants called temporarily G-3 and G-4) from the Germaniae provinces. Their volume is only testimonial compared to the high percentages documented in Germania Superior (i.e. Strasbourg, Walheim)[36]. Fabric analyses will be carried out in order to recognize a possible origin. However, the fabrics at macroscopical level resemble the ones from Baden-Württemberg and Rhenania-Palatine.

Ostmauer

Table 3 shows quantities of different fabrics and typologies documented in this area. Descriptions of those types and fabrics appear below. Without any doubt, this is the most interesting context studied in 2002, because it presents a quite homogeneous material from the early decades of the era. Some amphora types reminds us similar context of Augustean-Tiberian period documented in military camps in the Lippe valley such as Haltern (12 BC–AD 9) and Oberaden (BC 11–8). For instance, the Tarraconense form Oberaden 74, which is dated in the early decades of the 1st century AD. The amphora material confirms the hypothesis of an early settlement, perhaps *Oppidum Cugerno-*

33 Kraus 1999.

34 Hanel 1995.

35 Carreras 2000.

36 Baudoux 1996, 106–112; Carreras 2004.

Typologies	Weight	Sherds	EVE (degrees)	Spikes	Handles	Density (cg/m²)
Africana I	230	3	–	–	–	958
Baetica	101 670	635	–	1	2	423 625
Haltern 70	52 910	266	525	11	31	220 458
Dressel 20	29 760	115	813	8	25	124 000
Dressel 2–4 (Bet)	1 470	6	71	–	5	6 125
Dressel 28 (Bet)	340	1	–	–	–	1 416
Dressel 7–11 (Maris)	970	3	39	1	–	4 041
Campania	570	3	–	1	–	2 375
Dressel 2–4 (Cam)	12 960	95	108	3	20	25 174
Dressel 21–22 (Cam)	170	1	10	–	–	708
Oriental	21 670	150	–	5	–	90 291
Dressel 2–4 (Orient)	14 990	104	249	4	7	62 458
Rodia	11 030	85	76	2	18	45 958
South Spain	102 940	488	–	10	27	428 916
Dressel 7–11 (S.S)	13 650	48	1 007	1	1	56 875
Dressel 2–4 (S.S)	1 010	4	–	–	3	4 208
Gallia	32 220	208	–	4	24	134 250
G-2	1 400	12	10	–	–	5 833
G-3	180	2	39	–	–	750
G-4	310	4	91	–	–	1 291
Dressel 2–4 (Gaul)	760	4	31	–	2	3 166
Haltern 70 similis	460	5	109	–	–	1 916
Dressel 9 similis (Lyon)	18 680	87	453	3	9	77 833
Richborough 527	30	1	15	–	–	125
G-3 (Germ)	240	1	30	–	–	1 000
Tarraconense	3 260	22	–	–	1	13 583
Pascual 1 (Tar)	1 170	8	58	–	3	4 875
Dressel 2–4 (Tar)	5 050	21	71	1	6	21 041
Oberaden 74 (Tar)	100	1	23	–	–	416
??	610	3	–	–	1	2 541
total	430 960	2 390	3 828	55	185	1 795 666

Table 3 Xanten, Colonia Ulpia Traiana. Amphorae quantification from Ostmauer (76/29).

rum, before the colony foundation in Trajanean time[37]. Early wooden constructions are known in this area[38], as well as the presence of Augustean and Tiberian material such as Samian ware (Arretina) and coins[39]. Even some indigenous burials have been documented near the riverside[40].

The amphora evidence not only confirms this early site occupation, but also may provide a close date range for the first settlement, since the assemblage can be compared to others from well-dated military forts. Besides, the use of densities may allow us to evaluate the volume of amphora imported, perhaps suggesting the initial function of the settlement related to the legionary camp of Vetera I.

Due to the small size of the area excavated, the Ostmauer assemblage provides a very high density of amphorae. Only few small excavations in mediterranean towns such as Barcino, provide similar densities. In this case, the high density appears to identify a dumping area outside of an early settlement and not far from the riverside. This was the general pattern of rubbish disposal in Roman times close to settlement[41].

With regards to dating, the Dressel 20 rims documented are typologically, following Martin-Kilcher classification, of very early date. For instance, layers such as 12407 (MK-3: AD 20–40), 12406 (MK-8: AD 40–60), 14250 (MK-3: AD 20–

37 ZIELING 1989.

38 ZIELING 2001.

39 BOELICKE / LEIH / ZIELING 2001.

40 BRIDGER 2001.

41 CARRERAS 1998; DUPRÉ / REMOLÀ 1999.

40), 14224 (MK-1: 10 BC–AD 30), 14279 (MK-5: AD 30–50), 14296 (MK-4: AD 30–50), 14298 (MK-8: AD 40–70), 15013 (MK-5: AD 30–50), 15012 (MK-1: 10 BC–AD 30) or 15005 (MK-1: 10 BC–AD 30). Actually, these are the first varieties of Dressel 20s form that seems to develop from other types such as Haltern 70 or Oberaden 83. Due to early date of the material, the volume of Dressel 20 is lower than in the middle of the 1st century onwards and the amphora is hardly stamped[42]. No stamps have found despite the large amount of Dressel 20s recorded in the assemblage, which means that the whole context is very early. Stamps on Dressel 20 became very common from Claudian times onwards.

Therefore, the main amphora type recorded is the Haltern 70, another Baetican vessel, which also shows higher percentages in amphora assemblages in northwestern Spain and Portugal in Caesarian and Augustan contexts[43]. Such high percentages together with low percentages of Dressel 20 and other olive-oil vessels, may one wonder whether Haltern 70 may have occasionally carried olive-oil in the early periods[44]. Other well-represented amphorae are fish-sauce vessels from Southern Spain, in fact only Dressel 7–11, which confirms an early date since Beltran types were produced later. Besides, there are a myriad of minor types coming from either Guadalquivir valley or coastal Baetica such as Dressel 2–4, Dressel 28 or Dressel 7–11 (Maris).

In terms of typology, the present assemblage provides quite interesting new information that can be even better with a closer dating of layers. Probably, the Gaulish amphorae are the ones that show more news. First of all, the percentage of Dressel 9 similis, a vessel also recorded in Haltern, is incredible high, but appears to be also common in other sites in Germania Inferior such as Köln. Quantities documented in Xanten may help to understand this amphora distribution, which is still quite unknown[45]. There are also documented the amphora typologies from Gaul, which were produced in the early 1st century such as Dressel 2–4, Gauloise 2, Gauloise 3 and Gauloise 4. An accurate dating of the layers where they were found, will provide useful data about those typologies. For instance, the Gauloise 4 amphora that will become the main wine container from 60s onwards is hardly documented here, which means that these are early exports (AD 40–50s).

Since there was no monopoly of wine imports in the Julio-Claudian period, the assemblage show god numbers of wine vessels from a wide variety of sources. Italian wine carried in Dressel 2–4 is attested in high numbers, as well as Eastern mediterranean vessels such as Dressel 2–4 and Rhodian containers[46]. These three types were supposed to transport luxurious wines, therefore they reveal a high purchasing power in Xanten. Finally, Tarraconense wine amphorae were also present in assemblage, which were also present in other military camps in Augustean-Tiberian period.

With regards to location productions, there is only one sherd that resembles an imitation of a Gauloise, but produced in Germania. This fact confirms that local production started in later date, in the 2nd and 3rd century AD, as also the assemblage from Walheim reveals[47]. As it has been mentioned so far, the main exporting regions of the amphorae found in the Ostmauer were from Baetica, Italia and Gallia, however the importance of other regions such as Eastern Mediterranean and Tarraconense is remarkable. In terms of typology, the assemblage contains rare types such as Dressel 21–22, Dressel 7–11 (Maris), Richborough 527, Oberaden 74 or Haltern 70 similis.

42 Dressel 20 began to be stamped on the rim and near the handle in Augustean and Tiberian period, but only in a few cases. However, stamps became common in Claudian period when amphorae started being stamped on handles.

43 FABIAO 1989; LOPES SOUSA 1998; CARRERAS 2000, 92; CARRERAS ET AL. 2004.

44 Haltern 70 carried *defructum* and olives according to the *tituli picti* documented, and olives and defructum from content analysis. Nevertheless, olive-oil cannot been discarded since chemical traces may be similar to the olives.

45 DESBAT / DANGRÉAUX 1997.

46 The good presence of Rodian amphorae in earlier contexts than Claudian period contradicts Peacock's hypothesis (PEACOCK 1977) of their imports in military sites due to a special tax paid in kind by Rhodians after their revolt (AD 44).

47 CARRERAS 2004.

Typologies	Weight	Sherds	EVE (degrees)	Spikes	Handles	Density (cg/m²)
Baetica	4740	23	–	–	–	7900
Haltern 70	2250	8	–	2	4	3750
Dressel 20	45210	178	350	1	11	75350
Dressel 2–4 (Cam)	810	4	–	–	1	1350
Oriental	750	4	–	–	–	1200
Dressel 2–4 (Orient)	1030	5	–	–	2	1716
Rodia	3480	9	–	4	3	5800
South Spain	38390	126	–	3	10	63983
Dressel 7–11 (S.S)	20760	5	142	2	2	34600
Beltran II-A (S.S)	17280	6	28	–	1	28800
Gallia	1090	4	–	–	3	1816
G-3	1320	1	100	–	–	2200
G-4	5890	24	100	3	4	9816
London 555	290	1	27	–	–	483
Lyon	510	3	–	–	1	850
Dressel 9 similis (Lyon)	3300	6	233	–	1	5500
Dressel 20 (Germ)	1070	3	40	–	–	1783
G-3 (Germ)	570	1	80	–	–	950
G-4 (Germ)	3710	9	481	–	2	6183
??	770	4	–	1	2	1283
total	153220	424	1581	14	47	255366

Table 4 Xanten, Colonia Ulpia Traiana. Amphorae quantification from Hafengrabung (93/16).

Hafengrabung

Table 4 shows quantities of different fabrics and typologies documented in this area. Descriptions of those types and fabrics appear below. The amphorae from the Hafengrabung (Schnitt 93/14 and Schnitt 93/16) cover a wide chronological horizon, similar to some extent to the one from Insula 39. Most dated forms appear to belong from late Julio-Claudian period to the 2nd century AD. For instance, there are some Dressel 20 rims that can be dated early such as the MK-6 (AD 30–60) from layer 34647, MK-7 (AD 40–60) from layer 34650, MK-8 (AD 40–60) or MK-5 (AD 20–40) from layer 35105 or MK-7 (AD 40–60) from layer 36060. However, the Dressel 20 stamp recovered in this excavation provides a more complete chronological picture. Only one stamp have been documented in this excavation, PASSERARI. This stamp is dated on typological ground in the Flavian-Trajanean period.

Compared to other assemblages in Xanten, the Hafengrabung reveals the highest percentatge of fish-sauce amphorae from Southern Spain, almost two complete vessels have been recovered (one Dressel 7–11 and Beltran II-A). Although, this kind of amphorae have been always important in the military markets, its important volume is also remarkable. As happens in the case of the excavation of the Ostmauer, the amphorae densities from the Hafengrabung are very high. The reason is simple, the area is found in the extrawall part of the colony, near the river and its port. Since this zone was not inhabited, disposals such as amphorae sherds may have not disturbed everyday life.

Of course, the Guadalquivir valley imports such as Dressel 20 and Haltern 70 are still very important, but as much as other excavations in the site. The Dressel 20 imports increase their volume from Claudian period onwards, while Haltern 70 followed the opposite trend to disappear in the Flavian-Trajanean period. As can be seen the evolution of both Baetican types seem too close related.

The third group of amphorae correspond to the wine containers, chiefly Gauloise 4, since from the second half of the 1st century AD onwards will become the most common wine vessel. It comes along with other Gaulish amphorae such as Gauloise 3 (wine) and the rare London 555 (olives). The province of Gaul is the second main amphorae supplier of this excavation, because also Lyon productions such as Dressel 9 similis (fish-sauces) are documented here.

Furthermore, the picture of wine consumption is completed with imports from the Eastern Mediter-

Typologies	Weight	Sherds	EVE (degrees)	Spikes	Handles	Density (cg/m²)
Dressel 20	142 030	534	85	–	18	49 315
Oriental	440	3	–	–	–	152
Dressel 2–4 (Orient)	270	2	–	1	–	93
South Spain	1 810	10	–	–	1	628
Dressel 7–11 (S.S)	160	1	15	–	–	55
G-4	23 880	165	78	5	5	8 291
Dressel 20 (Germ)	110	1	–	–	1	38
Carrot	1 070	30	–	–	–	371
total	171 770	746	178	6	25	59 642

Table 5 Xanten, Colonia Ulpia Traiana. Amphorae quantification from Insula 15 (2000/06; 2000/07).

ranean (Rodia, Dressel 2–4) and Campania (Dressel 2–4) in relatively good numbers, which shows that there was still a luxurious market for these long-distance beverages.

Finally, local productions are also documented due to the late dating of this excavation. At least, three types were recorded (Gauloise 3, Gauloise 4 and Dressel 20) that suggest a 2nd century chronology for their imports. Fabric analysis will help to pinpoint the exact source of the local productions, though workshops of Germania Superior seem to be the most likely possibility.

Insula 15

Table 5 shows quantities of different fabrics and typologies documented in this area. Descriptions of those types and fabrics appear below. The study of amphorae from Insula 15 attempted to cover the late imports in Xanten, however the date range appears only to cover the late 1st century AD to 2nd century AD. Few Dressel 20 rims provide good dating, but most of them define 2nd century dating such as 42730 (MK-30: AD 80–150). No stamps were recovered in this excavation.

Regarding other assemblages in Xanten, the volume of amphora is relatively small as well as its variety. In part the reason is the limited extension excavated, so densities of amphorae may provide us with an excellent mean to compare the volume of imports to other site. The densities obtained in Insula 15 (59.642 cg/m² as overall) show quite a high value compared to other parts of the Colonia. More densities should be obtained in the nearby in order to assess whether those values may suggest low urbanisation in this zone, or perhaps an early dumping[48].

As happens in most 2nd century military sites, Dressel 20 and Gauloise 4 are the majority amphora types. Due to their high number compared to the rest of vessels, a distinctive public tied supply seems to be the most plausible explanation. Likewise, the assemblage of Insula 39 or the one from Walheim[49], the Insula 15 is a good archaeological sample of the *annona militaris* in wine and olive-oil. Besides, the presence of fish-sauce containers from Southern Baetica is also well-documented in relatively good numbers. They become the only suppliers of fish-sauce, market that was so far shared with the Lyons Dressel 9 similis. Perhaps, the fact that those amphorae came from the same region and shared the same ship cargoes that Dressel 20 amphora may give the answer[50]. The assemblages also register amphorae from the Eastern Mediterranean. There are wine containers such as Dressel 2–4 and the carrot type, which appear to have carried dates. The volume of such Eastern Mediterranean trade seems of little importance compared to earlier periods. Besides, other relevant wine importer such the Campanian Dressel 2–4 does not appear in this excavation. Local productions are only attested by a single sherd of Dressel 20 imitation, which also reveals the scarce significance of these products in Xanten.

48 Carreras 1998.

49 Carreras 2004.

50 Carreras 2000, 141–149.

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