Potters’ stamps on Italian Terra Sigillata: towards a new catalogue

Philip Kenrick

The preparation of a general catalogue of stamps on Italian terra sigillata (a term now generally preferred to the former ‘Arretine Ware’) was first begun in earnest in 1896 by August Oxé, in the light of his experience in studying the finds from the Sels Brickworks at Neuss, and was continued by him until 1943, at which time he consigned his manuscript to the German Archaeological Institute for safe-keeping: lengthy negotiations had secured the interest of the Institute (and specifically of its subsidiary, the Römisch-Germanische Kommission in Frankfurt), but no commitment to publication and no finance. Oxé visited and examined personally many museum collections, and included such instances as he was able from publications, notably various volumes of the Corpus Inscriptionum Latinarum. From the beginning, his work therefore included both drawings of those stamps which he had seen personally (or of which facsimile drawings had been published), and many transcriptions of varying quality taken from publications. Oxé died in 1944.

After the war, Professor Howard Comfort of Haverford College, Pennsylvania, sought out Oxé’s manuscript and obtained permission from his widow and from the German Archaeological Institute to make whatever arrangements he could for its publication. Oxé had been unsuccessful in attempting to arrange publication and Comfort was to experience many similar difficulties, but the work finally appeared in print in 1968 as Corpus Vasorum Arretinorum: a Catalogue of the Signatures, Shapes and Chronology of Italian Sigillata (Bonn). The potters were listed under 2,620 rubrics, drawing on the evidence of some 25,000 vessels. From the title it is clear that this was always intended to be more than just a list of signatures: Oxé had compiled indexes of foot-profiles associated with the stamps (for in the nature of things, one frequently does not have an entire profile to consider), of the frames of the stamps (which are far more varied than those of their Gaulish counterparts) and of the potters associated with particular centres of manufacture. He also listed the findspot of each instance together with the shape of vessel where possible, and provided indexes of nomina gentilicia and of cognomina (including names of slaves). As far as chronology was concerned, there was not a great deal to say, for much of the material was without archaeological context.

While Professor Comfort was struggling to publish the catalogue, he was keenly aware both of new material continuing to appear in print and of the extensive unpublished material in American museums which he had seen but Oxé had not. Comfort very wisely decided not to complicate the issue by attempting to include this material, but started immediately to list it for a future supplement. This collation of new material has now continued intermittently for some forty years, a period which has seen a vast increase in archaeological publication from all parts of the Roman Empire and a general increase in the amount of both descriptive and contextual detail that accompanies such publication. In 1986 Comfort called on many colleagues who had worked in the field of Italian Sigillata studies to devise a new typological classification of the ware which might be used to regularise the description of shapes in the Supplement. This was done, resulting in 1990 in the publication by Elisabeth Ettlinger and others of Conspectus Formarum Terrae Sigillatae Italico Modo Confectae (perpetuating Comfort’s affection for the Latin language and emphasizing the international character of the work!).

When this volume appeared, it was clear that
Comfort himself, now in his eighties, would not be able to see his own work through to fruition and I was asked if there would be any possibility of my undertaking the task. The outcome has been that, with the support of colleagues in many countries, sufficient funds were secured for a research post to be set up in October 1992 at the Institute of Archaeology in Oxford in order to produce the supplement, hopefully within a span of five years. Funding has been received from a number of bodies and individuals, including the Gerda Henkel Stiftung (Düsseldorf), the Ceramic Stiftung (Basel) and a long-standing friend and colleague of Professor Comfort in the USA, Dr. A. M. McCann. The British Academy has lent both academic and subsequently financial support to the project.

I was able to visit Professor Comfort at his home in January 1991 in order to discuss his material with him, and all of his notes were subsequently shipped to me across the Atlantic. No attempt had been made to determine the form of the new publication, but there existed on duplicate cards approximately 12,000 entries for the supplement, together with extensive files of correspondence, photographs and rubbings. From the proportion of Comfort's bibliographic index which had been systematically catalogued, I estimated very roughly that there might be as many as 50,000 potential entries to be made from material which is already in print in one form or another. This is clearly quite enough to be representative of the Italian Sigillata industry without seeking out any other unpublished material (which would be infinitely less cost-effective than working from publications in the Ashmolean Museum Library fifty yards away!).

Given that nothing had been done to determine the form of the supplement, I had effectively carte blanche to make my own decisions. Comfort had assembled two duplicate sets of records, indexed by site and by potter respectively. Clearly, however, it would be desirable to index the material in a variety of ways, starting with those chosen by Oxe. The material seemed to lend itself naturally to the new technology of computer databases, both because the use of such technology would make such indexing easy to set up (Oxe's indexes are demonstrably incomplete, and occasionally self-contradictory) and in regard to the overriding question of how the work should be published. The use of a computer would also allow various forms of validation to be applied to the records as they were entered, thus reducing the range of possible errors involved in transcribing such a large body of data.

With regard to publication, it was clear that a book in the form of the original catalogue would be extremely expensive to produce and uncomfortably bulky to handle. On the other hand it will very soon be true (if it is not already) that anyone engaged in archaeological research will be using a personal computer: the power of these machines continues to increase at a staggering rate and the price continues to fall. The benefits that I would enjoy whilst creating the catalogue (such as the ability to search or index it in a variety of ways) could be passed on to the eventual user, and whilst it would be important that there should be a book (illustrating all the stamp-types in facsimile and discussing the implications of the research for our understanding of the industry) the individual catalogue entries could be disseminated far more economically on a disk or a CD. (Can we really celebrate the demise of the microfiche . . . ?) It was with these factors in mind that I concluded that a computer would be central to the conduct of my research and entered the minefield of deciding what computer and what software to use. Since similar factors are likely to affect anyone working with pottery, it may be helpful to describe the decisions that were made and the way in which the project has been set up.

**Hardware**

As I am based within a university environment, I had the option of using the university's main-frame computer and of making the data available to others by on-line remote access. This is already done for the Beazley Archive of Greek vases here at Oxford, offering the prospect of an existing system which could easily be adapted. The advantages would be the size of database that could be handled and the security which the data would enjoy through regular centralised backing-up. On the other hand, it seemed to me that the data would be far more accessible to end-users if they could be distributed on disk or CD and accessed on a PC, possibly even in the field. (Not all pottery workrooms have access to remote computer networks!) Because of the market dominance of IBM-compatible machines, this type of machine would be preferable to, say, a SUN workstation, provided that it was sufficiently powerful. I made an approximate calculation that my database might run to 50 Mb in size (this was very approximate and will always be so until very near the end!) and soon established that this presented no problem to the current generation of PCs. As to the relative merits of a PC and an Apple Mac, it seems
to me that this is almost entirely a matter of personal preference. One cannot nowadays just buy a computer off the shelf from a relatively narrow choice of brands and models: you have to make conscious decisions about almost every component. I shall not dwell on how I made various decisions: suffice it to say that I have bought a Viglen machine (a brand supported by the university and reasonably competitive in price), which has a 486DX processor running at 66 MHz. It has 8 Mb of internal RAM, a 200 Mb hard disk, one of each size of floppy disk drive and, most importantly, a built-in tape streamer for backing-up. If you don’t like these technical terms, I sympathize: just pass over them and understand that this was close to the top of the range at the time when the decision was made. But don’t forget the tape streamer – if you are working independently it is crucial to back up your work frequently in order to protect it against viruses, hardware and power failures and even your own brainstorm. At least one of these will happen sooner or later!

**Software**

I was anxious to discover what constraints might be placed upon the work or the form of publication by any particular choice of software, and conversely, if I was contemplating some form of electronic publication, what implications this might have for the conduct of the project. Happily, any such constraints are rapidly disappearing. The computer industry has realised that people want to change their software from time to time, and that, for instance, a WordPerfect user may want to be able to read a document which someone else has written using a different word-processing package. Formats are therefore generally more compatible than they used to be and conversion programs are widely available. This is also true of databases: the data can readily be transferred from one package to another. Therefore, a choice made at this stage would not impose a straitjacket for the future. This is also true in regard to electronic publishing, which is in any case advancing so rapidly that nothing available today is likely to be a guide to the situation in five years’ time.

I looked at dBase and Paradox as potential databases, as they are both in common use and both were supported by the Oxford University Computing Service. (Depending on your skills/familiarity with computing, the availability of support and advice is likely to be an important factor.) An academic version of Paradox 4.0 (for DOS) was available at £70 and this seemed a very good starting-point. (The costs of software fall on me personally.) Time has shown this to be very satisfactory, though the software has subsequently been upgraded to Paradox for Windows.

The question was raised at an early stage of uniformity of approach with other projects in the same field. Here, I must confess, I have not made very extensive enquiries, partly because it would take some time to find out what is going on elsewhere. But I do not think this is a serious problem. What I am doing is not like making a museum catalogue which might at some future time become part of a wonderful global network! And as far as intelligibility is concerned, this is no more of a problem than with any other kind of archaeological work: we are all used to understanding other people’s systems of excavation recording, despite the fact that there are many different approaches and that complete uniformity is unlikely, and probably not even desirable. But one detail which is different from a manual approach and which affects one’s daily pattern of work to some extent is that every entry made in the catalogue is potentially part of the finished product: there is no such thing as a ‘working version’ which will be tidied up when the final text is written. One must be careful therefore that annotations to catalogue entries are always clear and unambiguous, and in the case of the present project, it is also necessary to remember that the eventual reader may not use English as his/her native language. (A description of a fabric as ‘having the texture of a digestive biscuit’ is wonderfully precise and evocative – but only if you are familiar with a digestive biscuit!)

**Requirements of the Database**

The database needed to be constructed in such a way that one could eventually extract answers to as many as possible of the following questions.

1) Given a fragmentary stamp of which you have a few letters, an idea of the frame and, perhaps, a trace of an ornamental motif, what stamps in the catalogue might provide a match?
2) Where have the products of any potter been found?
3) What evidence is there from findspots and clay analyses to show where a potter worked?
4) Did certain potters specialise in the production of particular shapes?
5) What contextual dating-evidence is there for the activity of any potter?
6) Which potters supplied any particular region or site?
7) Which potters are associated with a particular manufacturing centre?
8) Is the centre associated with any characteristic shapes of vessel or stamp?

The structure which is most likely to give answers to these questions, whilst reflecting the relationships between different parts of the data, is a relational database. In this, a variety of separate tables are constructed, and they are linked together by the contents of certain fields which occur in more than one table. This may be illustrated quite simply in regard to relating the vessels to the publications in which they are recorded. One publication may list a number of vessels. It is also possible that one vessel may appear in several publications. However, there are features of a publication (such as the author) which have nothing to do with the vessel and there are features of the vessel (eg shape, origin) which are not dependent on the publication. It is therefore useful to have a table of Vessels with records of shape, origin (eg by clay analysis), findspot, museum location etc., and a table of Publications which bears every resemblance to a normal bibliography (ie composed of an author-date code and a full title).

What links the two is a table of References in which each record consists of a vessel number (which links it to an entry in the Vessels table), a publication code (which links it to an entry in the Publications table) and a precise reference to a page, figure or catalogue entry. Any number of these records may share the same publication code (reflecting the fact that one publication may refer to a number of vessels); there may also be a number which share the same vessel number (corresponding to the appearance of one vessel in several publications). But there will be no two records in the References table which have identical contents in both of these fields.

The structure of the new Corpus Vasorum Arretinorum database is determined by the following relationships within the data:

- A vessel may be associated with one context on one site.
- A vessel may carry one or more different potter’s stamps.
- A vessel may be associated with one or more publications.
- A stamp will be attributable to a potter and usually to one of a list of stamp-types associated with that potter. (Occasionally, when the source of information is defective, it may be possible to say that a stamp belongs to a certain potter but not to go into further detail.)
- A stamp-type may include one or more decorative motifs in addition to any wording.

Other relationships, such as the fact that a number of potters may use the same frame as a border for their stamps, are subsets of those listed above (eg each stamp-type has a frame number associated with it as well as a potter number, so it is easy to list all the potters who use a particular frame.)

This structure is shown graphically in Figure 1. Each box represents a table and the relationships are expressed by lines joining them together. A line which is forked at one end indicates that more than one record in the table at that end may be related to one record at the other. (Thus, more than one stamp may occur on one vessel; more than one stamp-type may be associated with one potter.) For the system to work, it is essential that none of the lines should be forked at both ends: hence the creation of the References table to resolve the relationship between Vessels and Publications, as already described. The blobs on the lines indicate that a relationship is compulsory at that end of the line: thus a site may or may not have dating evidence associated with it (SITES–DATING, no blob at LH end), but dating-evidence not associated with a site is meaningless (therefore there is a blob at the RH end to show that any record in the Dating table must have a corresponding entry in the Sites table).

The same information is presented in a slightly different way in Figure 2. This time the fields in each table are listed, showing the full range of
information which may be associated with a catalogue entry and the fields which define the links between the tables. Those fields which are marked with an asterisk are key fields: Paradox enforces the rule that no two entries in a table may have identical values in the field or fields so defined. Thus, in the Vessels table, no two vessels may share the same 'pot no.' which is in effect a serial number for each vessel catalogued. In the Stamps table two entries may share the same 'pot no.', but only if they differ in 'potter no./stamp-type'. (Early vessels in Italian Sigillata often do bear multiple impressions of the same stamp set radially around the floor, but this is indicated in the catalogue not by multiple entries but by the field 'position' in the Stamps table.)

The contents of many of the fields are self-explanatory, but to give as full a picture as possible, the following additional explanation may be useful.

Vessels

Shape: A reference to a form no. in the Conspectus

Origin: Where the vessel is believed to have been made

Attribution: Why? (Analysis/Visual inspection/Kiln site known)

Location: Present location (eg museum)

Stamps

Stamp type: Number referring to an external list for each potter

Illustration: Source of information (Drawing/Photo/Rubbing etc.)

Drawn? Is this the example used to define the type?

Position: Central/Radial/External

Another? Y/N – A flag to mark instances of multiple (distinct) stamps on a single vessel

Potters

Distinguishing No.: A number occasionally required to separate different potters with the same name

St-types

Frame No.: Number referring to Oxé's list, now extended

Pub-ns

Site: A keyword, allowing geographical indexing

Listing status: A comment field, in which pieces deliberately omitted may be noted etc.

Input of data

Paradox is a complete package which allows you not only to create the tables you require, but to define screen formats for input, queries which will extract required information and report formats which will determine the appearance of output to either screen or printer. The Windows version is sufficiently sophisticated to access all nine database tables in their correct relationships for the purpose of inputting stamp records.

The main input 'form' occupies the two screens shown in Figures 3 and 4. (The cursor moves automatically between them). When the 'Add new records' button is selected by means of the mouse a new record is opened and the next unused pot no. is given to it. Data are first entered to describe the vessel; when a findspot is entered, its modern country and Roman province are displayed on the screen. If the system does not already have that information in the Sites table, the cursor moves automatically to that part of the display and invites you to enter it. When a context is entered, the dating information (if any) is displayed or may be inserted. Similarly, when a potter no. is entered, the corresponding potter record is displayed if there is one: if not, the cursor moves to that part of the display to ask for the relevant information. This enables one to see both that a corresponding entry exists and that the correct number has been entered. And so on with the other relationships. For certain fields where only limited values are allowed (eg 'Attribution' which should only contain 'A', 'K' or 'V') these can be enforced by placing validity checks on those fields. 'Required' validity checks can also be placed to ensure that nothing crucial is missed.
Philip Kenrick

Fig. 3. Corpus Vasorum Arretinorum: the main data access form, first page

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pot No.</td>
<td>7179</td>
</tr>
<tr>
<td>Shape (Corp):</td>
<td>?</td>
</tr>
<tr>
<td>Origin</td>
<td></td>
</tr>
<tr>
<td>Basis of attribution</td>
<td>Analyses / K(un known) / V(etch)</td>
</tr>
<tr>
<td>Findspot</td>
<td>Luni</td>
</tr>
<tr>
<td>Present location</td>
<td>Inv. No.: CM 483/1</td>
</tr>
<tr>
<td>Potter No.</td>
<td>176</td>
</tr>
<tr>
<td>Stamp Type</td>
<td>3</td>
</tr>
<tr>
<td>Drawn?</td>
<td>N</td>
</tr>
<tr>
<td>Potter No.</td>
<td>176</td>
</tr>
<tr>
<td>Stamp Type</td>
<td>3</td>
</tr>
<tr>
<td>Drawn?</td>
<td>N</td>
</tr>
<tr>
<td>Reading</td>
<td>CNATE / IXANT</td>
</tr>
<tr>
<td>Position</td>
<td>C(entral) / R(adial) / E(ternal) / ? (Unknown)</td>
</tr>
<tr>
<td>Illustration type</td>
<td>DP</td>
</tr>
<tr>
<td>Additional motifs</td>
<td></td>
</tr>
<tr>
<td>Comment on stamp</td>
<td>Poor and partial impression, but possibly this potter/type.</td>
</tr>
</tbody>
</table>

Fig. 4. Corpus Vasorum Arretinorum: the main data access form, second page

<table>
<thead>
<tr>
<th>Publication Code</th>
<th>Precise reference</th>
<th>Site</th>
<th>Title</th>
</tr>
</thead>
</table>
out. If you can handle the programming, more sophisticated checks can be attached to the input (or any editing) process. It is possible to write routines which will check more complex aspects. An example is that related to the ‘Attribution’ field. If an origin has been entered, then this must be qualified by an attribution; otherwise this field should be blank. When a keystroke calls for departure from the box enclosing information about the vessel, the following routine is invoked:

If not (IsBlank(Origin) and IsBlank(Attr-)) then;
If both are blank:
/!
If IsBlank(Origin) then
Sound(500, 100); If one is blank, move to it
Origin.moveTo0
Message("*** Enter origin or delete attribution ***")
eventInfo.setErrorCode(CannotDepart)
Else
If IsBlank(Attr-) then
Sound(500, 100)
Attr-.moveToO
Message("*** Enter basis of attribution or delete origin ***")
eventInfo.setErrorCode(CannotDepart)
Endif
endif
endif

If either of these fields alone contains data, the computer beeps and displays an error message. Setting the error code prevents the user from moving out of the box. There are many such pieces of code which contribute to error-trapping, but they are the ‘icing on the cake’ and have been added progressively over along period of time: it is possible to set up an application that you are going to use yourself which will perform perfectly well without these subtleties.

**Data Output**

*Paradox* provides quite a simple way in which you can combine various tables together and then select records which meet certain criteria, printing out only those parts which interest you. Thus it would be possible to link *Stamps + Vessels + Dating* in order to extract a list of potter nos. for finds dated before 10 BC, and in the report to replace the potter nos. by the names of the potters. Figure 5 is an example of a print-out showing all the information for a chosen potter in the database. It draws upon the *Potters, St-types, Stamps and Vessels* tables to show all the stamp-types listed for that potter, their frequency, the shapes upon which they occur, where the examples have been found and the results of analyses or other attributions to source where made. The computer takes only a matter of seconds to generate such a report, and it is always fully up to date! The possibilities are almost endless, and a benefit to the end-user of publishing the database in electronic form will be the opportunity provided of conducting further research on its contents.

**Graphics**

A final point is worth mentioning, because it is undoubtedly a feature which is now in many people’s minds. The database described above makes reference to three external corpora. The first of these is the *Conspectus* of shapes. This is a volume in print and in general circulation, and there seems no good reason to incorporate its contents in some way into the database. The other two, the corpus of facsimile drawings of the stamp-types and the list of stamp-frames, are a different matter. Would it be useful for images of the stamp-types to be part of the database, so that they could be displayed on the screen for consultation? If not, would it none the less be useful to me to manipulate them electronically when the question of publication in hard copy arises? There are separate questions here of technical feasibility (including image quality), cost-effectiveness and practical desirability.

**Technical feasibility**

The latest generation of databases written to run in the *Windows* environment offers full support for graphic data, so that an image may be handled just like any other field of data in a table. *Paradox 4.0* is a half-way house in this respect: it accepts the appropriate data type but does not itself provide the means to display or manipulate the contents of such fields. *Paradox for Windows* offers full support. However, before you can support an image, it has to be created. This involves scanning and there are now a wide variety of scanners, both hand-held and flat-bed (resembling a photocopier) on the market. They can, in a matter of seconds, scan and record an A4 area of line-art, half-tones or even colour. The software generally allows you to edit the captured image to adjust its quality, or to chop it up and write different parts to different files. (For instance, after scanning a page of potters’ stamps from a report, one might wish to select just a few and to store them as individually named files.) All of this can be done with products that you can purchase over the counter.

**Image quality**

This depends on the scanner initially, and then on the printer or the screen when you wish to reproduce it. Printers and scanners support a range of print densities. For the purpose of cataloguing potters’
### LIST OF OCCURRENCES FOR A SELECTED POTTER

<table>
<thead>
<tr>
<th>Stamp type</th>
<th>Form</th>
<th>Findspot</th>
<th>Attribution Comment</th>
<th>Pot No.</th>
<th>Illus.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAMVS</td>
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<td>VS / GAM</td>
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<td>GA’MI</td>
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<tr>
<td>VS / CAM</td>
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<tr>
<td>Total no. of occurrences recorded: 9</td>
<td></td>
<td></td>
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</tbody>
</table>

Fig. 5. Specimen list of occurrences of a chosen potter.

stamps, high-quality line drawings are desirable, capable of showing fine detail at an exact scale of reproduction. A resolution of 300 dots per inch (dpi), which is the present standard for most inkjet and laser printers, is borderline for this purpose, but sufficient if you are careful how you manipulate the image. I have spent some time investigating this question (particularly the difficulty of ensuring that the images can be reproduced precisely to scale) and have reported on it elsewhere (Kenrick 1993). High-quality artwork (eg for magazines) may be scanned/printed at 1000 dpi or more, but this requires much more expensive equipment and huge amounts of memory, hardly justifiable in the present instance. So the technology exists to achieve both satisfactory capture and satisfactory reproduction of the drawings on paper. On the screen it is a different matter. High-resolution monitors today can display 1024 pixels (= dots) or more across the screen: for a 14" monitor, which is about 10" across, this amounts to only 100 dpi, which is far too coarse for an image at life size of a stamp which may be only a centimetre or two long. Images on the screen are therefore of very little use when trying to make comparisons of similar stamps, where measurements with dividers may be crucial.

**Cost effectiveness**

It is no quicker to scan and edit a page of drawings than to photocopy the page, cut it up with scissors...
and paste the cut-out drawings onto index cards. But photocopies vary in quality and may become smudged or damaged with time. A digital image, like a digital sound recording, is immune to such degradation. And when you want to re-arrange the drawings, it is very much easier to edit them into order on a screen than to prise off the little bits of paper and stick them down again! The drawings for the new catalogue are being stored on the computer, in the form of one file for each potter. I can add to the drawings in each file as new types occur, and re-print the page as often as I wish. I have, therefore, an index of drawings which is also kept (virtually) up to date, and the safety of the contents is ensured both by their existence on disk and by back-ups to tape made as often as I back up the textual data in the database. When it comes to composing the illustrations for the eventual publication, this can be done entirely from the data on disk without further recourse to the original publications, and the entire composition and layout (including captions) can be carried out at the keyboard. This promises savings over a manual approach which can only be described as bringing a potentially impossible task within the range of practicality.

The visual index of stamp-frames is now similarly stored electronically, in four files corresponding to four pages of frames. This has the same advantage of existing in a dynamic form as the drawings of the stamp types.

**Practical desirability**

In regard to the question of reproduction in hard copy, my enthusiasm for handling the drawings electronically has been made clear above. The advantage of actually integrating these files into the database (so that when the record for a potter is displayed, the drawings are shown too) seems to me trivial, given the relatively poor quality of reproduction on screen and the ready availability of hard copy. On the other hand, experiment has shown that to do this slows down the display enormously, because of the time taken to open the graphics file and display it as you scroll through the potter records. Each drawing file has a filename based on the number of the potter (eg 'P-1601.PCX'), which therefore relates it instantly to the information in the database, and for me this provides as close a link as I require.

**Future considerations**

The present project does not provide for the inclusion of the contents of Oxé’s original catalogue in the database (apart from the drawings, which of course represent the starting-point for the new corpus). This would entail a lot of work, for it would be necessary to check and edit each entry into conformity with the new catalogue structure; care would also have to be taken to avoid duplication, for some pieces listed by Oxé have received subsequent and more detailed publication and will already appear in the new catalogue. (This is true, for instance, of the material from Haltern which has been entirely re-studied and re-published alongside more recent finds). Clearly the inclusion of this material is desirable, and in the light of the number of potters who are listed once only there would be significant omissions if it were not done. However, in funding applications for the project this has been explicitly relegated to a possible final phase, to be considered only in the light of progress and funding at that stage. Likewise, no specific provision has been made for publication as the technology which will be available cannot be clearly foreseen: it is possible that the material will be eligible for publication in the *Oxford Monographs in Classical Archaeology* without additional cost, but again this is a question which it is hardly even appropriate to ask at this stage.

I have described the technicalities of the project in some detail, as I believe that the general approach is likely to find echoes in a wide variety of archaeological finds research. It is, of course, dynamic in the sense that new features may be added to the application at any time, and indeed there is little point in designing some of the querying and reporting routines until there is a sufficient body of data to demonstrate that they work correctly. I have some knowledge of computing, but the packages that one can buy are becoming increasingly automated in the facilities that they offer, reducing the necessity to become involved in actual programming almost to zero. The crucial area is that of design. But this is nothing to do with computing as such: it is a question of how well you understand the relationships within the material you are studying. The discipline of explaining these relationships to a computer is quite a useful means of sharpening one’s own understanding!

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**Bibliography**