THE EPHESIAN AMPHORAE DATA BASE

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Before we discuss these specific data base, we have to examine the development and functionality required. The data bases are specifically tailored to the given research circumstances. The examination and publication of the finds, namely the amphorae, would have been vastly more difficult by traditional means. The overview of the data stemming from archeological, geological and statistical sources warranted the usage of modern e.g computer assisted data processment. The first data bases using IT in archeology stem from the early 1980ies and were limited by technology: large, stationary and expensive mainframes were unable to store pictures in large quantities and were limited to text files. They made the management of the finds easier and established the first international standards in data processing.


Fig. 2 Bezeczky, T. (ed.) Múzeumi nyilvántartás II, (Válogatás a számítógépes nyilvántartás külföldi irodalmából / Selection of the published computer based documentation systems), FIGYELŐ, 11 MRMK (Institute for Conservation and Methodology of Museums), Budapest, 1979.

1 IBM STAIRS
The real breakthrough came with the spread of the personal computer (PC) systems worldwide. Not only the hardware, but also the rapid development in software led to new means of analysis. This resulted in data bases with more user friendliness, as data was also available as picture files and new discoveries. I am certain, that the coming generations will review these developments with a smile on their faces as they start to work in virtual reality.

**Hungarian National Museum Computer in Archaeology Project 1982-1991/1**

The modernisation of the manual archaeological documentation system at the Hungarian National Museum was begun about ten years ago. There is now a computer database containing descriptions, photos and films of all the objects in the collection. DataEase was chosen to create this database because it allows contact with such effective systems as Oracle and Ingres. Without these, the handling of our collection of half a million objects on the one system would have been impossible.

All the information on the objects - such as name, size, provenance, etc. - is stored in a format which accords with international museum standards. The database is also augmented by supplementary databases, such as a terminology database, which ensures unified names.

For a long time we have been trying to find a subsystem allows us to view objects which cannot be adequately shown in a photograph. For example, certain details may not be visible, the object may be too big, or it may need to be seen from all sides. Short video sequences of the objects can be stored on VHS (normally about 200-300 objects per cassette). The DataEase-based system uses a special program to search the cassette for the part of the film showing the requisite object, and the sequence can then be displayed on a separate screen. This way the objects can be looked at 'live', the long searching in the store-rooms will be unnecessary and the danger of damage to objects from use will be reduced.

**How it works**

The system installed at the Hungarian National Museum is in fact just one of many possible configurations from a wide palette of image regional database and software from ubiquitous personal computers. The technology has been expanded to meet the requirements of the museum, and the database is now made up of several totally separate and independent databases.

The system allows for high resolution BW display (2,048 x 1,080, 150

Fig. 3 Bezeczky, T. – Rezi-Kató, G. The Hungarian National Museum Project: Computer in Archaeology, in Múzeumi Hírlevél 1991122/6, 5-8 and Bezeczky, T. – Rezi-Kató, G. – Harsányi, Z. Images and DataEase, Collector's item, Dialogue, 3(1991) 15-16.

**THE EPHESIAN DATA BASE**

The information about the amphorae is contained in the ARES (FileMaker Pro) data base created by Péter Hornung. I am especially grateful to him for his patience, attention and expertise in creating the data basis programme that allowed me to record and process the various data of the amphorae.

My research (2001-2011) was supported by the Institute for the Study of the Ancient Culture (Austrian Academy of Sciences) and the Austrian Science Fund (FWF). The amphorae are kept at the store-room of the Austrian excavation house in Selçuk. The bulk of the available amphorae were found in Ephesus. There were more than a hundred excavation sites there. I studied the material of eight sites (Tetragonos Agora, partly Terrace House 2, Magnesian Gate survey, Prytaneion, Basilica Stoa, State Agora well, Serapeion, Arap-Dere...
survey). This data base primarily contains the amphorae of the Roman period. The amphorae of the Tetragonos Agora will be discussed first. (Fig. 4)

![Image](image_url)

**Fig. 4 Ephesus, Tetragonos Agora**

This is the largest group. The amphorae in the Agora are very fragmentary. Only the characteristic parts: rim, base and handle (RBH) were considered. More than 35% of the pieces are handle fragments which, unfortunately, do not always allow the identification of the type (obvious it was easy the types Rhodian, Koan, Dressel 2-4, amphorae). The amphorae are stored in numbered boxes according to the years they were found.

![Image](image_url)

**Fig 5. The amphorae in the Austrian Excavation Depot**

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2 The Tetragonos Agora excavations were directed by Peter Scherrer since 1987.
The following descriptions demonstrate the structure of the Ephesan data base. The data base has been reorganized several times since the beginning. The charts show important fields in some important tables. It is only a sample of the content and working method.

Fig. 6 Summary layout chart

At the beginning of the research in 1998 we started by reviewing the data of more than 10 years of research by traditional means. After six weeks of intensive work we realized, that a completely new approach would be needed. A picture data base would be necessary to review the data and finds not only „on-site“ but also in Vienna. A spreadsheet containing 2010 lines of excavation data as well as the „Fundjournal“, containing the description of the ceramic and other objects had to be systematically organised.

Fig. 7 The spreadsheet page no. 1
The next logical step was the data unification and systematic data recording. Because this process was done by a single person, it took years instead of months. In the beginning, photography was done on an analog camera and film reel. By the year 2000 the switch to a digital camera was made, the device of choice was a Nikon coolpix. The amphorae in each box are also recorded group photos. The 11,518 fragments found at the Agora are in 2,291 photos. At Terrace House 2, there are 1,888 fragments in 567 photos. At the rest of the sites, there are fewer amphora fragments.
The so-called Main entry layout offers exits to different layouts (summary, master picture, details = stamps, fabric). We can show the structure of the data base through the documentation of a group of findings. The contents of one box (93/059) are shown on 2 photos. Picture 9305901 shows all findings that were discovered together, while picture 9305902 depicts a Lamboglia 2 type amphorae rim with the distinctive stamp on it.

Fig. 10 Main entry layout

The pictures are imported in the Main (DataEntry) layout. (Fig. 10) Here the finds are identified: first the location, the shape (rim, neck, handle), the type – if a catalogue number was assigned as Cat.No, unique identifying number – and if a drawing was made, it is also entered in the data base. A note would be added if a petrological examination was made. If an amphora find contains a stamp, this also would be noted with a separate picture. If the finds have a catalogue number, the color of the find is defined according to the Munsell-colour scale or a fabric code is assigned. The field LayerID shows further information about the find’s location. Each find is also entered with the excavation and dating period, showing a complete chronology of the entire excavation. This data was recorded in Ephesos and in Vienna.

Switching from the Main layout to the Master Picture layout, the detailed information on each find is accessible. The data from the excel file is also added. With these, the excavation process is reconstructable. The "Fundjournal" contains all non amphora finds excavated simultaneously (coins, glasses, fine ceramics, bones etc.) (Fig. 11)
This so-called Summary layout offers exits to different features (details = stamps, fabric, types, excavations data and main). The features of the individual amphora fragments are recorded in this separate layout. All the stamps were recorded individually. Detail layout.
After all findings are described and entered in the data base, it is possible to select those types best representing its class. The significant pieces had their own drawings and photos. We have 667 drawings and 625 photos of the fragments at the Agora and 352 drawings and 187 photos of the fragments at Terrace House 2.
All data bases profit from singular data entry and the unique sorting and filtering possibilities. This explains some redundant data on some layouts but enabled the understanding of later added data (colour, type, description, etc.).

Fig. 15 Individual drawings

Fig. 16 Fabric layout
The data base contains photomicrographs at 1:10 and 1:20 magnification of the fresh breaks of the amphorae. The Agora has 1978, Terrace House 2, 818 photos. (Fig. 16)
We recorded the petrological data (thin section and heavy mineral) and the photomicrographs of the thin sections. (Fig 18)

Fig. 19 Photomicrographs in the data base

Fig. 20 Reference layout

There is a collection of reference photomicrographs of the amphorae from the Italian, African and Spanish kilns and workshops. The reference amphorae and the ones found in Ephesus can be compared within the same screen. (Fig. 20)

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3 The petrological analyses were prepared by Roman Sauer (Universität für Angewandte Kunst Wien)
When describing the various types of amphorae, we used the labels that are generally accepted. After the Southampton data base was published, we adopted the labels it uses.⁵ (Fig. 21)

Fig. 21 Amphora types in the data base

Fig. 22 Visualisation of position of the box on the map

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⁴ The author would like to express his special thank to all his colleagues who made it possible to draw samples from published finds. I am especially grateful for the support I have received from Professor David Peacock (Archaeology Department of Southampton University).

⁵ http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/
The database is connected to 3D software (ARCHICAD, Graphisoft). The numbers of the boxes were used as unique identifiers. The position of the objects found nearby can also be viewed. This makes it possible to understand their relationship. (Fig. 22)

Finally, the database allows several statistical analyses. We have studied the number of the different amphora types in the different layers. As the example shows, the Late Rhodian amphorae are present in different layers. Overall, 451 amphora shards have been discovered. The earliest one stem from the late second century B.C and continue in the mixed layers till before mid sixth century A.D. (Fig 23)

![Fig. 23 Statistical analyses of the Rhodian amphora in layers](image)

The creation and data entry in the database required long. Especially the creation of the photographs and the amphorae definition required great effort. Despite the large photographic data the database operates quickly: thanks to the file management system, the individual data is not stored in the database itself, rather it is stored in separate files and accessed separately. The individual descriptions were used in publications, using the database itself for printing. This was especially useful for the fabric.

We presented the database first at the conference in Athens. It appeared in the conference papers in 2004.

Bibliography


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6. This application also created by Péter Hornung.
7. Size on the disk 2.49 GB; Contains 7,717 files, 193 folders.
9. Bezeczky 2004, Fig. 7.