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Conservation of the Punic Collection at the Museum of Carthage. Part I – Mapping the Collection: Methodology, Classification, and Assessment

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In recent years, conservation projects have become increasingly multifaceted undertakings in which the role and involvement of conservators has expanded beyond the treatment of artifacts. This paper, the first in a series of three articles, reports on one such multifaceted research and salvage conservation project: the joint University of Toronto-Museum of Carthage Project, undertaken between 1989 and 1992. The project had several interrelated aspects: (a) the inventory, classification, and evaluation of the Punic collection of the Museum of Carthage; (b) the assessment, conservation, and storage of the artifacts; and c) the museological presentation of the collection and of the work accomplished. This paper discusses the first aspect of the project. To analyze and evaluate the collection, assembled over time and from various sources, a materials-based statistical approach was developed. In this approach large assemblages of artifacts of the same material were considered as populations and assessed according to parameters of design, size, scale, and aspects of technology and craftsmanship. This method emerged as the most helpful way to extract relevant information from a collection now detached from its context. The methodological approach developed here allows the exploration, in a scientifically justifiable manner, of a large collection of antiquities assembled prior to the development of current methods and cross-referencing systems. It may be useful to other scholars, curators, and conservators faced with similar problems of extracting information from large collections and deciding how to proceed with preserving them.

Depuis quelques années les projets de conservation sont devenus des entreprises à multiples facettes, où le rôle des restaurateurs ne se limite pas au seul traitement des objets. Cet article, le premier d'une série de trois, traite d'un projet complexe de ce type consacré à une opération de sauvetage : le projet conjoint de l'Université de Toronto et du Musée de Carthage, mis en œuvre de 1989 à 1992. Le projet a plusieurs aspects intimement liés : a) l'inventaire, le classement et l'évaluation de la collection punique du Musée de Carthage; b) la détermination de l'état des objets, leur conservation et leur mise en réserve; c) la présentation muséologique de la collection et du travail accompli. Le présent article discute du premier aspect du projet. Pour analyser et évaluer la collection, assemblée au Musée de Carthage à partir de sources diverses et sur une longue période de temps, on a développé une approche statistique fondée sur les matériaux. Selon cette approche, les objets faits des mêmes matériaux ont été considérés comme des populations et analysés suivant des paramètres tels que la conception, la taille, l'échelle, les aspects technologiques et la qualité de la fabrication. Cette méthode s'est révélée être le meilleur moyen de réunir des informations pertinentes à partir d'une collection détachée de son contexte. L'approche méthodologique développée pour explorer, d'une manière scientifiquement fondée, une importante collection d'antiquités assemblée avant le développement des méthodes et des systèmes de références croisées actuels, peut être utile aux chercheurs et aux restaurateurs qui ont pour tâche d'extraire de larges collections toute l'information utile et de choisir la manière de les préserver.

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Introduction

In recent years the evolution of conservation as a discipline has seen expansion of the role and involvement of conservators beyond the treatment of artifacts. Conservation projects today are becoming multifaceted undertakings that include research in associated disciplines, teaching, management, and presentation of sites and collections.

This paper reports on one such multifaceted research and salvage conservation project, undertaken over a four year period, conducted on the collection of archaeological artifacts at the Museum of Carthage in Carthage, Tunisia, as part of the University of Toronto-Museum of Carthage Project. The analysis and conservation of a very large collection of unique artifacts, stored in a museum for more than a century, posed particular problems that conservators and curators in many institutions have to face.

This paper is the first in a series of three articles and it focuses on the method and approach to the evaluation and study of over eleven thousand artifacts excavated at the turn of the century. The second article will feature the approach developed to establish a small salvage conservation laboratory at the museum and to train its staff. The third article will deal with development of a didactic museology gallery at the museum to present the conservation work to a local public and school community that were not considered a part of the museum audience. The conservation methods and techniques developed and applied to over 2,000 artifacts considered the most representative of the collection and in greatest need of treatment are documented in a conservation manual.[1]

The Problem and the Context

The Museum of Carthage is the custodian of a large collection of material excavated from tombs. This collection was assembled

mostly at the turn of the century. Due to the way in which the collection was originally gathered, documented, and stored, there is a lack of precise information on the provenance of individual objects and detailed accounts of the possible association of different objects. Yet this collection, never seen or classified in its entirety, is one of the largest assemblages of Punic artifacts in the world. It contains an enormous amount of information and represents an important part of the world's cultural heritage.

The task of the University of Toronto - Museum of Carthage project was to find ways of preserving, documenting, and evaluating the Punic artifacts in the Museum's collection. This paper focuses on the overall evaluation, classification, and inventory of the collection in order to provide the basis for the conservation and the preservation work. It outlines an approach for classifying artifacts as well as examining the ecology of objects and techniques that can illuminate historical situations even when the archaeological excavation methods, by today's standards, may have lacked precision. The materials science-based approach presented here may be useful to curators and conservators faced with a similar problem of assessing large collections of artifacts assembled over time and from various sources, employing methods that differ from those used today.

The Approach

When dealing with archaeological objects that have been assembled in the past by excavators who worked with different assumptions and methods than archeologists of today, scholars are faced with the task of extracting information from the evidence in the absence of adequate contextual parameters. As well, quantities of similar objects are rarely sufficiently large to allow for a statistical approach to evaluate their attributes. Therefore, studies are often done on individual objects or small assemblages, an approach that usually yields detailed information on particular pieces, but little on the overall systemic features of the objects under study.

At the Museum of Carthage, a large collection was assembled over a century by different excavators. Often precise information linking objects to the tombs where they were found was lacking. Thus, the traditional approach to organizing the collection according to archaeological strata and associated time periods was not available. Yet, there was the opportunity to examine an entire collection of related objects made from different materials and to carry out technical studies.

It was decided to adopt a materials-based statistical approach to the analysis of the collection that would include all objects. In this approach, large assemblies of objects made of the same material were considered as populations rather than as a collection of subsets of objects requiring study and selection prior to detailed and intense examination. The methodology relies on the assessment of all objects by common parameters and on an integrated overall approach to the object's design, size, scale, and aspects of craftsmanship.

This approach emerged as the most helpful way to extract as much relevant systemic information as possible from a collection detached from its context. The overview was also necessary before deciding on appropriate conservation measures.

The Background of the Collection

One of antiquity's most famous cities, Carthage, has been the subject of numerous international investigations by archaeologists and historians. The first modern discoveries of its Punic remains date to the 1870s when the White Fathers discovered, near Byrsa Hill, a Punic cemetery and a large number of tombs furnished with pottery, jewelry, masks, and other objects. For almost a hundred years, the hills of Carthage were excavated by French missionaries in search of Punic remains and, in particular, Punic tombs. These necropolises, preserved in spite of the successive occupation and destruction of the city, revealed a rich subterranean universe. For example, it is known that in just one year Father Delattre opened some 283 tombs.[2] The Scholasticon that the White Fathers established at Byrsa eventually became a repository of material for the study of ancient Carthage and, after Tunisian independence in 1963, the site of the Carthage Museum.

Although archaeological excavations continue today, now conducted by the Tunisian Institute for Heritage and various international teams, the vast majority of the objects comprising the collection of the Museum of Carthage come from the period of the earliest excavations and are primarily Punic funerary and votive objects found in tombs. These tombs date from the eighth through the second century B.C.[3] and extend across several hills to the northeast of the Carthage ports, covering an area of approximately 1,350 m by 700 m. **Figure 1** shows the location of excavated Punic cemeteries and tombs. The objects in the Museum's collection originate from tombs belonging to two basic ritual practices (burial and cremation) that co-existed in Carthage, both in time and in geographic location. It is believed that the tombs from the time of the early cremation rites (seventh and sixth centuries) had similar object contents as the burial tombs. In the later period (fourth and third centuries), tombs of the cremation rites had no objects associated with them.[3] The dating of tombs has been derived from the style of imported pottery found in the tombs.

The main literature sources dealing with Punic tombs in Carthage and their content are comprised of: (1) original excavation reports such as those by Delattre,[2,4-29] Merlin and Drapier,[30] Merlin,[31-33] and Gauckler;[34,35] (2) more recent excavation reports by Lancel[36-38] and Chelbi,[39,40] as well as reports by Ennabli;[41] (3) extensive and systematic work by Benichou-Safar[3,42-44] on the structure of tombs and funerary practices, including the content of tombs and their inscriptions; (4) studies on specific groups of objects such as the work by Cintas on ceramics,[45,46] Deneauve on ceramic lamps,[47] Picard on bronze oenochoes,[48] masks and razors,[49] Acquaro on razors,[50] Quillard on jewelry,[51-53] Astruc on ostrich egg shell objects,[54,55] and Seefried on glazes.[56]

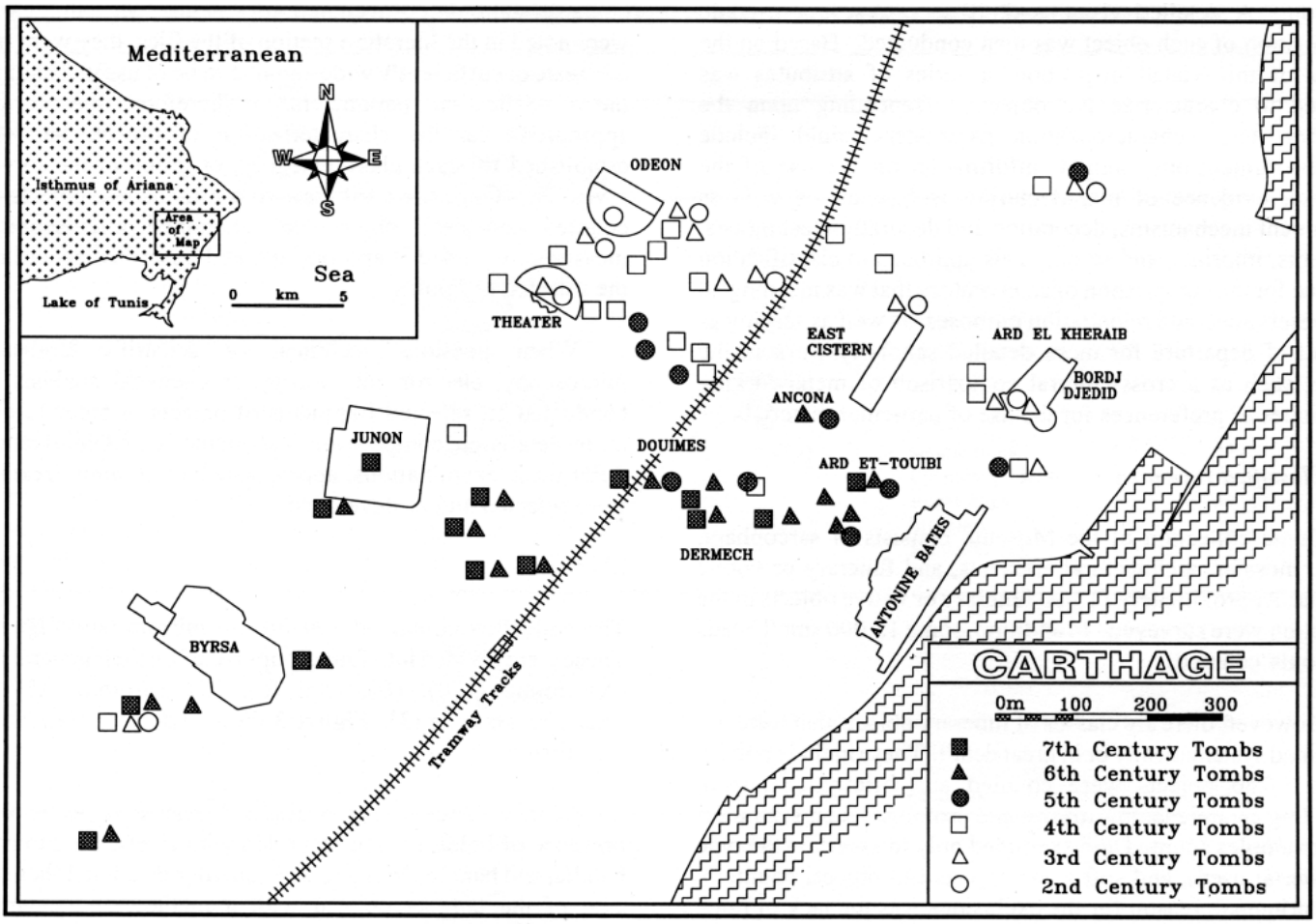

Figure 1. Location of Punic tombs excavated at Carthage.

Thus, the information on tomb objects in the collection of the Museum that was available to the University of Toronto- Museum of Carthage Project came from either the generalized descriptions of the tombs and their contents, or from the studies done on a selected and limited number of objects presented as groups of artifacts (not all necessarily belonging to the collection of the Museum of Carthage). Such groups were based principally on stylistic and morphological characteristics, and each group was considered separately from all other groups of funerary artifacts.

Today, the collection of the Museum of Carthage contains tens of thousands of artifacts. However, most of the individual objects are without information as to their precise provenance, *i.e.* the tomb in which they were found or the locality of the tomb itself. Thus, the collection is both an incredible cultural treasure and a considerable challenge for scholarly evaluation.

Practical Work: Mapping the Collection and Creating an Inventory

The Method

Before examining the inventory, certain decisions had to be made with respect to the mapping of the collection. It was decided to develop a taxonomy of the collection that would use the material from which the artifacts were made as the first classification parameter. This decision was dictated to some extent by the conservation component of the project, but it was made principally because the objects were considered a primary historical source. Therefore, the various artifact materials were determined first and objects divided into classes according to the material from which they were fashioned (*e.g.*, glaze/frit, ostrich egg, bronze, gold, lead, *etc.*). The objects within each class of material were then subdivided into categories according to the type or function of the object (*e.g.*, vessels, adornment pieces, *etc.*). These functional categories were further subdivided into groups of objects based on their size, shape and/or the decorative technique employed.

It was felt that comparisons within each material class and between classes of objects could illuminate both cultural practices and material techniques, and by this process, anchor and put in context the objects in spite of the inherent weaknesses of chronology and provenance.

This approach required, first of all, a massive sorting into different material classes and then into categories according to function. A detailed visual and, if necessary, microscopic

examination of each object was then conducted. Based on the results of this visual inspection, a series of attributes was selected to characterize the objects. Depending upon the category, these characterization parameters could include physical dimensions, weight, information on the use of the material, evidence of manufacturing techniques as well as attachment mechanisms, decoration and decoration techniques, pigments, imprints, and so on. This approach to classification allowed for the compilation of an inventory that was meaningful for conservation and registration purposes, as well as serving as a point of departure for more detailed scholarly work in the future, such as a cross-cultural comparison of metalworking techniques or preferences for the use of particular materials.

The Classified Inventory

The Punic collection of the Museum consists of sarcophagi, steles, mosaics, architectural elements, and funerary or votive objects. Approximately 11,000 funerary or votive objects in the collection were surveyed. In addition, some 15,000 small beads were only counted.

However, there are classes of funerary objects that were not examined systematically or in great detail. These include pottery (some 1,750 objects were counted and briefly examined, excluding ceramic lamps, masks, and protomes), coins, amulets (330 examples counted and examined only to ascertain the type of material used), and soft stone objects (43 objects counted). The principal reason for the exclusions was the lack of time. In addition, pottery, the most abundant type of object found in the tombs, had already been systematically studied and was the least in need of rescue conservation.

The object categories studied systematically and in detail, as well as their quantities, are shown in **Table I**. Samples of pigments (9 different colours), as well as numerous pieces of textile and textile-like materials, were also examined. In addition to glazes, 127 Roman glass objects in need of treatment were studied and conserved as well.

Examples of the Approach to the Study of Different Classes of Objects

In order to illustrate the methods of assembling files on particular object categories, as well as the evaluation and the potential for future research that these files represent, the work on two categories of objects—mirrors and objects made of ostrich egg shell—are chosen as illustrations. These were selected in order to demonstrate the approach to the assessment of the inventory of objects that are either commonly found in the Mediterranean realm during this time period, as are mirrors, or objects that are typically and uniquely Carthaginian, such as masks made of ostrich egg shells.

In assembling the files, all objects of a particular materials class were first surveyed together, in order to establish appropriate characterization parameters. While art historical characterizations or provenance information, when they existed, were noted in the literature section of the files, they were rarely adequate or sufficiently wide-ranging to be of use in deciding on the classification parameters. Therefore, the attributes appropriate for the characterization of objects had to be established for each class, category, or group of the surveyed inventory. Once the attributes were established, objects were counted and each object was examined microscopically, measured, weighed if appropriate, and described according to the selected attributes.

When possible, technical or scientific studies by microscopy, electron microscopy or chemical analysis were conducted on selected fragments of objects in order to obtain more details on composition and methods of manufacturing. After these examinations, appropriate conservation treatments were selected and/or developed.

Mirrors

The collection contained 194 bronze mirrors (see **Figure 2**). These were divided into four groups based on their general form: (A), round (170); (B), oval (6); (C), cardioid (15); (D), square/rectangular (3). **Figure 3** shows a derived classification for mirrors.

Within these groups, variations existed in terms of the presence of holes, sometimes filled with rivets, used to affix a handle, and handle tangs and ears (small protruding lobes on the side of the tang associated with a method of attachment). Furthermore, the round mirrors, the largest group within the collection, exhibited significant differences in mirror cross-section possibly indicative of different methods of manufacture. This was the reason for the further subclassifications of: (A1), round mirrors with flat cross-section (89); (A2), round mirrors with thickened profile (51); and (A3), round mirrors with raised rim (30).

Figure 2. Part of the collection of mirrors during examination.

Table I. Categories and Quantities of Objects examined. Figures in brackets refer to additional broken pieces.

Bone-like objects*	3,161				
Ostrich egg shell	1,190	whole egg shells	4		
		vessels	7		
		"masks"/fragments	1,179		
Bronze objects	1,569 (121)	fragments	(32)		
		bells	84		
		oenochoes/parts	282		
		cymbals	58		
		mirrors	194		
		razors	68		
		nails	305		
		coffin hardware	366		
		arrowheads	94		
		jewelry	118 (89)	simple rings	54
				earrings/pendants	3
				finger rings	50
				bracelets	2
				amulet boxes	2
				various	7
Lead objects	689 (103)	fragments	(64)		
		weights	369		
		vessels/containers	44		
		inlay plates	95		
		jewelry	181 (39)	earrings	80
				rings	24
				bracelets/necklaces	63
				pendants	14
Iron objects	213 (18)	fragments	(9)		
		knives	45		
		scissors	45		
		projectile points	13		
		hammers/picks	13		
		nails	57		
		jewelry	40 (9)	simple rings	7
				finger rings	33
"Gold" objects	525 (140)	jewelry	525 (140)	simple rings	1
				earrings/pendants	208
				finger rings	86
				necklaces	138
				seal pendants	4
				amulet boxes	12
				various	76
Silver objects	178 (91)	vessels	1		
		jewelry	177 (91)	simple rings	24
				earrings/pendants	76
				finger rings	54
				necklaces	2
				bracelets	6
				amulet boxes	12
				various	3
Semi-precious stone objects	275 (89)	jewelry	275 (89)		
Glaze objects	189	containers	8		
		jewelry	181	necklace elements	179
				rings	2
Terra cotta figurines	281 (96)	figurines	281 (96)		
Total	8,270 (658)				

* This category includes objects made of bone (3,087), ivory (8), teeth (61), and horn (5). Because the use of this class of artifacts was difficult to discern, the class was subdivided immediately into a number of groups, depending on the decorative techniques used.

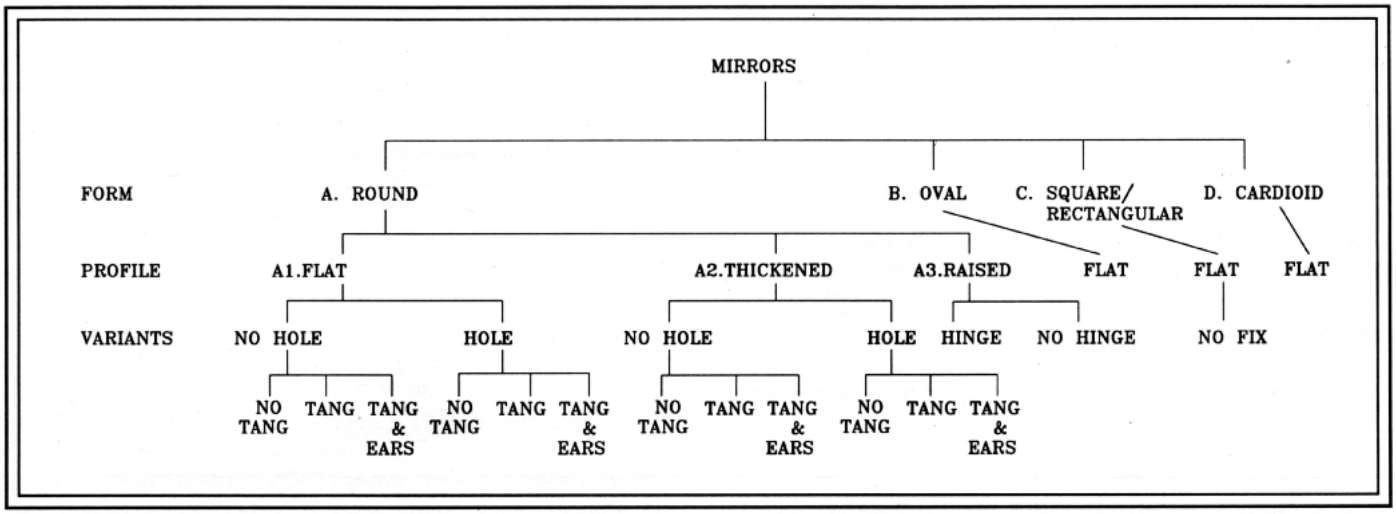

Figure 3. Classification of bronze mirrors according to their shape and handle characteristics.

Having categorized all mirrors according to these parameters, it was possible to correlate a number of features. **Figure 4** shows the correlation between mirror form and mirror diameter, indicating very clearly that small diameters were only found within round, flat mirrors and within round mirrors with raised rims. The round mirrors with a thickened cross-section (likely hot hammered) appeared to have much larger diameters.

It was also possible to correlate both mirror forms and cross-sectional profiles to the features related to attachment techniques for the mirrors (see frequency table in **Figure 5**). Such correlations are only meaningful if one has access to a large number of related objects. The correlation tables can then serve as points of departure for other archaeological or technical inquiries that would examine, for example, relationships between materials, composition, and production techniques used.

Technical studies were performed on eleven samples representing all three cross-sectional categories.[57] The composition of all the samples was obtained together with their metallographic analysis. With the exception of one flat profile mirror, containing 8% tin and substantial amounts of lead, all others were in the 10-14% tin range, with no or minor lead content. Though zinc was looked for, none was found in any of the samples. The metallographic evidence showed worked and annealed microstructures rather than "as cast" configurations. The presence of copper sulfide and copper-iron sulfide inclusions indicated that roasted copper sulfide ores were used as the raw material source. Alloys of this composition produce silvery and quite shiny mirrors; the observed tin content is less than the 19% tin reported by Delattre.[11]

The information on record also included observations from the microscopic examination such as the nature of corrosion, or the presence of textile traces in the corrosion layers. Along with references to the relevant excavation reports and pertinent literature this information was also transferred to the registration files and conservation records of individual objects.

Objects Made of Ostrich Egg Shell

This artifact category, containing 1,190 objects and fragments of individually made artifacts including 1,179 masks that are uniquely and purely Carthaginian, illustrates the challenges of categorizing this group of objects.

In addition to the items described below, it was found that the collection contained some 15,000 small perforated beads (approximately 5 mm in diameter) made from ostrich egg shells. These beads were originally described as made of soft stone. The remarkable uniformity of their thickness as well as closer microscopic observations showed that the beads were actually made of ostrich egg shell. Originally, the beads were probably strung and served as parts of necklaces.

The collection also contained four whole ostrich egg shells, seven shell vessels and 1,179 masks or mask fragments made of ostrich egg shell. The typology devised for their evaluation is indicated in **Figure 6**.

Two whole shells had only an emptying hole and no surface treatment, two others consisted of shell "nuclei" with missing pieces. The areas of missing shell are bordered with traces of

TYPE	FORM	QUANTITY	DIAMETER (cm)																		
			5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
A1	ROUND/FLAT	89	4	3	–	1	2	1	2	4	8	22	15	12	8	3	2	–	2	–	–
A2	ROUND/THICKENED	51	–	–	–	–	1	–	–	–	1	–	2	7	8	7	12	7	4	1	1
A3	ROUND/RAISED	30	–	–	4	2	1	–	3	3	2	8	2	2	3	–	–	–	–	–	–
B	OVAL	6	–	–	–	–	–	–	–	–	–	2	2	–	1	1	–	–	–	–	–
C	SQUARE	3	–	–	–	1	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–
D	CARDIOID	15	–	–	–	–	–	–	–	2	1	6	3	1	–	2	–	–	–	–	–

Figure 4. Correlation between mirror form and mirror diameter.

		FORM				PROFILE			HOLD										
									HOLE				NO HOLE						
		ROUND	OVAL	SQUARE	CARDIOID	FLAT	THICK	RAISED	HINGE	NO TANG	TANG	EARS	NO TANG	TANG	EARS	UNDIAGNOSTIC
FORM	ROUND	170	–	–	–	89	51	30	6	14	32	6	35	7	51	19
	OVAL		6	–	–	6	–	–	–	–	3	–	–	–	–	3
	SQUARE			3	–	3	–	–	–	–	–	–	3	–	–	–
	CARDIOID				15	15	–	–	–	12	–	–	–	–	–	3
RIM	FLAT					113	–	–	–	25	35	4	11	6	12	20
	THICKENED						51	–	–	1	–	2	3	1	39	5
	RAISED							30	6	–	–	–	24	–	–	–
HOLD	HINGE								6							
	HOLE – NO TANG									26						
	HOLE – TANG										35					
	HOLE – TANG & EARS											6				
	NO HOLE – NO TANG												38			
	NO HOLE – TANG													7		
	NO HOLE – TANG & EARS														51	
	UNDIAGNOSTIC															25

Figure 5. Frequency table correlating form, cross-sectional profile, and attachment features for mirrors.

resinous substance and we believe that this material may have been used to outline the area of the shell that was extracted for mask making.

Among the seven shell vessels were found six shell vases of a closed form (with only an opening in a form of a simple cut hole that is never above three-quarters of the height of the egg) with or without geometric decorations, and one shell cup (in a form of a half-shell) painted in red on the interior and decorated with faint geometric floral patterns and bands on the exterior.

The main part of the collection was made up of 1,179 shell masks or fragments of masks. These were pieces of extracted or cut shell material decorated with a human face, often in relief, by incision and/or paint. The contour of the face is round to semi-circular, sometimes quadrangular, and the image of the face occupies all or most of the shell fragment. The hair is indicated by a line of stylized curves; the eyebrows, the eyelashes, the eyes, the mouth, and the cheek bones are clearly shown; the nose is rarely visible and appears not to be painted but either incised or suggested by a whiter area. An example of such a mask is shown in **Figure 7**.

Six different types of masks can be distinguished based on the form of the shell fragment and the decorative approach (**Table II**). Because the decoration was not discernable before the masks were treated by the conservation laboratory (they were covered with a thick layer of dust and dirt), the numbers of objects reported in the table for each group refers only to treated masks. However, the ratio of various groups of conserved masks reflects the overall proportions of different groups since their size and shape are related to their decorative approach.

In general, both the number and the variety of masks were greater than expected given the archaeological record. The technical studies showed the variety of intricate techniques utilized in what was a prevalent class of votive artifacts. A number of technical questions were addressed, such as the method of obtaining the shell fragment from the egg shell, the surface treatment of the mask, and changes in the material due to burial and post-burial conditions.

As indicated in **Table II**, three methods of separating shell fragments from the shell were distinguished: "etching," a "hole and groove" technique, and "chipping." There are also three distinct technical methods of indicating facial features: etching away the background, incising, and painting directly onto the existing surface.

The pigments from the masks were examined using x-ray diffraction and optical spectroscopy, and were identified as inorganic (often impure mineral mixtures) and organic colorants [*e.g.*, red (hair, lips)—hematite and red ochre; red (eye corner, interior surface)—cinnabar; dark brown/black—manganese pigment or charcoal; heavy dark brown/black paint—organic residue].[58] The microscopic analyses also showed that the pigment was mostly applied to the abraded and incised surface of the egg shell fragments.

During burial, a variety of diagenetic changes took place to the shells, including the dissolution and re-precipitation of calcium carbonate, the deterioration of pigments containing copper impurities, and the widespread nucleation and growth of an entirely new phase, hydroxyapatite. This latter phenomenon is perhaps the single most notable feature of the state in which the masks are found today, accounting for a variety of surface deposits, decorative layer alterations, and structural changes to the shell.

The Findings

Prior to the current project, there had been no study of the whole Punic collection of the Museum of Carthage, nor did an overall inventory exist. Preparations for the project, as well as expectations of what the collection might contain were, therefore, formed from a study of the general literature, personal consultations with scholars in the field, excavation reports, and published studies of certain Carthaginian artifacts such as razors or oenochoes. It is of interest to review the main features of the collection in the light of this prior knowledge because all phases of the project yielded unanticipated results.

There was both an unexpectedly large number of objects in particular groups, as well as a very wide variety in objects and materials used. For instance, jewelry was made from almost every material available to Carthaginian artisans.

The number of metal objects as well as the variety of their forms was greater than expected from the records. Bronze mirrors and bronze razors were numerous and varied in their form. The ratio of razors to mirrors, 1 to 3, was unexpected given that the literature principally describes the presence of razors. The number of oenochoes and their handles, as well as the various forms of the handles was greater than anticipated. Subsequent conservation treatment revealed two inscriptions that had gone unrecorded: one on the handle of an oenochoe and one on a bronze cymbal. Each inscription has been studied by a different epigraphist.[59,60] The quantities of bronze cymbals, bells, and arrowheads was much greater than expected when considering the inventories reported in individual excavation reports, as was the quantity of coffin hardware (nails, brackets, handles) and the variety of its forms.

Lead artifacts were far more frequent and more varied in form than the records indicated. Most of them showed traces of gilding, which was previously not recorded. There were many iron objects, in particular, scissors and knives, as well as iron finger rings. There was a striking predominance of "gold" jewelry objects, previously described as solid gold, but on close examination, identified by the team as another material covered by gold sheet. Other jewelry artifacts were also numerous, and the ratios of gold to lead to bronze to iron objects is of interest. The general tendency to make all jewelry with a gold appearance regardless of its core material, is worth stressing.

In this project 3,161 objects made from bone-like material were inventoried. The majority of these objects that are

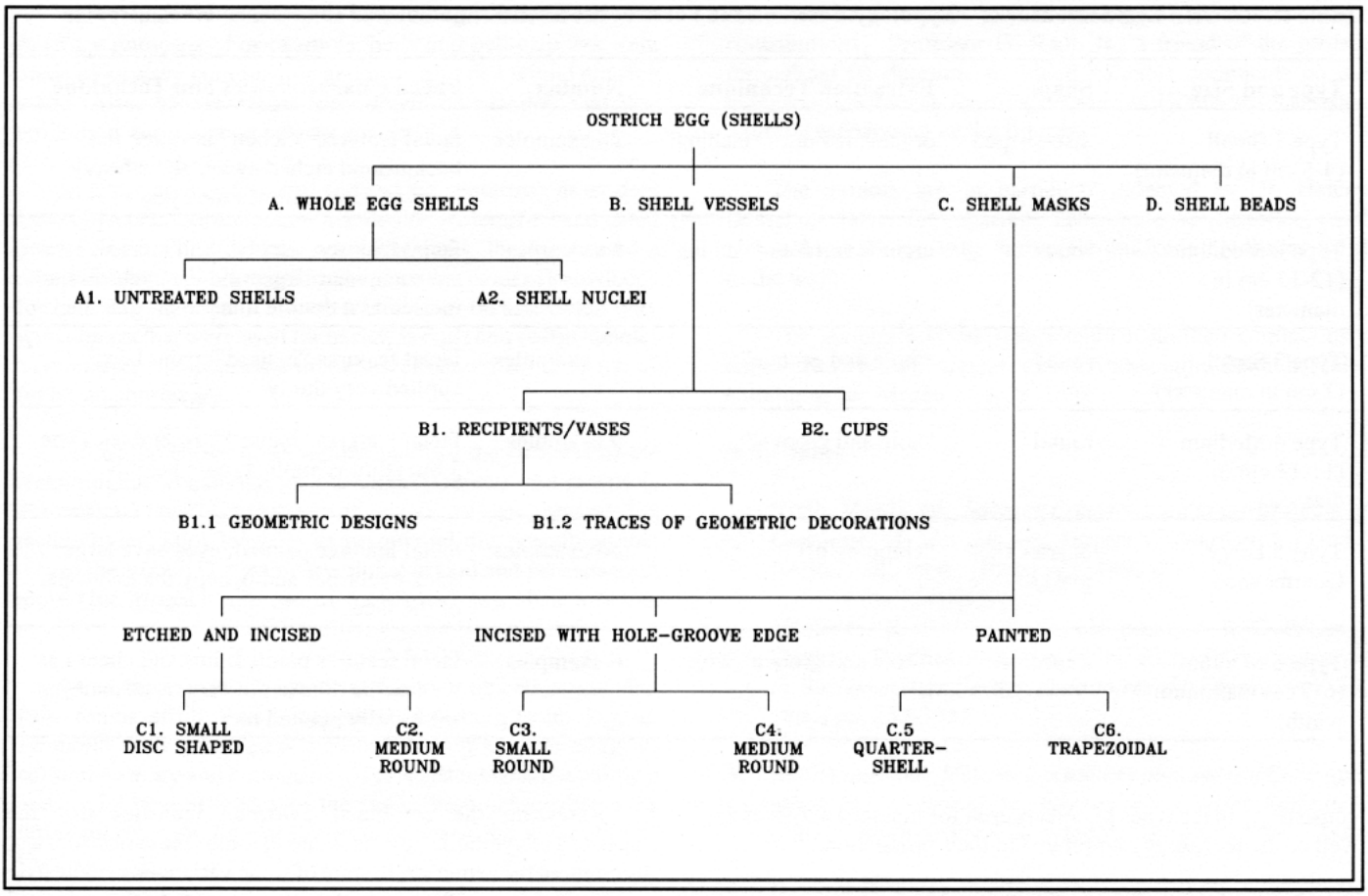

Figure 6. Classification of ostrich egg shell masks according to their shape and decoration technique.

identified and described in the literature were originally characterized as being made of ivory. However, an optical examination revealed that only 8 objects were made of ivory.

The presence of textile and grassy woven materials on all types of objects, either as remnants of original material or as pseudomorphs found in corrosion layers, was much more widespread than previously reported in excavation notes.

Ostrich egg shell artifacts were much more numerous than anticipated. The variety of techniques employed to extract and cut the shell material, and to treat the surface and decorate it, had not been previously reported. Nor had the presence of thousands of ostrich egg shell beads been recorded.

Glaze/frit artifacts were present in quantities greater than expected, particularly as small vessels. Close examination of terra cotta figurines has revealed overpainting with cinnabar around the neck and ears of the figurines. This finding, previously unrecorded, may confirm beliefs that the figurines were overpainted in religious ceremonies.[3]

The Implications of the Findings: Another Window on Carthage

The examination and assessment of the collection as a whole revealed important information about the state of preservation of the collection and the characteristics and technology of the production of objects. The examination and assessment enabled guidelines to be established for the subsequent work, including conservation treatments, covered in this series or in the manual.[1] The following section focuses mainly on what the examination and assessment of the collection as a whole revealed about the Carthaginians and their society.

A particularly striking characteristic of the collection of funerary and votive objects that became evident as a result of examining the collection as a whole is the remarkable consistency

Table II. Ostrich Egg Shell Masks – Typology Based on the Form of the Shell Fragment and the Decorative Approach

Type and Size	Shape	Extraction Technique	Number	Facial Characteristics and Technique
Type 1 Small (4-6 cm in diameter)	disc-shaped	organic residues "etching"	28 examples	facial features "etched" in relief: the background etched away, and a heavy layer of paint outlines the eyes
Type 2 Medium (12-13 cm in diameter)	round	organic residues "etching"	5 examples	facial features "etched" and incised: eyes are somewhat larger and the eyebrows are incised as a double line
Type 3 Small (7 cm in diameter)	round	"hole and groove"	11 examples	facial features "incised": paint layer applied very thinly
Type 4 Medium (11-13 cm in diameter)	round	"hole and groove"	9 examples	facial features "incised": resembles Type 3 but paint is applied more heavily
Type 5 Large Quarter shell	quarter shell masks	"chipping off"	16 examples	facial features painted: eyes have large thick eyelashes and occupy the major part of the face
Type 6 Medium (6-7 cm maximum width)	trapezoidal	"hole and groove" with less care	6 examples	facial features painted: lips and cheeks as well as the dots in the corners of the eyes are usually painted red

in the types of objects used for funerary purposes as well as the technology employed in their production.

Though details of provenance and the association of individual objects were not available (for the historical reasons outlined above), more than 600 excavated necropolis tombs ranging in period from the eighth to the second century B.C. are known. The existing excavation reports provide inventories and object association for but a few of the tombs throughout this period.

Figure 7. An example of a mask made of ostrich egg shell (trapezoidal face mask).

Assessing the combined evidence indicates that the repertory of symbolic objects found in tombs remained constant throughout the centuries, in spite of some variations in their style or decorations. This was also the case with the principal preoccupations for the afterlife, which appear to have been focused on personal appearance. The predominance of decorative artifacts such as jewelry, pigments and make-up boxes, glaze and ostrich egg shell masks, *etc.*, seems to indicate an ongoing preoccupation with personal appearance and individual satisfaction.

The lack of military objects found in the tombs suggests that, although Carthaginians were actively involved in conquest and military actions, those buried in the necropolises of Carthage, many of them likely of high or elevated status, did not seem to think that they needed weapons for their protection in the next world.

Also, except in the very early period, it seems that different styles co-existed in public taste throughout the period between the seventh and the second century B.C. For instance, decorations on objects showed both Egyptian-like and Hellenistic motifs, sometimes appearing side by side on the same artifact, as previously noted on razors.

The variety of materials used, and the relative sophistication with which objects were produced, indicate a considerable knowledge of different technologies. The large quantities and variety of objects found suggest a local manufacture with a diverse and abundant production. (Lead-isotope studies on a number of metal objects are in progress.)

Some of the objects appear to have been made solely for funerary purposes. For example, bells and bell clappers were made of an alloy composition and in shapes that would not ring well. Also, bronze razors were made of an alloy that was unlikely to have a good cutting quality.

In later periods (the third and second centuries), as evident from objects in the collection that could be identified and dated on the basis of individual excavation notes, there appeared a relatively sloppy workmanship in spite of an evident knowledge for handling materials. However, this may be associated only with objects that were used for burial, as nails and coffin handles have copper compositions that are well-suited for their use as functional hardware.

All of the above observations point to the richness of the technological vocabulary in Carthage. Objects and materials demonstrate that Carthage was aware of and shared the technological knowledge of its period and did everything that was in the technical vocabulary of that period and perhaps even more (for instance, the use of the ostrich egg shell to make masks).

Thus, the tens of thousands of funerary objects originating from tombs of all periods appear to indicate a technological, symbolic, and ideological stability, which in turn suggests cultural stability and homogeneity, co-existent with the political and social circumstances of the time, these being often very turbulent over the five-century existence of the Punic city of Carthage.

In addition to providing fresh insights on Carthage, it is hoped that the methodological approach that was developed to explore, in a scientifically justifiable manner, a large collection of antiquities assembled prior to today's established archaeological methods and cross-referencing systems, may also be useful to scholars, curators, and conservators faced with similar problems of extracting historical information from large collections.

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References

1. Vitali, Vanda, ed., *Salvage Conservation at the Museum of Carthage: A Manual for Artifact Conservation* (Tunis: Institut national du patrimoine, 1993).

2. *Delattre, R. P, "La nécropole punique de Douimes à Carthage. Fouilles de 1895 et 1896," *Extrait de mémoires de la Société nationale des antiquaires de France*, vol. 56, 1897, pp. 255-395.

3. Benichou-Safar, Hélène, *Les tombes puniques de Carthage: topographie, structures, inscriptions et rites funéraires* (Paris: Centre national de la recherche scientifique, 1982).

4. Delattre, A. L., *Les tombeaux puniques de Carthage* (Lyon: Imprimerie Mougin-Rusand, 1890).

5. Delattre, A.L., "Les tombeaux puniques de Carthage: nécropole de la colline de Saint-Louis," *Revue archéologique*, vol. 1, 1891, pp. 52-69.

6. Delattre, R. P., "Nécropole punique de la colline de Saint-Louis," *Extrait des missions catholiques*, 1896, pp. 7-96.

7. Delattre, R. P., "Carthage. La nécropole punique de Douimes: fouilles de 1893-1894," *Extrait du Cosmos*, 1897, pp. 1-31.

8. Delattre, A. L., "Un mois de fouilles dans la nécropole punique de Douimes à Carthage: février 1895," *Revue archéologique*, 1895-1897, pp. 170-177.

9. Delattre, R.P., "Carthage. Quelques tombeaux de la nécropole punique de Douimes (1892-1894)," *Extrait des missions catholiques*, 1897, pp. 5-31.

10. Delattre, R. P., "Carthage. Nécropole punique voisine de Sainte-Monique: second mois des fouilles," *Extrait du Cosmos*, 1898, pp. 1-23.

11. Delattre, R. P., "Fouilles exécutées à Carthage pendant le premier trimestre de 1899, dans la nécropole punique située entre Bordj-Djedid et la colline de Sainte-Monique," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1899, pp. 308-322.

12. Delattre, R. P., "Carthage. La nécropole punique voisine de la colline de Sainte-Monique: le premier mois des fouilles. Janvier 1898," *Extrait du Cosmos*, 1899, pp. 1-23.

13. Delattre, R. P., "Note sur une nécropole punique voisine de Sainte-Monique," *Extrait du bulletin archéologique*, 1899, pp. 262-273.

14. Delattre, R.P., "Les fouilles de la nécropole voisine de Sainte-Monique, à Carthage," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1900, pp. 83-93.

15. Delattre, R. P., "Nécropole punique voisine de Sainte-Monique. Le deuxième semestre des fouilles (juillet-décembre)1898," *Extrait du Cosmos*, 1900, pp. 1-27.

16. Delattre, R.P., "Carthage. Nécropole punique voisine de Sainte-Monique: troisième mois des fouilles," *Extrait du Cosmos*, 1900, pp. 1-16.

17. Delattre, R. P., "Musée Lavigerie de Saint-Louis de Carthage," in: *Musées et collections archéologiques de l'Algérie et de la Tunisi*e, vol. 1 (Paris: Ernest Leroux, 1900).

18. Delattre, A. L., "La nécropole punique voisine de la colline Sainte-Monique à Carthage – Rapport semestriel (janvier-juin 1900)," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1900, pp. 488-511.

19. Delattre, R. P., "Carthage. La nécropole punique voisine de Sainte-Monique. Deuxième trimestre des fouilles," *Extrait du Cosmos*, 1901, pp. 1-28.

20. Delattre, R. P., "Fouilles exécutées dans la nécropole punique voisine de Sainte-Monique, à Carthage," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1901, pp. 583-601.

21. Delattre, R. P., "Figurines trouvées à Carthage dans une nécropole punique (1903)," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1903, pp. 429-436.

22. Delattre, R. P., "Les grands sarcophages anthropoïdes du Musée Lavigerie à Carthage," *Extrait du Cosmos*, 1904, pp. 1-45.

23. Delattre, R. P., "Nécropole punique de Carthage (avril-mai 1905)," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1905, pp. 317-327.

24. Delattre, R. P., "Carthage. La nécropole voisine de Sainte-Monique: groupe de figurines," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1905, pp. 125-134.

25. Delattre, A. L., "La nécropole des rabs, prêtres et prêtresses de Carthage (1899)," *Extrait du Cosmos*, 1906, pp. 3-30.

26. Delattre, A. L., "La nécropole des rabs, prêtres et prêtresses de Carthage (deuxième année des fouilles)," *Extrait du Cosmos*, 1906, pp. 3-30.

27. Delattre, A. L., "La nécropole des rabs, prêtres et prêtresses de Carthage (troisième année des fouilles)," *Extrait du Cosmos*, 1906, pp. 5-43.

28. Delattre, A. L., "La nécropole des rabs, prêtres et prêtresses de Carthage (quatrième année)," *Extrait du Cosmos*, 1906, pp. 1-27.

29. Delattre, A.L., le R. P., "Fouilles de Carthage Douimes et la colline dite de Junon," *Extrait du bulletin archéologique*, 1907, pp. 433-453.

30. Merlin, A. and Drappier, L., "La nécropole punique d'Ard el-Kheraib à Carthage," *Notes et documents de la Direction des antiquités et arts, Tunis*, vol. 3, 1909, pp. 5-97.

31. Merlin, A., "Note sur des tombeaux puniques découverts à Carthage en 1916," *Extrait du Bulletin archéologique*, 1917, pp. 131-153.

32. Merlin, A., "Fouilles de tombeaux puniques à Carthage," *Bulletin archéologique du Comité des travaux historiques et scientifiques*, 1918, pp. 288-334.

33. Merlin, A., "Notes sur quelques tombeaux puniques découverts à Carthage," *Bulletin archéologique du Comité des travaux historiques et scientifiques,* 1920, pp. 3-20.

34. Gauckler, P. and Poinssot, L., *Catalogue du Musée Alaoui; 1er supplément* (Paris: Ernest Leroux, 1907-1909).

35. Gauckler, P., *Nécropoles puniques de Carthage*, vols. 1 and 2 (Paris: Auguste Picard, 1915).

36. Lancel, Serge, ed., *Mission archéologique française à Carthage – Byrsa I et II*, vols. 1 and 2 (Tunis: Institut national d'archéologie et d'art de Tunis et École française de Rome, 1979).

37. Lancel, Serge, *La colline de Byrsa à l'époque punique* (Paris: Éditions Recherche sur les civilisations, 1983).

38. Lancel, Serge, *Carthage* (Paris: Fayard, 1992).

39. Chelbi, Fati, "Carthage. Sépultures puniques découvertes à l'est du théâtre," *Reppal*, vol. 1, 1985, pp. 77-94.

40. Chelbi, Fati, "Carthage. Découverte d'un tombeau archaïque à Junon," *Reppal*, vol. 1, 1985, pp. 95-117.

41. Ennabli, Abdelmajid, "La campagne internationale de sauvegarde de Carthage. Fouilles et recherches archeologiques 1973-1987," *Extrait des comptes rendus des séances de l'Académie des inscriptions et belles-lettres*, 1987, pp. 407-438.

42. Benichou-Safar, Hélène, "Tophets et nécropoles puniques," in: *L'histoire et l'archéologie de l'Afrique du Nord*, Proceedings of the Colloquium, October 1993, Pau, France (Nancy: Centre national de la recherche scientifique, 1995), pp. 91-101.

43. Benichou-Safar, Hélène, "Les fouilles du tophet de Salammbô à Carthage," *Antiquitiés africaines*, vol. 31, 1995, pp. 81-199.

44. Benichou-Safar, Hélène, "Les phénico-puniques et la mort: mise en perspective des recherches," in: *I Fenici: Ieri Oggi Domani*, Proceedings of the Colloquium, 3-5 March 1994, Rome (Rome: Accademia Nazionale dei Lincei et Consiglio Nazionale della Richerche, 1995), pp. 95-105.

45. Cintas, Pierre, *Manuel d'archéologie punique - Histoire et archéologie comparées*, vol. 1 (Paris: A.et J. Picard, 1970).

46. Cintas, Pierre, *Manuel d'archéologie punique - La civilisation carthaginoise: les réalisations matérielles*, vol. 2 (Paris: A. et J. Picard, 1976).

47. Deneauve, Jean, *Lampes de Carthage* (Paris: Centre national de la recherche scientifique, 1968).

48. Picard, Colette, "Les œnochoés de bronze de Carthage," *Revue archéologique*, vol. 1, 1959, pp. 29-64.

49. Picard, Colette G., "*Sacra Punica* – Étude sur les masques et les rasoirs de Carthage," *Karthago*, vol. 13, 1965-1966, pp. 11-115.

50. Acquaro, E., "I Rasoi Punici," *Studi semitici* , vol. 41, 1971.

51. Quillard, Brigitte, "Les étuis porte-amulettes carthaginois," *Karthago*, vol. 16, 1970-71, pp. 5-32.

52. Quillard, Brigitte, *Bijoux carthaginois: I – Les colliers* (Louvain: Université de Louvain, 1979).

53. Quillard, Brigitte, *Bijoux carthaginois: II - Porte-amulettes, sceaux-pendentifs, pendants, boucles, anneaux et bagues* (Louvain: Université de Louvain, 1987).

54. Astruc, Myriam, "Traditions funéraires de Carthage: Oeufs d'autruche," *Les cahiers de Byrsa*, vol. 6, 1959, pp. 29-58.

55. Astruc, Myriam, "Exotisme et localisme: Étude sur coquilles d'oeuf d'autruche décorées d'Ibiza," *Archivo de Prehistoria Levantino*, vol. 6, 1957.

56. Seefried, Monique, *Les pendentifs en verre sur noyau des pays de la Méditerranée antique* (Rome: École française de Rome, 1982).

57. Wayman, Michael L., *Technical Analysis of Carthaginian Metal Objects* (Internal Technical Report, University of Toronto, 1992).

58. Twilley, John, *Technical Studies of Carthaginian Ostrich Egg Masks* (Internal Technical Report, University of Toronto, 1992).

59. Ferron, Jean, *Note* (Internal Report, Musée de Carthage, 1992).

60. Morel, Jean-Paul, "Une oenochoé en bronze à inscription grecque de Carthage," *Travaux du Centre Camille Jullian*, vol. 17, 1994, pp. 179-188.

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