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# Conservation of Archaeological objects, the case of Saruq Al Hadid

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***Abstract*—** Artfix Conservation is a group of young professionals specialized in cultural materials conservation. Our highly qualified team of conservator-restorers, archaeologists and art historians bring together a wealth of experience and knowledge in cultural heritage.

Artfix Conservation adheres to international codes of conduct and applies a minimal intervention approach to our treatments, which are consistent with current conservation literature.

For the past year, Artfix has been working with Dubai Municipality to conserve and restore archaeological objects from the significant archaeological site, Saruq al Hadid.

Saruq al Hadid is perhaps the most interesting and prolific archaeological site in Dubai. The site was active as a metals production site during the Iron Age (III-I Millennium B.C.E), and has been actively studied and excavated for several decades.

Hidden under desert sand dunes, this site has revealed a diverse range of artefacts such as a wide variety of iron and bronze weapons of different shapes and sizes, bronze household goods, beaded necklaces, and even delicate gold ornaments. A small selection of the thousands of objects found at the Saruq al Hadid site can be found in the newly opened Saruq al Hadid Museum in the Al Fahihi historical neighbourhood.

The interdisciplinary study of the Saruq al Hadid site has allowed Artfix Conservation to contribute to the overall understanding of the site, in addition to prompting further questions and directions for research.

***Keywords*—***Heritage, Archaeology, Conservation, Restoration, Iron Age, Dubai.*

## I. ARTFIX CONSERVATION, CODES OF CONDUCT

Artfix Conservation is a group of young professionals specialized in cultural materials conservation. Our highly qualified team of conservator-restorers, archaeologists and art historians bring together a wealth of experience and knowledge in cultural heritage.

Trained in renowned universities, the team has developed their professional careers in leading cultural heritage institutions, museums and archaeological sites of different countries.

Artfix Conservation adheres to international codes of conduct consistent with current conservation literature. These codes are:

- minimal intervention: only treatments necessary to the ongoing stability of an object should be applied.
- maximum respect to objects in their entirety: every single object is a proof of History, no matter the chronology, size, material or authorship.
- knowledge of the causes of degradation: as a key to provide conservation solutions.
- legibility: a conservator's work must help to improve the legibility of an object but not at the object's expense.
- reversibility: conservation is a changing science, you never know when a more effective solution is going to appear.
- stability: as the main goal of the conservator's work.
- preventive conservation: as a key to prevent and/or minimize degradation on any heritage material through the control of an object's environment.
- sustainability: every action taken in the present should be sustainable in the future otherwise is a waste of time and energy.
- documentation: as a key to understand and make easier for other people to understand every step the object has gone through.
- multi and interdisciplinary collaboration: ensuring a balanced and comprehensive analysis of an artefact.

The team has the ability to work with a diverse range of objects and materials, such as archaeological metal, ceramics, stone, wood and glass, and approaches the treatment of cultural material in accordance to current conservation knowledge and codes of conduct.

## II. SARUQ AL HADID SITE

The Saruq Al Hadid archaeological site is located at the north of Rub al Khali desert, in an area of active dunes between the cities of Dubai, Abu Dhabi and Al Ain, in the United Arab Emirates.

The site was discovered by chance by the Sheikh Mohammed Bin Rashid Al Maktoum during a helicopter flight, when he observed some unusual dark shapes within the desert dunes.

The meaning of "Saruq al Hadid" in Arabic is "way of iron" and that can give us an idea of the type of activities that were undertaken in this place at its height of production and human occupation. The site is defined by the presence of thousands of archaeological objects spread over an approximate area of 1 $km^2$ and covered by more than 6 meters of sand dune. Archaeologists have determined the chronology of the site to be the period of Iron Age II (1100-600 BC) [1], describing the place as a very important metalwork centre. Saruq al Hadid could have been an important cult meeting place and peregrination point for other populations in the region, as well as an important location for the regional exchange system [2] [3] [4].

The justification for choosing a remote location to establish a metals production site is not immediately apparent, however Saruq al Hadid is situated between the Hajar Mountains, a place rich with copper deposits, and the gulf coast. All the evidence seems to indicate that the environment at that time was different from the current one, and the presence of important resources such as water and agriculture were assumedly substantial enough to support the metallurgic industry. It is unknown yet if the availability of these resources remained constant over the year.

Whilst it is unknown why this location was chosen, the type of objects found has provided evidence that the people from Saruq al Hadid were in contact with other important cultural centres such as Mesopotamia, Syria, India and Egypt. This is not a surprise as Saruq Al Hadid was likely at the crossroads between the sea and the land routes of some of the most influential civilizations of that time.

## III. OBJECT FOUND IN SARUQ AL HADID

The variety of objects extracted from Saruq al Hadid is exceptionally rich. There have been more than 15,000 archaeological objects excavated, and that amount has continued to increase as archaeological activity has continued. There are ceramics, stoneware, necklaces, and seals, but objects made from iron and copper alloys are the most abundant. The huge amount of objects reveals the ability of the metalworkers to produce a wide diversity of metal objects, and the capacity to mass produce particular objects such as arrowheads (of which thousands have been found). In addition to copper and iron alloy objects, evidence shows metalworkers at the site also worked with gold to produce a variety of objects. Although it remains unclear if these objects were for local use, or intended for trade with other cultures.

Among the archaeological metal objects there is an immense variety of tools and weapons. Some of these are decorated, whilst others are unfinished, which could be seen as proof of that the metalwork activity was taking place at the site itself.

Our team has had the opportunity to conserve iron swords, iron and copper decorated daggers and other copper alloy objects such as swords, daggers, knives, axes, bowls, arrowheads, anklets, plates or rings.

Due to the susceptibility of iron to corrosion processes, iron objects from this period are rare. We are fortunate to have had the opportunity to work with many iron swords. They are very difficult to conserve and they are an amazing example of the technical abilities of the metalworkers, when one takes into account that they were made more than 3,000 years ago.

Anklets are one of the mysteries of this site. They are made of solid copper alloy and vary in size and shape, most of them with a very rich geometric decoration. The theories about their use vary from decorative accessories for human beings to camel anklets, which it seems to be the current accepted theory.

Daggers with decorated handles are some of the more conspicuous objects found at Sarouq al Hadid. The daggers are either made of only copper alloy or a mix of two metals: iron for the blade and pure copper or copper alloy for the handle. These objects, feature rich decoration in the handle, such as goats, snakes or lion motifs and forms. These elements are frequently used in Mesopotamia and the Eastern Mediterranean, which suggests a link between Saruq al Hadid and these distant regions.

Incense burners are also very remarkable examples of the workmanship at the site. Until now, approximately 20 incense burners have been excavated, with very different shapes and typologies, probably influenced by the material culture of nearby civilisations. The wide variety of incense burners include simple shapes without decoration, to tall incense burners with complicated shapes and even animal decoration in their stands.

The function of many objects at Saruq al Hadid remains unclear. The best example of this group are the especially significant “spouted bowls”. Made in a range of sizes, these objects usually have an excessively large spout and some of them have decorations in their bodys or/and on their rims.

Snakes seem to have been an important symbol in the region during the Iron Age, because examples of the presence of these decorative elements are very abundant in other sites in the UAE and Oman. The objects from Saruq al Hadid are characterized by the presence of serpentine decorative elements both in ceramic and metallic containers, and also in the shape of small copper alloy snake figurines complete with facial features and spots along the body.

Although weapons are the most abundant type of object founded in this archaeological site, thousands of other objects have been found. Many of these appear to have some domestic function, such as bowls of different shapes and sizes, and larger storage vessels such as cauldrons. Although most show no clear signs of use, some have revealed traces of decorative elements such as animals or geometric designs.

As a last curiosity, it is important to point out that there are some objects that seemed to have been abandoned, intentionally or not, in the middle of the working process. There have been a lot of examples of objects which have been bent, cut, broken or probably “recycled” for further use, but these could also be considered as intentional deposits for ritual or other unknown reasons.

## IV. CONSERVATION AND RESTORATION WORK

The following examples highlight the relevance of the Conservator to the archaeological process, from the excavation of an artefact to its interpretation. At Saruq al Hadid, conservation has contributed to the decades of archaeological excavation and study which has revealed tens of thousands of objects including copper alloy axes, arrowheads, knives, incense burners, bowls, iron swords…

Due to the specific burial conditions of the site and the resulting corrosion processes, the surfaces of the metal artefacts are almost completely obscured by carbonates and corrosion products. The conservation team has chosen to apply a minimal intervention approach using appropriate cleaning techniques, informed by the results of previous analysis.

This approach has allowed conservators to reveal decoration which was not previously detected by archaeologists or investigative techniques. In addition to decoration, meticulous conservation work has revealed evidence of manufacturing processes, repairs and even possible intentional destruction. This information could influence the archaeological interpretation of an object, a context, or even the entire site.

### *A. Iron objects*

Some of the most spectacular objects found in Saruq Al Hadid site are made of iron, such as the exceptionally long swords which are often found broken in sections and in a very precarious condition.

Based on the remaining fragments of some of the handles, it is logical to think that the they were originally made of organic material such as animal bone. If the handles were originally decorated, there is no evidence remaining as the fragments are generally small and quite degraded.

Treatment of iron swords generally consist of an intensive mechanical cleaning which focuses on the removal of corrosion products, sand and carbonates from the surface and between the layers of delaminating iron. This cleaning is followed by chemical stabilization and the application of protective coatings which will act as a barrier between the object and the environment

### *B. Anklets*

From the conservator's point of view, anklets are complicated artefacts to restore. Firstly, its curve shape creates tension in the metal which results in higher structural and corrosion problems; and secondly the decoration on its wedges is very superficial and can be lost in the process of removing the corrosion.

### *C. Daggers*

The copper alloy daggers with bone handle found are an outstanding example of how organic material can remain if the archaeological/burial environment is suitable. Before the cleaning process started, the bone has to be covered with gauze and synthetic resin to avoid any staining from the copper corrosion cleaning, this would also serve to prevent cracks developing in such a delicate material.

As we said before, one of the most impressive typologies of dagger are those made of a composite of two different materials. The combination of two metals can have a galvanic effect with one of the metals being preferentially corroded. Fortunately, in the case of composite daggers found in Saruq Al Hadid, this has not resulted in the loss of the iron blade, although it can be seen that the copper is relatively better preserved.

### *D. Incense burners*

Over the years of excavation, around 20 incense burners have been found but there is one that can be considered exceptional due to the high degree of skill undoubtedly involved in its creation and a particularly good state of preservation.

The cleaning process for this incense burner was laborious due to its size, shape and, most of all, the fragility of the body (note that there was a medium size hole on the body that could lead to a wall crack and eventual collapse).

This object can be seen as an example of how sometimes conservation treatments have their limits. The incense burner body is naturally hollow (rather than solid metal), and access to the interior was not possible, so chlorides undoubtedly remain on the interior surface.

### *E. Bowls/Spouted bowls*

The classification of a 'bowl' is very wide, and under this tag there are many typologies of receptacles that were created for very different functions, but the most widely accepted assumption is that there were used for domestic purposes. This is why it is considered significant when decoration is found on otherwise utilitarian objects.

Examples of such decoration that we have found during course of treatment include fish silhouettes found on the rim of a spouted bowl, snake silhouettes on the bottom of a plate/bowl and geometrical decoration on the body of a spouted bowl, all of them incised with an unknown tool after the bowls were made.

The largest objects that Artfix Conservation has been tasked with conserving are two large copper alloy cauldrons. Both copper alloy cauldrons have two loop handles, and evidence of use, however their shape and form is quite difference.

The first one is mended with a thin sheet of the same copper alloy material affixed with nails, probably with the purpose of extending its use.

In contrast the second one has holes in the wall clearly made on purpose, possibly indicating intentional destruction. Also it has been crushed in the bottom but it is yet to be determined if this was done on purpose or by the action of the weight of sand during burial.

## V. THE IMPORTANCE OF THE CONSERVATOR IN ARCHAEOLOGY

The purpose of conservation and restoration was historically seen as the restoration of objects to original appearance, with an emphasis on the restoration of aesthetic elements. However, as the profession developed alongside the development of archaeological investigation teams, the focus has changed to the conservation and preservation of archaeological information.

The role of the conservator in archaeological research is not just another vital link in interdisciplinary collaboration, but also as a key resource in scientific research. Far from consisting of the specific conservation treatments of archaeological material, the current role of a conservator requires involvement both before and during scientific studies of archaeological material. Working together and in close proximity to the archaeologist is essential. This mutual collaboration ensures robust results and provides material that will provoke more research questions and directions.

A conservator must take into account that each object is singular and unique, and for that reason, each object requires a tailored treatment approach to facilitate their archaeological comprehension and facilitate further investigations.

As it has been observed throughout this presentation, conservation treatment has been essential to allow the archaeological objects from Saruq Al Hadid to endure over time. It has also served to expose and illuminate the historical origins of this country, with an emphasis on the preservation of this material to ensure access for current and future generations. But also, on the archaeological level, the restoration of these objects has provided the answer to some of the many unknowns that surround this archaeological site. Thanks to the treatments carried out on these objects, the theory of this site as a metallurgical production center has been confirmed. The numerous objects bent or "recycled" are an example of the operational chains, and the revelation of hidden decorations under the corrosion has provided evidence of possible cultural connections with other areas of the Gulf and further afield. Conservation has provided archaeologists with evidence for further historical parallels and important information about the cultural function of Saruq al Hadid at the time of its greatest occupation.

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