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Limited technology and unlimited results from National Museum of Ras Al Khaimah collection and its sustainability for future generations accessibility

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***Abstract*— The National Museum of Ras Al Khaimah reflecting an eventful history, displaying a rich diversity of traditional architecture. Today the 'Late Fort'exhibits historical, ethnographical, and archaeological material relating to the emirate of Ras Al Khaimah and provides an interesting insight into the history and traditions of this area.**

The formulation of history through the study and preservation of the museum collection is a dynamic and collaborative process that apply a multidisciplinary approach, ethical considerations, and a commitment to sharing the richness of human history with current and future generations. The research focus and shade the light on the role of using technology in studying, investigating and Preservating collection can extracting information which formulate the history of collection. Different cases here representing different time periods, the Daggers, Herbarium collections, and pottery from National Museum of Ras Al Khaimah are valuable resources, a crucial process for formulating and understanding the history, culture and for research, education, and inspiration when studying and preserving it. The research offers innovative technology and solutions for collection that enhance the significant value, history, trading knowledge, protecting unique stories, knowledge, and environmental changes during the history. By adopting integrated study and preservation approaches, using technology and the right methodology of can extend the lifespan of collections and make it more sustainable.

Keywords — Collection, conservation, sustainable, preservation, accessibility, archaeobotanical, digital, herbarium.

I. INTRODUCTION

The National Museum of Ras Al Khaimah was an 'Early Fort' existed inside Ras Al Khaimah Old Town in close proximity to the Mohammed bin Salim Mosque. The Fort according to ancient documents and letters was destroyed twice, in 1621 by the Portuguese and in 1820 by the British. Serving as a residence for the ruling family it was eventually given up around 1920 for a bigger one, just 700m to the south. This 'Later Fort' had originally been built between the British attacks of 1809 and 1819 outside the town-wall and Ras Al Khaimah Old Town. Drawn on the ancient British maps as a squarish defence structure strengthened with three round towers and a single big tower, it was eventually developed into a larger fortified complex. It served as the residence of the ruling Quwasim family until 1964, when the late Ruler, H.H. Sheikh Saqr Bin Mohammed al-Qasimi, moved to a modern building in Mamoura. Later it became a police headquarters and a prison, before it was finally converted into the National Museum in 1987 to start a new adventure but this time with collection [***1***].

The National Museum of Ras Al Khaimah Reflecting an eventful history it has been continuously enlarged over time, displaying a rich diversity of traditional architecture. Today the 'Late Fort ' exhibits historical, ethnographical and archaeological material relating to the emirate of Ras Al Khaimah and provides an interesting insight into the history and traditions of this area.

The museum design like all other traditional houses in Ras Al Khaimah Old Town the 'Late Fort' was originally constructed from coral stone, a fossil building material originating from the sea. The massive rectangular tower represents the oldest part of the 'Late Fort'. It originally served as a single defence tower and, unlike today, stood outside the perimeter wall of Old Town Ras Al Khaimah. While its foundations and lower parts originate from 1809-1819, all further additions took place after the peace treaty

[1] National Museum of Ras Al Khaimah". Department of Antiquities and Museums. Retrieved 2021-11-19.

was signed with the British in 1820[2].
Today the 'Late Fort' is an interesting conglomerate of two-storey buildings surrounding a central courtyard. The big rectangular tower is still the most impressive feature and a smaller tower occupies the opposite corner. Another prominent building is the wind tower, representing the traditional 'air conditioning of the past. Its open sides are designed to catch the breeze from any direction and funnel it down into the room below keeping it cool and ventilated, especially during hot summer months. If desired the wind tower could be blocked with matting or specially cut pieces of wood during winter, when the weather was much cooler with occasional rainfall[3].
The museum gallery in the Late Fort is the rooms situated around the inner courtyard garden with antique wooden doors with traditional carved designs, are open to the public. The artifacts and collections were partly donated by members of the ruling Quwasim family and residents of Ras Al Khaimah. Archaeological excavations, surveys and various scientific research projects undertaken by the Department of Antiquities and Museums have provided further material and significant information about the culture and the traditions of the area [4].

II. METHODOLOGY OF CONSERVATION AND PRESERVATION

III. OBJECT CASE STUDIES

Three cases are discussed the two Daggers, Herbarium collection and pottery jars from recent excavation. The objects were kept in the museum storage and presented to receive the preservation, restoration, and conservation treatment in preparation for future display in the museum gallery for the first time.

A. DAGGER, JAMBIYA

TWO DAGGERS (RAK 430, RAK 11584)

Dagger in a form of Khanjar or Jambiya is a traditional worn by men for ceremonial occasions, it is a specific type of dagger with a short, curved blade with a medial ridge attached to a belt made of textile and/or leather usually worn around the lower abdomen, originated from the Middle East and the Arab world. Craftsmen have excelled in their manufacture and made it full of fine artistic inscriptions and decorations that made it an expensive masterpiece.

The two dagger consists of a curved, double-edged blade, usually made from a fine steel that does not seem to corrode or oxidize to form rust. The hilt/handle is the most important part that holds the most value. The best ones are made of rhino horn. The hilt/ handle is a flattened piece and ornamented, at the centre of the pommel and on the base, with two small circle disks of copper, silver, or gold looks like old coins. The hilt/handle of horn decorated from the front with many holes inlayed with silver.

The sheath where the steel blade is stored, made of ivory or wood covered with metal, cloth, or leather. Sheaths are of two types of Al-Hashidi, which is characterized by the small angle of curvature at the back of the sheath, and its shape resembles the Arabic letter L, and Second type is Al-Bakili, which is in the form of the Arabic letter R and is like the scabbard of a sword. the belt which the scabbard is generally permanently secured on it. The full jambiya outfit is not considered complete without such a belt. The belt is usually worn around the lower abdomen. the belt made of leather decorated with leather strips in different colour and other time made of textiles support decorated with embroidery decoration.

The main problem of the two dagger that there is no any data about them and the hilt of dagger RAK 430 was broken. The methodology started first with the aime of extracting all data with aid of technology to search about the significance value of the two objects.

Photographic documentation was applied to record the state of preservation of the objects and to document in details all the jambiya component (Fig. 1). Digital documentation also applied to obtain a digital facsimile from the original object (Fig. 2,3). Microscopic image using Dino-lit portable microscope was able to get deep magnification for the object component in different area.

Fig. 1 Two daggers RAK 430, and RAK11584.

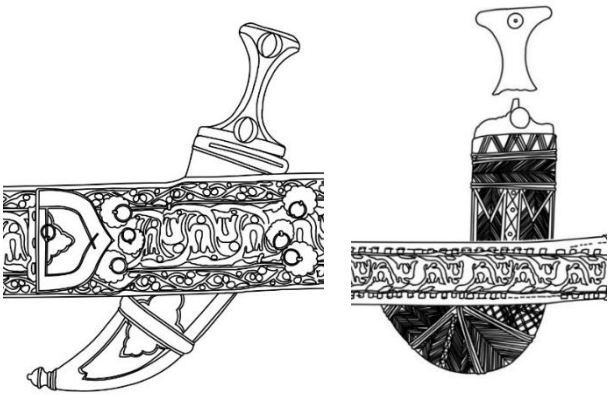


Fig. 2 Diagram of object RAK 430, RAK 11584.

[2] Exell, Karen (2016-03-10). Modernity and the Museum in the Arabian Peninsula. Routledge. ISBN 978-1-317-27901-3.

[3] Haza, Ruba (2020-10-15). "Ras Al Khaimah National Museum to reopen after six months". The National. Retrieved 2021-11-19.

[4] National Museum of Ras Al Khaimah Set to Reopen with Tamra (Date Palm) Exhibition - Ras Al Khaimah Media Office". Ras Al Khaimah Government Media Office. Retrieved 2021-11-19.

B. SIGNIFICANT OF THE OBJECTS

From the investigation of the decorated gold circle/flower, in the form of circular golden pounds, this circle contains a significant sign which is the Christ standing with sixteen stars around and text in the circl fram: SIT T XPE DAT QTV REGIS ISTE DVCA

This decorated circle has a foreign feature may be affected or come from the medieval art (Fig.4,5). This metal circle is like gold coin minted by the Republic of Venice 13th centur. The face of the Christ is very simple it a circle with three dots inside and arc above it.

Fig. 4 Gold circle / flower diamete 1.8 cm, Christ standing with sixteen stars around.

Fig. 5 A digital facsimile copy from the visible traces of the golden circle.

As the hilt/handle the most significant part from the dagger, it was important the identify the type of material which the hilt made of. Microscopic image using Dino-lit portable microscope was able to identify the type of horn which proved that it made from rhino horn this was clear from the microscopic images for the Internal structure, Intertubular matrix and Horn tubules of rhino horn (Fig. 6,7) [5].

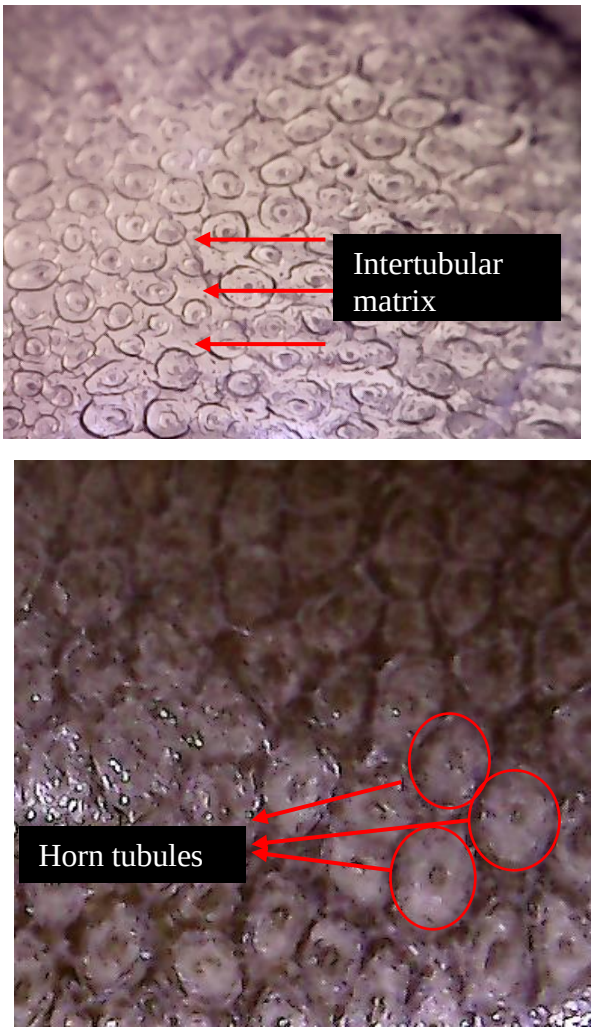


Fig. 6.7 Microscopic image for Internal structure of rhino horn.

Identification of the rhino horn in the hilt/handle of this jambiya can prove it is from the Al-Saifani type and the age of these jambiya bearing Saifani's head ranges between 400 and 1500 years and it is invaluable with the passage of time, the other hilt according microscopic inestigation not made from rhino horn.

These information can add as Object 'biography' which help us to understand what stage in an object's life we are studying, recording, representing and conserving Also help us to think about: how things are made (materials and technique) and how their significance varies.

SHEATH

The sheath shape in in the two dagger was different.The dagger RAK 11584 type of sheath known as Al-Bakili, which is in the form of the Arabic letter R, and is like the scabbard of a sword (Fig. 8). The dagger RAK 430 of sheath known as Al-Hashidi shape resembles the arabic letter L (Fig. 9). Belt decorative motif are similar from type know as Kepsi (Fig.10).The names given to sheath and motif

[5] Hieronymus, T.L., Witmer, L.M. and Ridgely, R.C., 2006. Structure of white rhinoceros (Ceratotherium simum) horn investigated by X‐ray computed tomography and histology with implications for growth and external form. Journal of Morphology, 267(10), pp.1172-1176.

according to the name of family who created the design.

Fig.8 sheath from type of Al-Bakili, shape resembles the arabic letter R.

Fig.8 sheath from type Al-Hashidi, shape resembles the arabic letter L.

Fig.10 Belt decorative motif are similar from type know as Kepsi.

C. HERBARIUM COLLECTION

The Ras Al-Khaimah national museum Herbarium houses collections, acquired through collections of Mrs R. E. Ash and identified by Mr A. G. Miller.

were organized by the collector in this following: The collections comprise five files in which are contained the specimens in alphabetical order according to their family names (Fig.11). Each specimen, mounted on an individual card, shows a pressed example of the flower together with a photograph of the plant in its natural habitat. the details with each specimen include, name, family, Map co-ordinates of location and reference number.

The main problem of the collection was the missing of data which was the collectr's working notebooks of which there were three.

the missing of the collectr's working notebooks were include the identification sheets of the specimens made by Mr A. G. Miller, of the Royal Botanical Gardens, Edinburgh, Scotland. which give the following information: name, Arabic, family, locality, co-ords, habitat, description and uses, date and collection number which for example this is shown, as R. E. ASH 169. this is shown, as R. E. ASH 169.this number is shown on the specimen card as REA169 at the specimen and working notebooks.

duplicates of this collection are held at the royal botanical gardens, Edinburgh, Scotland, the herbarium at Oman national history museum, ministry of national heritage and culture, Muscat, sultanate of Oman and on the 18th of May 1992 for the national museum of Ras Al Khaimah.

This herbarium collection was kept at the national museum of Ras Al Khaimah storage from 1992 until 2023 without any sorting for data or preservation.

COLLECTION PRESERVATION STRATEGY

The main aim of the preservation of the herbarium collection was to apply a computerized cataloging of the collections to makes it available for scientific studies and research send information and material, upon request, to scholars from all over the world (Fig.12).

Organizes guided tours for individual users, as well as for schools of all levels to see the collection, design an exhibition and study days, both in the academic and popular fields; participates in projects aimed at the dissemination of scientific culture and finally promotes editorial activities aimed at disseminating knowledge of flora.

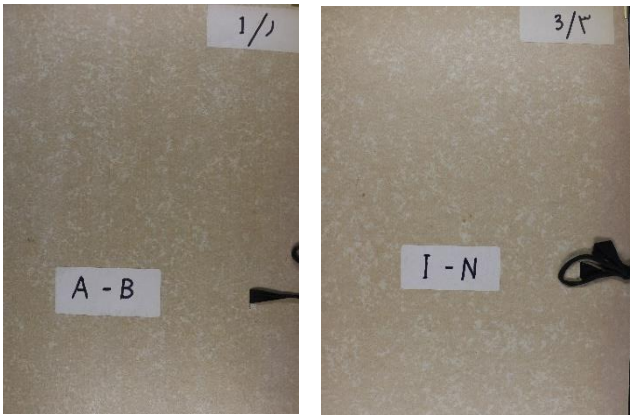


Fig.11 Files in which are contained the specimens

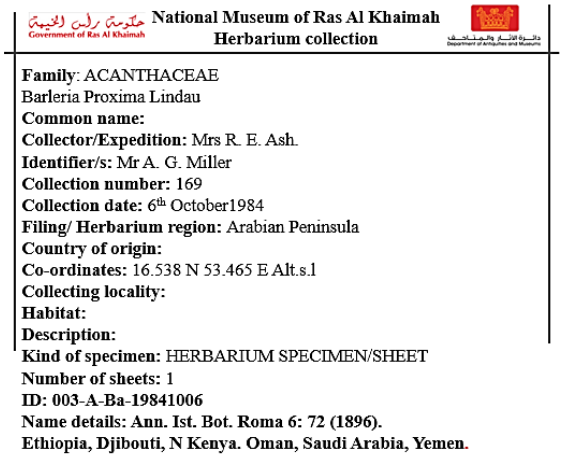
Fig.12 Example of The computerization and digitization of the collections

COMPUTERIZATION AND DIGITIZATION OF THE COLLECTIONS

The computerization and digitization of the collections was the first procedures to apply. The computerization of the collections was the first procedures to apply which was counted in 34 Family and 78 species, followed by designing a digital sheet for each file of the fifth files (Fig.13). Describing, identifying, and cataloging plants, a designed card for each specimens include all data which were missed by losing the collection notebooks.

Fig.13 Example of The computerization and digitization of the collections

In the designed card for each specimens an ID number for each specimen was generated consisted of a serial number, the first alphabetic of the family, the two-starting alphabetic of the specimen and the date of collection (Fig.14).



National Museum of Ras Al Khaimah
Herbarium collection

Family: ACANTHACEAE
Barleria Proxima Lindau
Common name:
Collector/Expedition: Mrs R. E. Ash.
Identifier/s: Mr A. G. Miller
Collection number: 169
Collection date: 6th October1984
Filing/ Herbarium region: Arabian Peninsula
Country of origin:
Co-ordinates: 16.538 N 53.465 E Alt.s.l
Collecting locality:
Habitat:
Description:
Kind of specimen: HERBARIUM SPECIMEN/SHEET
Number of sheets: 1
ID: 003-A-Ba-19841006
Name details: Ann. Ist. Bot. Roma 6: 72 (1896).
Ethiopia, Djibouti, N Kenya. Oman, Saudi Arabia, Yemen.

Fig.14 Example of specimen new card

Digitization and digital innovation will allow data sharing of images and data to countries of origin which is Oman, more accessible to botanists and others around the world. Finally, we are building an electronic Herbarium Catalogue containing images of the specimens and information taken from their collection labels and some new data which were added for the sustainable development and systematics of collection [6].

D. POTTERY FROM EXCAVATION

Two big pottery jar from recent excavation were discovered in archaeological site Al Hudaibah,RAK,UAE (Fig. 15). The two jars were moved from archaeological site to museum laboratory to recieve conservation. The two jars were filled of soils from the excavation site. The methodology applied started to look first on the soil. employed to recover and analyze any materials or remains might be found.

Fig.15 The two pottery jars at the excavation site.

The materials collected from fotation carefully transferred to trays or containers for further analysis. The collected botanical materials are dried and sorted under controlled conditions.The materials classified as follow: pottery shards, fragments of glazed pottery, glass fragments, archaeobotanical remains, seashells and large group of bones (Fig. 16).

Fig.16 The seprated remains after flotation.

The investigated and analyzed remains provide valuable insight about past societies and the site itself. The glazed fragments identified to have a relation with glazed dishs from RAK collection and the bone remains idenyified as fish bones might be for saw fish and Salmonidae most

[6] Kew, Royal botanical Garden.

probably for *Oncorhynchus keta*[7][8].Althought the excavation site was far from the sea these find can interoertate that might be the site was close to the sea in the past or might be the jars were used to store food .The methodology of conservation for the two jars was not only preserving the objects but more deep to an impotratnt idea about the historical context of them. This is linked to the idea that integrated conservation approaches promote interdisciplinary collaboration.

IV. DISCUSSION

Preservation and conservation of collections involves not only on practices to mitigate risks and maintain the integrity of collection but also to disseminating of knowledge and facilitate the exchange of ideas.Foster collaborations within the scientific community.make research findings accessible. serve as an archival record of scientific progress and research developments over time. provide a reference point for future researchers. This discussion explores the importance of preservation and extraction of data about collection. In the case of the two daggers explain how conservation is important when you identify the significant value of collections.

In herbarium collection the technological advancements offers new tools and methods for preserving collections, such as digitalization which allows for the creation of high-quality replicas, reducing the handling of fragile objects while providing access to a wider audience.

The preservation national museum of Ras Al-Khaimah collection is a huge challenge. Working in direct contact with the objects and studying the debates and practices of the past while reviewing our own practices revealed that present-day conservation decisions integrate decisions for the collection future sustainability. It was discovered that limited devices and materials, in combination with the condition or state of an object and past trends in scientific approach, affect an object's characteristics, even becoming part of it[*9*].

Our present-day conservation of our collection not only the remedial intervention that applied, but scientific methodologies and laboratory applications are both advancing and have different approaches. The challenge to discover a new information about collection and sorting its data can add more value to it.

V. CONCLUSION

The Preservation and conservation efforts help safeguarding collection, ensuring their physical existence, and protecting their unique stories and knowledge for future generations. Collections serve as valuable resources for research, education, and inspiration. By preserving and conserving collections, can ensure that future scholars, students, and enthusiasts have access to these materials, enabling them to deepen their understanding of history, culture, science, and various disciplines.

Digitization initiatives make collections accessible to a broader audience, transcending physical boundaries. Online platforms, virtual exhibitions, and digital archives provide easy and remote access, ensuring future generations can explore and learn from collections.

Preservation and conservation are crucial for ensuring the sustainability and accessibility of collections for future generations. conservation and preservation in museums have changed to adapt to changing technologies, scientific development, and philosophical approaches. By adopting integrated preservation approaches, using technology and the right methodology of preservation and conservation extend the lifespan of collections and make it more sustainable.

FUTURE RESEARCH

The author suggests further investigation and analysis techniques such as optical microscope for identification of fibers and leather . X-ray Fluorescence (XRF) as non-destructive technique for the measurements of the elemental composition of metal parts and pottery shards. Spectroscopic techniques with the aid of High-performance liquid chromatography for the identification of dyes on textile parts. carbon dating for the bone remains.

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REFERENCES

1. Beisaw, April M. Identifying and interpreting animal bones: a manual. Vol. 18. Texas A&M University Press, 2013.
2. Exell, Karen. Modernity and the Museum in the Arabian Peninsula. Routledge, 2016.
3. Hamza, NAGMELDEEN MORSHED AHMED MORSHED, Ishii Mie, and Shaheen Eslam. "Conservation between scientific methodology and laboratory application: An integrated approach to past and present challenges." In ICOM-CC 19th Triennial Conference 2021 Beijing, pp. 1-7. ICOM-CC, 2021.
4. Haza, Ruba (2020-10-15). "Ras Al Khaimah National Museum to reopen after six months". The National. Retrieved 2021-11-19.
5. Hieronymus, Tobin L., Lawrence M. Witmer, and Ryan C. Ridgely. "Structure of white rhinoceros (Ceratotherium simum) horn investigated by X‐ray computed tomography and histology with implications for growth and external form." Journal of Morphology 267, no. 10 (2006): 1172-1176..
6. Kew, Royal botanical Garden. http://apps.kew.org/herbcat/navigator.do
7. National Museum of Ras Al Khaimah Set to Reopen with Tamra (Date Palm) Exhibition - Ras Al Khaimah Media Office". Ras Al Khaimah Government Media Office. Retrieved 2021-11-19.
8. National Museum of Ras Al Khaimah". Department of Antiquities and Museums. Retrieved 2021-11-19.
9. Yee, Debbi. "Marine Fish Osteology: A Manual for Archaeologists." (1987).

[7] Yee, Debbi. "Marine Fish Osteology: A Manual for Archaeologists." (1987).

[8] Beisaw, April M. Identifying and interpreting animal bones: a manual. Vol. 18. Texas A&M University Press, 2013.

[9] NagmEldeen Morshed Hamza, Mie Ishii, Eslam Shaheen,Conservation between scientific methodology and laboratory application: An integrated approach to past and present challenges, ICOM-CC 19th Triennial Conference 2021 Beijing.