POLLEN FLORA FROM ARCHAIC & OLD KINGDOM EGYPTIAN TOMBS

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ABSTRACT

Four samples of plant remains were collected from inside pottery jars from two tombs in Tel el-Rob'a at the site of ancient Mendes (BA-nb-Ddt), the capital of the 16th Nome of Lower Egypt since c. 3000 BC. The first tomb belonged to a young girl (from the Predynastic Period, c. 2920-2575 BC), the second tomb contained human skeletons (from the Old Kingdom, c. 2575-2134 BC). The samples were analyzed for their pollen content, and the data revealed the presence of ten types of pollen-grains belonging to six botanical families. Pollen samples identified as: *Acacia nilotica* (Egyptian thorn), *Achillea millefolium* (common yarrow), *Ambrosia artemisifolia* (common ragweed), *Coriandrum sativum* (coriander), *Linum usitatissimum* (Linseed), *Thymus vulgaris* (Thyme), *Triticum estivum* (wheat) and *Vicia faba* (faba bean) of (a young girl’s tomb); *Hordeum vulgare* (barelly), *Triticum aestivum* (wheat) and *Avena sativa* (common oat) at (a human skeleton’s tomb). In our article we are going to present and study these results, concluding about their proper use in the context of the ancient Egyptian religious society.

KEYWORDS: Prehistoric Period, Mendes, Pollen, Ancient Medicinal Plants, Tombs’ Flora, Pottery Jars.
1. Introduction

Egyptologists have carried out little archaeological investigations and despite the long history of the detailed archaeological investigations in Egypt, the application of pollen analysis to archaeobotanical questions are still limited (Ayyad, 1995). Previous studies of ancient agriculture in Egypt have been carried out on the Nile flood and grain production, (Fekri Hassan, 1997). The main source of information is plant material in the form of tomb goods, these tomb goods and pictures give the impression of a varied diet (Ayyad and Krzywinski, 1994). Palynology, which is the study of pollen grains and spores, is one important area of research. At archaeological sites, pollen grains can be found inside the sediments; on the surface of objects manipulated by humans, or even on the surface and inside fossilized feces. Pollen is very durable as its wall is made of sporopollenin (Reinhard & Bryant 1992).

Archaeology is often associated with the discovery of tombs, temples, and palaces rich in plants. Small and fragile plant remains can be every bit as valuable, than these large, permanent structures in providing information about human life in the past. During the eighteenth and early nineteenth centuries, botanists, geologists, and zoologists were working with archaeologists to research a shared interest at the past (Wilkinson and Stevens, 2008). The analysis of botanical remains from archaeological excavations is a three-steps: recovery, identification, interpretation (Pearsall, 2000).

Palaeobotanical material can be divided into macrofossils, visible to the naked eye, and microfossils that require magnification to examine. The identification of any botanical remains is dependent on analogies with modern flora and with archaeological reference collections (Dincauze, 2000). While, Archaeologists use the types of remains that to elucidate information about the roles of plants in the ancient world to the broader research questions about both daily life and special events that can be approached through this information. Several themes have been selected as especially pertinent to flowers: diet and palaeo economy;
medicine, poison, and psychotropics; perfumes, cosmetics, and dyes; prestige. These represent only a sample of the ancient uses of the botanical world. Plant material was also essential for building materials like timbers, roofs, mud brick, and rope (Trigger, 1989). The environmental conditions and the soil pH will affect the preservation and recovery of botanical remains. Desiccation common to arid regions can preserve remains not usually found in the archaeological record such as fruits, flowers, leaves, and membranes (Wilkinson and Stevens, 2008). This is the process that allows spectacular survival of plant material in Egypt (e.g. Murray, 2000), including the dried flower garlands found in tombs such as that of Tutankh amun which included cornflowers (Centurea cyanis) and mayweed (Anthemis pseudo cotula) (Hepper, 2009). The present study aimed to provide a great biological interest about history of tombs flora, beliefs about herbal medicine, food regime and perfumes of Ancient Egyptians hereafter.

2. Study area

Mendes located in the eastern Nile Delta and was the capital 1. The sites that revealed important remains are mainly Tell El Roba, Tell Temy El Emdeid, Tell El Mekdam and Tell El Balamoun. An Old Kingdom Necropolis was discovered in Monshaet Ezzat, 15kms south Tell El Roba that was Mendes. Mendes was mentioned in the sarcophagi texts as the meeting place of Osiris and Ra. Mendes became the capital of Egypt during the 29th Dynasty. Civilization in the area goes back to the Old Kingdom as the most ancient discovered tombs there are mastabas referred to the first and second dynasties but scholars proved their use during pre-dynasties and archaic periods (Redford, 2004). Mendes, the Hellenic name of the Ancient Egyptian city of Djedet, also known in Ancient Egypt as Per-Banebdjedet (“The Domain of the Ram Lord of Djedet”) and Anpet, is known today as Tell El-Roba. The city is located in the eastern Nile delta (30°57′30″N 31°30′57″E / 30.95833°N 31.51583°E / 30.95833; 31.51583) and was the capital of the 16th Lower Egyptian Nome of Kha, until it was replaced by Thmuis in Greco-Roman Egypt. The two cities are only several hundred meters
apart. During the 29th dynasty, Mendes was also the capital of Ancient Egypt, which lies on the Mendesian branch of the Nile (now silted up), about 35 km east of Al-Mansurah. The city was celebrated for the manufacture of a perfume designated as the Mendesium unguentum (Healy, 2004). Redford (2005) stated that, the chief deities of Mendes were the ram, he also showed that, is why the Egyptian statues of Zeus have a ram’s head, is why rams are sacred to the Thebans, and they do not use them as sacrificial animals. However there is just one day of the year—the day of the festival of Zeus—when they chop up a single ram, skin it, dress the statue of Zeus in the way mentioned, and then bring the statue of Heracles up close to the statue of Zeus. Then everyone around the sanctuary mourns the death of the ram and finally they bury it in a sacred tomb.
3. Material and methods

Pottery vessel’s remains and deposits from two ancient tombs were taken dry weight samples for pollen analysis (ten grams each). The samples were collected in April 2014 these samples had clearly identified chronology and dating by the archaeological Canadian mission excavations with help of Professor Redford the Head of Canadian Mission in Egypt. Samples were taken to Environmental studies and Research Institute (ESRI) of the University of Sadat City, Egypt where analyzed. Three grams subsamples from each extracted for their fossil pollen using a monofilament sieving according the method of (Faegri and Iversen, 1989) and (Moore and Webb, 1978). Sub- samples were placed in boiling thermoplastic tube, mixed with 10 ml KOH (10%), and then placed in boiling water bath for 15 minutes. Samples were sieved through a 100 um mesh aperture sieve. The pollen grains were settled in monofilament sieve (7um), and washed with dist water .The washings were made up with dist water and centrifuged at 3000 rpm for 3 minutes .The liquid was decanted and 10 ml of Hydrofluoric HF (40%) were added, then placed the tubes on boiling water bath over night, centrifuged and decant. The pellet re suspended in 10% HCL to dissolve residual silicoflorides, centrifuged and decant. Pellet re suspended in
glacial acetic acid to dehydrate prior to acetolysis. Acetolysed according to (Moore et. al 1991). The purified samples mounted on glass slides then counted for their pollen up to 300 grains. *Lycopodium* tablets were added to calculate pollen concentration (pollen grains per gram = p/g). Pollen identification used Light Microscope at x1000 magnification for small and difficult types with reference standard key (Andrew, 1984)., and reference pollen collection herbarium specimens at Environmental Studies and Research Institute (ESRI) University of Sadat City, Egypt. Percentages were calculated in a pollen sum including all identified pollen grains. Pollen and spores nomenclature followed (Bennet et al. 1994). Light microscope photographs of fossil pollen were taken and the pollen terminology follows (Hesse et al., 2009). The difficulties in identification pollen were sent with Professor Sekina Ayyad to the Botanical Institute of Bergen University, Norway to make re-chick identification.

4. Results

Data obtained Table.1and 2. and fig. 4, 5, 6, 7 and 8 revealed that, relative abundance of fossil pollen grains extracted from soil remains of Young Girl’s Tomb Predynastic Period, (2920-2575 BC) showed a dominance of Thyme pollen type (Lamiaceae family) 28% followed by *Acacia* pollen type (Fabaceae family) 23.25% followed by Cereals *Triticum* type 17.44 % (Poaceae family). *Achellea* type (Asteraceae family) 15.98, *Linum* type (Linniaceae family) recorded 10.75%, while, *Vicia faba* type (Fabaceae family) 9.88%, Coriander pollen type (Apiaceae family) recorded 8.72 %, *Ambrosia* pollen type (Asteraceae family) recorded 7.26 %, on the other hand, *Hordium* type (parley Poaceae family) recorded 4.36 %, finally *Avena* type (wild grass Poaceae family) recorded the lowest ratio 2.90 %. Fossil pollen grains extracted from Human Skeketon’s Tomb and filling jar remains dated, Old Kingdom (c. 2575-2134 BC). Data obtained showed a dominance of *Acacia* pollen type (Fabceae family) (33.33%) followed by Cereals *Triticum* type 13.09 % and *Vicia* type ( Fabaceae) 13.09 %, *Linium* pollen type recorded 11.90 % while, Coriander recorded 10.71% and the wild
grass *Avena* 8.92 % but Thyme recorded 4.16 % and *Hordium* 2.97 %, finally *Achillea* type recorded the lowest value 1.7%.

Fig. 3 A young girl’s tomb (Predynastic period, about 3100-2780 BC) Mendes

Fig. 4 A human skeletons’ tomb (Old Kingdom, 2575-2134 BC)
Fig. 5 Different types, size of pottery Pots and jars collected from tombs

Fig. 6 Excavation Site at Mendes
Fig. 7: Different pollen types recorded with Magnifications power (X= 1000).

- Ammoca type, b- Avena type, c- Linum type, d- Acacia type, e- Achillea type, f- Vicia type, g- Thymus type, h- Hordeum type, i- Coriandrum type and j- Triticum type.
Table 1: Pollen types recorded of different archaeological samples from study area

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Monocotyledonae</th>
<th>Dicotyledonae</th>
<th>Chronology</th>
<th>Total Pollen count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poaceae</td>
<td>Asteraceae</td>
<td>Fabaceae</td>
<td>Lamiaceae</td>
</tr>
<tr>
<td></td>
<td>Wild grasses</td>
<td>Cereals</td>
<td>Ambrosia</td>
<td>Achillea</td>
</tr>
<tr>
<td></td>
<td>Avena type</td>
<td>Triticum</td>
<td>Hordeum</td>
<td></td>
</tr>
<tr>
<td>Young Girl’s Tomb</td>
<td>10</td>
<td>60</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Human Skeleton’s Tomb</td>
<td>15</td>
<td>22</td>
<td>5</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Relative abundance of pollen types recorded of different archaeological samples

<table>
<thead>
<tr>
<th>Location</th>
<th>Wild grasses</th>
<th>Cereals</th>
<th>Ambrosia</th>
<th>Achillea</th>
<th>Acacia</th>
<th>Vicia faba</th>
<th>Thyme</th>
<th>Linum</th>
<th>Coriander</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Avena type</td>
<td>Triticum</td>
<td>Hordeum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Predynastic Period, (2920-2575 BC)</td>
</tr>
<tr>
<td>Young Girl’s Tomb</td>
<td>2.90</td>
<td>17.44</td>
<td>4.36</td>
<td>7.26</td>
<td>15.98</td>
<td>23.25</td>
<td>8.88</td>
<td>28.00</td>
<td>10.75</td>
<td>8.72</td>
</tr>
<tr>
<td>Human Skeleton’s Tomb</td>
<td>8.92</td>
<td>13.09</td>
<td>2.97</td>
<td>-</td>
<td>1.7</td>
<td>33.33</td>
<td>13.09</td>
<td>4.16</td>
<td>11.90</td>
<td>Old Kingdom, 2575-2134 BC</td>
</tr>
</tbody>
</table>

Fig. 3: Relative abundance of pollen types recorded of different archaeological samples
5. Discussion

A study pollen grains and spores, one of more important area of research. Through we can obtain important information about past plant vegetation, as well as about possible plant uses in a given site and geological time. At archaeological excavations, pollen grains can be found inside the sediments, on the surface of objects manipulated by humans, or even on the surface and inside fossilized feces – coprolites (Reinhard & Bryant 1992).

The present study revealed that, presence of ten types of pollen–grains belonging to six botanical families see Tables.1and 2, figs. 4, 5, 6, 7 and 8, the relative abundance of fossil pollen extracted from archeological samples of young girl’s tomb dating to (Predynastic Period about (c. 2920-2575 BC) revealed that, Thyme, *Acacia*, Cereals *Triticum* type, Achellea, Linum type, *Vicia faba*, Coriander *Ambrosia*, *Hordium* type finally *Avena* pollen type with ratio 28, 23.25, 17.44, 15.98, 10.75, 9.88, 8.72, 7.26 4.36, and 2.90 % respectively. Thyme recorded the highest representation 28%, the presence of this herb with high record may explain quite possibly in a recipe for *kyphi*, in this connection, Manniche (1989) stated that *Thymus*, a well-known temple fumigant and beverage additive, is to be translated as “mint” according to inscriptions in the late first millennium BC temples at Edfu. It was interesting to find *Acacia* pollen type in high abundance in the tomb remains, this may indicate that *Acacia* trees were abundant at the study area (Mendes, Nile Delta, throughout Predynastic Period, (2920-2575 BC) and being used as a fire wood source in ancient Mendes and Avaris (Thanheser, 1992). On the other hand *Acacia* is associated with a number of Egyptian Deities; it has specific associations with Isis and Her family. A particular *Acacia* simply called the *Acacia*, or Shondj was sacred to her. The Goddess Shontet, the *Acacia* Goddes who took part in the Osirian resurrection rites at Djedu (Mendes), and was considered to be a form of Isis. *Acacia*’s flowers sweet smelling, yellow which look like little yellow sunbursts. Brewed *Acacia* leaves were drunk in a cough mixture (James Breasted, 1906). They were also applied to wounds and swollen limbs for their astringent properties. The crushed bark produces tannin that was used to help heal burns and tan leather. While, Ancient Egyptian women used gum acacia blended into a base of dates and honey, as a contraceptive. When gum acacia is dissolved, it produces lactic
acid, a spermicidal (Pliny, 1945). Cereals (Triticum and Hordium pollen type) recorded high representation, this may explained by the nature of these two crops as main cultivated crops, in this connection (Ayyad and Krzywinski, 1994) stated that, starting in Pre-Dynastic times, the Ancient Egyptians buried their dead beneath the sand and included with the body a mat under which the dead body rested in the fetal position (which refers to the belief that one was born and should die in the same position). Also buried with the dead were a few trinkets the decedent used during life and several jars of food to ensure provisions in the Afterlife. Avena pollen type recorded low representation may be due to the weed nature in cultivated land; in this connection (Koff, 1995 and Fahmy 1995) stated that Triticum, Avena and Hordeum types altogether indicate the presence of cultivated land. Triticum aestivum were preserved at a cache of florets was discovered in a jar tombs, which could represent storage samples, as only a few glumes and husks of Hordium vulgare were found in the same vessel (Jiang et al. 2007b). In these cases, the tomb offerings were specifically chosen for further use in another world. Achillea pollen type recorded 15.9% abundance the tomb’s remains dating back to Predynastic Period, (2920-2575 BC). This may indicate the use of Achillea as a medicinal herb during this period. This herb is being used in recent medicine to cure intestine and liver (Ayyad 1995). The Ambrosia type recorded 7.2%, in this connection (Patrick et.al 2009) in their study on "Ancient Egyptian herbal wines" stated that, there are two herbs of Egyptian origin should also be noted: Ambrosia maritima contains camphor and carvone and Conyza dioscorides has camphor and linalool. Linum type (Linseeds, flaxseeds) recorded high representation; the flax seeds of (Linum usitatissimum) are edible as such but are also rich in oil. Seeds may well have been used untreated as food but also for extracting oil, edible when cold water used for this process (Valamoti, 2009 and Megaloudi, 2006) Flax was extensively cultivated in ancient Egypt, where the temple walls had paintings of flowering flax, and mummies were entombed in linen (Sekhri, 2011). Egyptian priests only wore linen, as flax was considered a symbol of purity (Wisseman, 2013).

It was interesting to find Coriander pollen type in high abundance 8.2% in remains of young girl’s tomb (Predynastic Period, 2920-2575 BC), this may indicate that Coriander were abundant at this period, this may indicate that Apiaceae plants had been widely cultivated during this period. Plants of Apiaceae e.g. Apium graveolens L., Coriandrum sativum, Foeniculum vulgare and
Cuminum cyminum), were used as spices, hot drinks, food additives and medical remedies (Grivetti, 2001). Among the most probable herbal additives to the Abydos wine, only coriander is known by its ancient Egyptian name (s3w). Eight baskets (half a liter) of coriander mericarp in the tomb of Tutankhamun underline its importance in ancient Egyptian culture and medicine (Germer, 1989). Coriander is explicitly listed in several medical prescriptions, thus, stomach problems called for drinking (Manniche, 1989). The presence of Vicia faba (broad bean) with relative abundance 9.8 % may support the use of ancient Egyptians to this crop as a human food, this explanation agree with (Ayyad, 1995) and (Ayyad and Krzywinski 1994); they stated that Vicia faba pollen type was found in the Old Kingdom with relatively high frequencies and the Broad bean (Vicia faba) introduce into agriculture in ancient Egypt during the New Kingdom, but they found fossil pollen of this crop with high concentration from Mendes archaeological site. In Ancient Egypt, food was an essential commodity in death as it was in life. The depletions of food offering were placed in tombs to maintain the soul of the deceased, (Germer, 1989).

6. References

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