ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

Mechanical Engineering in Ancient Egypt, Part 48: Statuettes of Fly, Bee and Scorpion

Galal Ali Hassaan

Emeritus Professor, Department of Mechanical design & Production,
Faculty of Engineering, Cairo University, Egypt
galalhassaan@ymail.com

***Abstract*— The production of statuettes and figurines for bee, fly and scorpion in ancient Egypt is investigated. Examples of each insect production is presented showing material, dimensions and present location if known. The impact of each example on the evolution of mechanical engineering in ancient Egypt is outlined . Mechanical technologies applied in the production of the presented examples are stated.**

***Index Terms*— Mechanical engineering history, ancient Egypt, fly- bee- scorpion statuettes.**

I. INTRODUCTION

A number of insects had a great appreciation in ancient Egypt. This research paper focuses on three of them: bee, fly and scorpion. The author handles the scarab in a separate paper under publication.

Wassell (1991) in her Ph.D. thesis about ancient Egypt presented a complete chapter about insects in ancient Egypt. She analysed the existence of some insects in ancient Egypt such as fly and bee with detailed presentation of their use and presence in ancient Egyptian texts [1]. Lobban (1994) in his research paper about bees in ancient Egypt studied the bees and beekeeping in the Egyptian history and outlined that probably the oldest notation of domestic honey in ancient Egypt occurred during the 5th Dynasty as a relief from a Temple at Abusir. He also outlined that during the New Kingdom, the Egyptians took beehives in gardens and temples and used honey for funerary purposes [2]. Arnold (1995) in her paper about the Egyptian bestiary presented some insects from ancient Egypt such as faience butterflies, faience dragon flies and damsel flies from 12th-13th Dynasties, faience fly from 26th-29th Dynasties and ivory flies from 13th-17th Dynasties [3]. Redford (2001) presented a chapter in his encyclopaedia of ancient Egypt about insects. He (as Editor) outlined that ancient Egyptians considered honey as a killer for bacteria and fungi, regarded it as having magical properties and used its beeswax in medicine and to make magical figurines, shawabties, as a cosmetic gradient, as adhesive, for coating painted surfaces for embalming of mummies [4].

Seawright (2002) wrote an article about 'Serqet', the goddess of scorpion and venomous creatures, magical protection and the afterlife. She presented 'Serqet' as the ancient Egyptian scorpion goddess of magic and outlined that she was often shown as a woman with a scorpion on her head and occasionly as a scorpion since the Predynastic times [5]. King (2009) in his Ph. D. Thesis presented a useful brief review of insect morphology including mouth parts, types of antennae, wing modifications and abdomen [6]. Rogers (2010in her Master of Fine Arts Thesis about apiary investigations to create an awareness of the environmental issues pertinent to the disappearance of bees and to introduce the general public to bee culture. She outlined that in ancient Egypt, the bee signified the divinity of the land and was a symbol for Lower Egypt [7].

Nazari and Evans (2015) in their paper about Butterflies in ancient Egypt outlined that a review of butterflies depicted in ancient Egyptian tomb scenes and other artefacts from Predynastic to the End of the Pharaonic Period revealed a wide spectrum f stylistic change over time [8]. Wikipedia (2017) wrote an article about 'beekeeping' and outlined that workers were depicted on the wall of the sun temple of Nyaserre Ini, the 6th King of the 5th Dynasty (2445-2421 BC) blowing smoke into hives while removing honey combs. They declared that sealed pots of honey were found in the tombs of Pharaohs such as Tutankhamun [9]. Hassaan (2017) in part 47 of his series of research papers about mechanical engineering in ancient Egypt presented a study about the scarab insect statuettes and figurines in ancient Egypt [10].

II. FLY STATUETTES

The ancient Egyptians registered their daily life with flies through the production of fly-amulets since the time of the Predynastic Naqada II (3500-3200 BC) [11]. On the other hand, Fly amulets were generally given for military achievement and bravery in battles [12]. The ancient Egyptians produced wonderful- fly-based necklaces through the dynastic periods up to the 19th Dynasty as will be illustrated by the following examples:

- The first example is an a necklace with three golden flies for Queen Ahhotep I during the End of the 17th Dynasty of the Second Intermediate Period (1550 BC) in display in the Egyptian Museum at Cairo and shown in Fig.1 [12]. The necklace was based on three golden flies equally spaced on the necklace

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

wire. The designer showed the flies as completely symmetric and hanged by a loop in its mouth. He could show the details of the eyes and head professionally as cleared in the zoomed image of Fig.1. All the fly surfaces are smooth and rounded following the wonderful design tradition of the Mechanical Engineers in ancient Egypt.

Fig.1 Three flies necklace of Ahhotep I [12].

- The second example is a 240 mm length fly-necklace with gold flies from the 18th Dynasty in display in the British Museum and shown in Fig.2 [13]. The necklace consists of a strand holding 38 golden fly-amulets separated by spherical garnet beads as clear in the zoomed image of Fig.2. This is a different type of flies compared with that in Fig.1. The body is thinner and longer than that of the flies of Fig.1.
- The third example is a 23 mm length red jasper fly amulet from the 18th Dynasty (1400 BC) in display by ebay for sale with an estimated price of 600 US $ (!!) and shown in Fig.3 [14]. The designer simulated physically a third type of ancient Egyptian flies of a shape different than those in Figs. 1 and 2. The surfaces were carved professionally maintaining completely round surface.

Fig.2 Fly-necklace from 18th Dynasty [13].

Fig.3 Jasper fly from 18th Dynasty [14].

- The fourth example is a 15 mm length carnelian fly amulet from the 18th Dynasty in display by ebay for sale by 130 US$ and shown in Fig.4 [15]. The eyes are marked in black as two concentric circles, the horns are shown as discs and the neck is recessed to hang the amulet. This is a master piece indicating the high technology of fly-amulets production using non-metallic materials. In an area of only 15 x 9 mm2, the designer could show the details of a new type of flies using two colors in three locations keeping the smooth rounded surfaces everywhere.

Fig.4 Carnelian fly from 18th Dynasty [15].

The fifth example is a 22 fly amulet necklace from the 18th Dynasty (1450 BC) in display in the Walters Art Museum at Baltimore and shown in Fig.5 [16]. The necklace consisted of 46 carnelian ovoid beads, 23 carnelian cornflower pendants and 22 golden flies amulets. Each fly and cornflower was separated by a bead from the adjacent ones. All the elements of the necklace are symmetric and well carved (beads and cornflowers) and casted (flies).

Fig.5 Fly-necklace from 18th Dynasty [16].

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

- The sixth example is a 267 mm length carnelian fly amulet necklace from the 18th Dynasty (1549-1292 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.6 [17]. The designer used 29 flies of gradually increasing length, 29 ovoid beads and 29 cylindrical beads in producing the necklace . Most probably, the ovoid beads were manufactured from carnelian while the cylindrical beads and the fly-amulets were manufactured from gold.

Fig.6 Carnelian fly-amulet from 18th Dynasty [17].

- The seventh example is a 6 mm glazed steatite fly amulet from the New Kingdom (1539-1077 BC) in loan to Michael Carlos Museum of the Emory University at Atlanta and shown in Fig.7 [18]. The designer showed the bull striding and could use the casting technology in ancient Egypt to produce such complex shape with the head details (horns, ears, eyes etc.). This model of fly represents a new type different than those presented in the six fly-examples presented in Figs.1 through 6. In a very small area 6 x 6 mm^2, the designer could set too many details of the wings and head.

Fig.7 Glazed steatite fly-amulet from New Kingdom [18].

- The eighth and last example is a jasper fly-amulet in a 457.2 mm length necklace from the 19th Dynasty (1200 BC) in display by ebay for sale and shown in Fig.8 [19]. The designer succeeded to select a stone material for the amulet that could sustain its color and construction for more than 3200 years. He used a hole through the fly head to hang the fly in the necklace string.

Fig.8 Jasper fly amulet from the 19th Dynasty [19].

III.BEE STATUETTES

Ancient Egyptians new bees and gave it great appreciation for honey production and was applications. They used a bee hieroglyph indicating the King of the North (Nile Delta) [20]. The bee was authorized during a limited period from the 6th to the 18st Dynasties as depicted by the following four examples:

The first example is a 26 mm diameter bone seal amulet from the End of the 6th Dynasty (2311-2140 BC) in display in the Cleveland Museum of Art and shown in Fig.9 [21]. The designer showed the seal amulet as a uniform bone disc professionally carved showing all the details of a bee even though the bone is relatively hard and brittle. The producer could adjust the outer profile using his primitive tools to be exactly on a geometric circle as shown by the modern red circle drawn on the outer surface of the amulet. This indicate how the ancient Egyptians could have high class of products quality more than 4150 years ago.

Fig.9 Bone seal amulet from the 6th Dynasty [21].

- The second example is a bee amulet from the 9th-10th Dynasties (2150-2100 BC) in display in Metropolitan Museum of Art at NY and shown in Fig.10 [22]. I spent some time trying to trace the image in Fig.10 to identify the different parts of the bee, however I failed and I couldn't find an alternative image for the same product.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

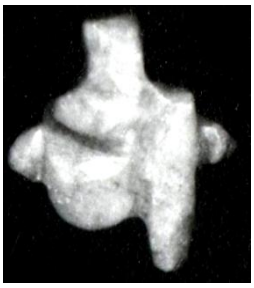

Fig.10 Bee amulet from the 9th – 10th Dynasties [22].

- The third example is a bee amulet of Princess Chenment from the 12th Dynasty (1820 BC) in display in the Egyptian Museum at Cairo and shown in Fig.11 [23]. Most probably, this is a golden product inlaid by three different semi-precious stones for the wings, head, antenna and body of the bee. The designer succeeded to show all the main external parts of the bee using metallic and non-metallic materials assembled together.

Fig.11 Bee amulet from the 12th Dynasty [23].

- The fourth example is an 80 mm length faience scarab with bee hieroglyph from the 18th Dynasty (1504-1492 BC) in display in the Walters Art Museum and shown in Fig.12 [24]. The scarab is inscribed by the Pharaoh Kart ouch and a bee indicating that he is a Lower Egypt Pharaoh (!).

Fig.12 Scarab with bee hieroglyph from the 18th Dynasty [24].

IV. SCORPION STATUETTES

The ancient Egyptians has a great appreciation for the scorpion insect. They used it as a symbol from as early as the time of Naqada III (3200-3000 BC) or as a woman with a scorpion on her head [25]. Moreover, they used the scorpion as amulets in necklaces and motifs of rings as will be presented by the following examples:

- The first example is a necklace with two gold scorpion amulets from the Middle-New Kingdoms in display in the British Museum and shown in Fig.13. The necklace comprised beads and amulets other than the scorpion amulets produced from gold, carnelian and glazed composition [26]. It seems that the scorpion amulets were produced from gold.

Fig.13 2 scorpion necklace from M-N Kingdoms [26].

The second example is glazed steatite scorpion amulet from the 18th Dynasty (1300 BC) in display in Petrie Museum at London and shown in Fig.14 [27]. The designer selected a cheap raw material and used the glazing process to give it the yellow color to look as if it was produced from gold.

Fig.14 Steatite scorpion amulet from 18th Dynasty [27].

The third example is a golden-finger ring with scorpion motif of Horemheb, the 15th Pharaoh of the 18th Dynasty (1319-1292 BC) in display in the Louvre Museum at Paris and shown in Fig.15 [28]. This is a swivel ring with bezel rotating about two revolute joints at its two ends. The bezel was casted with the scorpion engraved on its surface showing most of its external details with inscriptions on its sides.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

Fig.15 Golden finger ring from 18th Dynasty [28].

- The fourth and last example is a 37 mm length pottery scorpion-amulet mold from the New Kingdom (1550-1069 BC) in display in the BA Antiquities Museum at Alexandria and shown in Fig.16 [29]. The mold is a witness about the development of the metal-casting technology in ancient Egypt more than 3000 years. The mold is for a sold casted scorpion.

Fig.16 Scorpion clay mold from New Kingdom [29].

V. CONCLUSION

- The production of fly, bee and scorpion statuettes and figurines in ancient Egypt was investigated.
- This investigation covered a time span from the Middle to the New Kingdoms.
  The ancient Egyptians produced golden fly-amulets at the End of the 17th Dynasty and used them in necklace production.
- They produced necklaces in the 18th Dynasty comprising up to 38 golden fly-amulets.
- Materials used in producing fly statuettes and figurines: gold, steatite, jasper and carnelian.
- They produces statuettes and figurines for different types of flies.
- They produced necklaces during the 18th Dynasty having gradually increasing length.
- During the Middle Kingdom, they could produce statuettes having only 6 mm length.
- They could produce wonderful fly-amulets from materials lived more than 3200 years without deterioration (indicating proper selection of product material).
- They produced bee amulets using: bone, gold and semi-precious stones.
- They used the bee as a symbol for the Pharaoh in Lower Egypt.
- They used the scorpion insect as a symbol from as early as the time of Naqada III.
- They used scorpion amulets as elements in necklace production since the Middle Kingdom.
- They produced scorpion amulets using: gold and steatite.
- They used clay to produce casting molds to cast scorpion amulets.
- They used the glazing process to glaze less mechanical and chemical properties materials such as steatite to look as a gold material.

REFERENCES

[1] B. A. Wassell, "Ancient Egyptian fauna: a lexicographical study", Ph. D. Thesis, *School of Oriental Studies, University of Durham*, 1991.
[2] R. Lobban, "Bees in ancient Egypt", *Anthrozoos*, vol.7, issue 3, pp.160-165, 1994.
[3] D. Arnold, "An Egyptian bestiary", *The Metropolitan Museum of Art* Bulletin, pp.7-64, Spring 1995.
[4] D. Redford (Editor), "Oxford Encyclopedia of ancient Egypt ", *The Oxford University Press*, vol2, pp.161-163, 2001.
[5] C. Seawright, "Serqet, goddess of scorpions and venomous creatures, magical protection and the afterlife", http://www.touregypt.net/featurestories/serqet.htm , March 2002.
[6] G. A. King, "The alien presence: Palaeoentomological approaches to trade and migration", *Ph. D. Thesis in Archaeology*, University of York, September 2009.
[7] K. M. Rogers, "Apiary investigations", *Master of Fine Arts*, University of Florida, 2010.
[8] V. Nazari and L. Evans, "Butterflies of ancient Egypt", *Journal of the Lepidopterists Society*, vol.69, issue 4, pp.242-267, 2015.
[9] Wikipedia, "Beekeeping", https://en.wikipedia.org/wiki/Beekeeping , 2017..
[10] G. A. Hassaan, "Mechanical Engineering in ancient Egypt, Part 47: Statuettes scarabs", *World Journal of Engineering Research and Technology*, 2017 (under publication).
[11] M. El-Dorry, "The golden fly of valour", http://www.arabworldbooks.com/egyptomania/jewels.htm
[12] J. Jasminka, "Necklace from the tomb of Queen Ahhotep I (1550 BC)", https://www.pinterest.com/pin/8233211792580283/
[13] British Museum, "Necklace in the form of a string of alternating garnet beads and gold fly amulets", http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=152692&partId=1 , 2017.
[14] Ebay, "Ancient Egyptian red jasper fly amulet, 1400 BC", http://www.ebay.com/itm/ZURQIEH-Q302-ANCIENT-EGYPT-NEW-KINGDOM-RED-JASPER-FLY-AMULET-1400-B-C-/391462307426 , 2017.
[15] Ebay, "Ancient Egypt 18th Dynasty carnelian fly amulet, 1400 BC", http://www.ebay.ca/itm/391601125128?rmvSB=true
[16] H. Swaine, "Fly necklace", https://www.pinterest.com/pin/350014202259461134/
[17] MFA, "Necklace of fly beads", http://www.mfa.org/collections/object/necklace-of-fly-beads-164837 , 2017.
[18] Sands of Time, "An Egyptian steatite fly-amulet, New Kingdom", https://www.sandsoftimedc.com/products/ea1542?utm_campaign=Pinterest%20Buy%20Button&utm_medium=Social&utm_source=Pinterest&utm_content=pinterest-buy-button-0edf82ea1-d4c7-41da-b255-7e82496c862d , 2017.
[19] Ebay, "Ancient Egyptian jasper fly amulet mummy bead necklace", http://www.ebay.com/itm/NILE-Ancient-Egyptian-Jasper-Fly-Amulet-Mummy-Bead-Necklace-ca-1200-BC-/391661899363
[20] Wikipedia, "Bee (hieroglyph)", https://en.wikipedia.org/wiki/Bee_(hieroglyph) , 2017.
[21] A. Khattab, "Seal amulet, 2311-2140", https://www.pinterest.com/pin/314548355195586583/
[22] Metropolitan Museum, "Bee amulet, Late Old Kingdom", http://www.metmuseum.org/art/collection/search/570931 , 2017.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 3, Issue 5, May 2017

[23] ARS Mundi, "Bee amulet of Princess Chenment", http://www.arsmundi.com/en/artwork/princess-chenmet-bee-amulet-necklace-031742.html .
[24] Wikipedia, "Egyptian scarab from Egyptian style necklace, Walters 57153013", https://commons.wikimedia.org/wiki/File:Egyptian_-_Scarab_from_Egyptian-Style_Necklace_-_Walters_57153013_-_Bottom.jpg , 2014.
[25] Wikipedia, "Serket", https://en.wikipedia.org/wiki/Serket , 2017.
[26] British Museum, " Beads and amulets strung as a necklace", http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=140857&partId=1&images=true , 2017.
[27] Trip Advisor, "Glazed steatite seal-amulets and scorpion amulet", https://www.tripadvisor.co.uk/LocationPhotoDirectLink-g186338-d638489-i236272268-Petrie_Museum_of_Egyptian_Archaeology-London_England.html , 2017.
[28] S. Swanson, "Scorpion signer ring of Horemheb", https://www.pinterest.com/pin/308215168231834477/
[29] Antiquities, "Mold of scorpion-shaped amulets", http://antiquities.bibalex.org/Collection/Detail.aspx?lang=en&a=1052.

BIOGRAPHY

Galal Ali Hassaan:

- Emeritus Professor of System Dynamics and Automatic Control.
- Has got his B.Sc. and M.Sc. from Cairo University in 1970 and 1974.
- Has got his Ph.D. in 1979 from Bradford University, UK under the supervision of Late Prof. John Parnaby.
- Now with the Faculty of Engineering, Cairo University, EGYPT.
- Research on Automatic Control, Mechanical Vibrations , Mechanism Synthesis and History of Mechanical Engineering.
- Published more than 210 research papers in international journals and conferences.
- Author of books on Experimental Systems Control, Experimental Vibrations and Evolution of Mechanical Engineering.
- Chief Editor of the International Journal of Computer Techniques.
- Member of the Editorial Board of a number of International Journals including IJARMATE.
- Reviewer in some international journals.
- Scholars interested in the author's publications can visit: **http://scholar.cu.edu.eg/galal**