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Tutti i diritti sono riservati all'Editore.  
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Il volume è dedicato alla memoria di Paul Canart (25.10.1927-14.09.2017)  
*Belge vivant à Rome et travaillant dans la Cité du Vatican...*





# THE ENGRAVED GLASS HEART OF THE LADY *NFRW* : MULTI-VISUALIZATION OF AN INSCRIBED AMULET\*

## § I. Introduction

Glassmaking is believed to have been introduced in Egypt during the reign of Thutmose III in the mid-18<sup>th</sup> Dynasty (15<sup>th</sup> century BC). Glass, which was regarded by the Egyptians as a precious material, was used to imitate semiprecious stones. During the 19<sup>th</sup> dynasty (1292-1189 BC), a new type of glass, using different recipes, colors, and forms, appeared<sup>1</sup>. The seemingly miraculous quality of this rare new material may have given glass a status above that of faience, making it a prestige product destined for the use of the high elite of Egyptian society<sup>2</sup>. In this paper, we discuss an amulet, made of transparent blue glass in the shape of a heart, for the lady *Nfrw* during the Ramesside Period (1295-1069 BC). It was discovered, among other objects, at the Saqqara Necropolis in 1957, and is now on display at the Egyptian Museum in Cairo.

It is an extremely valuable object, the oldest known example of engraved glass, on which the technique was used to apply the hieroglyphic text on the back and the *Bennu* Bird (Phoenix) figure on the front (Fig. 2). The heart amulet, which came into use during the Second Intermediate

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<sup>1</sup> Ya. KYŌKO, *Identification and Tentative Reconstruction of a Glass Head in the Miho Museum Collection*, in *Ancient Glass. Feast of Color*, Miho Museum 2013, pp. 350-353, in part. p. 350.

<sup>2</sup> P.T. NICHOLSON, *Glassworking, Use and Discard*, in W. WENDRICH *et al.* (eds.), *UCLA Encyclopedia of Egyptology*, Los Angeles 2011, p. 7 (available online: <<https://escholarship.org/uc/item/2w17t0cw>>).

Period (1650-1550 BC)<sup>3</sup>, was traditionally made of dark green stone such as serpentine; later examples were found in basalt and even obsidian<sup>4</sup>.

For the ancient Egyptians, the heart was the source of intelligence, feelings, and actions. An important contribution to estimate the Egyptian definition of the heart is provided by Helmut Brunner<sup>5</sup>: his article provide the substantial definition of the multiple aspects of the heart as it was depicted in the wisdom and religious literature. With the work of this author the heart came to be fully understood as the centre of the human being, a pivotal piece that united the body, the ka and all the multiple set of elements that were seen as part of the human nature.

### § I.1. Archaeological Context

Ka-Nefer-Nefer (13<sup>th</sup> century BC) was an ancient Egyptian noble woman who lived during the Nineteenth Dynasty. Ka-Nefer-Nefer, along with tens of her contemporaries were buried in a graveyard located above the first course of the unfinished pyramid of Horus-Sekemkhet of the 3<sup>rd</sup> Dynasty<sup>6</sup>. Goneim in 1952 discovered buried in the sand above the unfinished pyramid of Sekhemkhet; this particular type of mat burial entailed a large mat made of either palm-stems or papyrus stems woven together at both ends and at regular intervals along the length to form a stable sheet. This was longer than the body enclosed which was then wrapped in the sheet and buried in the sand<sup>7</sup>. Her body was not mummified and was badly decomposed, and she wore an elaborate mask that covered her head and shoulders. Her head was crowned with a glass diadem; her eyes and nipples were also covered with glass. Goneim named her Ka-Nefer-Nefer, meaning "Twice-Beautiful Ka"<sup>8</sup>.

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<sup>3</sup> R. SOUSA, *Heart of Wisdom: Studies on the Heart Amulet in Ancient Egypt*, Oxford 2011, p. 5.

<sup>4</sup> Materials used to produce these amulets may differ significantly: unidentified green stones, schist and glass stand out as the most frequently used, but very common are materials as cornelian and gold; see SOUSA, *Heart of Wisdom* cit. nt. 3, p. 13.

<sup>5</sup> H. BRUNNER, *Herz*, in *Lexikon Der Aegyptologie*, II, Wiesbaden 1975, coll. 1158-1168.

<sup>6</sup> Z. GONEIM, *Horus Sekhem-khet. The Unfinished Step Pyramid at Saqqara*, Vol. I, Le Caire 1957, p. 65.

<sup>7</sup> GONEIM, *Horus Sekhem-khet*. cit. nt. 6, p. 66.

<sup>8</sup> GONEIM, *Horus Sekhem-khet*. cit. nt. 6, p. 65; B. SCHLICK-NOLTE-R. WERTHMAN-CH.E. LOEBEN, *An Outstanding Glass Statuette Owned by Pharaoh Amenhotep II and*

Through the style of Ka Nefer-Nefer's mask, and because a man buried near her was buried with a set of finger rings inscribed with the name of Rameses II, we can determine that Ka Nefer-Nefer lived and died in the early 19<sup>th</sup> dynasty<sup>9</sup>.

Kay-Nefer-Nefer 𓏏𓏏𓏏𓏏 is the name inscribed on the ushabti in the burial. Although the name on the mask and in most of the amulets is Neferu, 𓏏𓏏𓏏 or 𓏏𓏏𓏏, Goneim hypothesized that the lady's name was Ka-Nefer-Nefer, and that her nickname was Neferu<sup>10</sup>.

## § I.2. Description of the Engraved Glass Heart

The heart amulet (L: cm 6,2; W: cm 4; D: cm 1,3) is carved from transparent greenish blue glass decorated with a trace of pigment, with an eyelet on top. It is dated to about 1186 BC, and it weighs just over 38 grams. The object is preserved in the Egyptian Museum, Cairo (JE 92635). On the front, the figure of the *Bennu* Bird is incised<sup>11</sup>; on the back, horizontal lines are engraved from spell 30 B in the Book of the Dead, written in neat hieroglyphs that can be read from right to left. The text of glass heart of the Lady *Nfrw* is written in *cursive hieroglyphs*, which was also adopted as the writing system for other funerary texts in use during the New Kingdom and later<sup>12</sup>.

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*Other Early Egyptian Glass Inscribed with Royal Names*, «Journal of Glass Studies» 53 (2011), pp. 11-44.

<sup>9</sup> GONEIM, *Horus Sekhem-khet*. cit. nt. 6, pp. 65-66. The Ka-Nefer-Nefer cartonnage mask is a beautiful ancient Egyptian artifact depicting the face of a woman at the court of Ramses II. It has inlaid glass eyes and is covered by gold. Her head is adorned with a black wig decorated with a gilded lotus flower, and in each hand she holds a wooden amulet signifying strength and status. A delicate scene carved in relief on her arms shows the woman's ascent into the afterlife on the boat of the god Osiris. The Ka-Nefer-Nefer mask is on display in the Saint Louis Art Museum, St. Louis, Missouri.

<sup>10</sup> GONEIM, *Horus Sekhem-khet*. cit. nt. 6, p. 65.

<sup>11</sup> E. SCHINDLER VON WALLENSTERN, *Die Reiber im Alten Ägypten. Ornithologische Betrachtungen und religions geschichtliche Bedeutung*, Diss. Tübingen 2011, pp. 326-328.

<sup>12</sup> Cf. J.P. ALLEN, *Middle Egyptian: An Introduction to the Language and Culture of Hieroglyphs* (third ed.), Cambridge, UK 2014, p. 7 and P.F. O'ROURKE, *An Ancient Egyptian Book of The Dead. The Papyrus of Sobekmose. Translation, Introduction, and Commentary*, London-New York 2016, pp. 55-56.

### § I.3. Funerary inscription

The chapter 30 B of the Book of the Dead, the one commonly inscribed on scarabs<sup>13</sup>, played also an important role in the decoration of larger amulets, especially during the Ramesside Period. Nevertheless, short inscriptions are the rule, mainly limited to the name of the deceased; the choice of the only name can be understood if we take into consideration the belief that the heart was the seat of identity and memory<sup>14</sup>.

This amulet was wrapped within the bandages covering the body, in close proximity to the heart. The deceased was expected to produce her heart to be placed on the scales of Maat, goddess of truth, in the Hall of Judgment<sup>15</sup>.

The text of chapter 30 B of the Book of the Dead of glass heart of the Lady *Nfrw* give us some clues for providing protection against negative testimony in the weighing of the heart, the magical role of this object as a potential substitute for the heart and, above all, as a symbol of rebirth seems much more important<sup>16</sup>.

«To be recited by Nefer: she says: ‘My heart of my mother, my heart of my mother, my fore-heart of my forms, do not stand against me as witness do not oppose me as witness, do not oppose me in the tribunal, do not lean against me in the presence of the balance-keeper. You are my [ka-spirit] that is in my body, Khnum who makes my limbs whole; you go out to [...]’»<sup>17</sup>.

But why was this heart carved from transparent, greenish blue glass? According another version of Spell 30 B of the Book of the Dead: «spell for giving a heart to N. make a scarab of **Nephrite** adorned with gold and put within a man breast, and perform for him (the ceremony of) opening the mouth ....»<sup>18</sup>.

<sup>13</sup> Th.G. ALLEN, *The Book of the Dead or Going Forth by Day. Ideas of the Ancient Egyptians Concerning the Hereafter as Expressed in Their Own Terms*, (Studies in Ancient Oriental Civilization-SAOC 37), Chicago 1974, p. 40.

<sup>14</sup> SOUSA, *Heart of Wisdom* cit. nt. 3, p. 42.

<sup>15</sup> Ch. EL MAHDY, *Mummies, Myth and Magic in Ancient Egypt*, New York 1989, p. 153.

<sup>16</sup> SOUSA, *Heart of Wisdom* cit. nt. 3, p. 39.

<sup>17</sup> SCHINDLER VON WALLENSTERN, *Die Reiber* cit. nt. 11, pp. 326-328. St. QUIRKE, *Going out in Daylight. prt m hrw the Ancient Egyptian Book of the Dead, translation, sources, meanings*, (GHP Egyptology 20), London 2013, pp. 99-100. Ellipsis points within square brackets [...] indicate a gap or loss of text.

<sup>18</sup> A number of ancient Egyptian artifacts have tentatively been identified as Nephrite. The source is thought to be the Eastern Egyptian Desert. Nephrite is a variety of the calcium,

### § I.4. Decoration

Nevertheless, the Heliopolitan *Bennu* bird is the symbol most often connected with the heart amulet. The solar *Bennu* bird appears on ancient amulets as a symbol of rebirth and immortality, bringing new wealth and fertility<sup>19</sup>. The Egyptian sunbird is identified with Ra, the Sun God<sup>20</sup>. The prevalence of these solar symbols in the decoration of the heart amulet definitely echoes their meaning in the Book of the Dead, since the scarab and the *Bennu* bird evoke chapters 30 B and 29 B respectively, and play an important role in securing the rebirth and regeneration of the deceased. The heron appears therein as Ba of Osiris in this context, the amulet employed as a symbol of the *Osirification*<sup>21</sup> of the deceased and can be seen as an important element of the iconographical constellation of Osiris<sup>22</sup>.

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magnesium, and iron rich amphibole minerals tremolite or actinolite (aggregates of which also make up one form of asbestos). The chemical formula for nephrite is  $\text{Ca}_2(\text{Mg, Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$ . It is one of two different mineral species called jade, which has hardness of 5 to 6, and a density range (for actinolite) of 3.0-3.44. It is white to green to greenish-black in color with increasing iron content. Actinolite is named from the Greek word for 'ray', and nephrite is named from the Latin *lapis nephriticus* (or "kidney stone"). Cf. G. RAPP, *Archaeomineralogy*, Berlin-Heidelberg 2009, pp. 106-107; ALLEN, *The Book of the Dead* cit. nt. 13, p. 40.

<sup>19</sup> SOUSA, *Heart of Wisdom* cit. nt. 3, p. 16.

<sup>20</sup> SOUSA, *Heart of Wisdom* cit. nt. 3, p. 13.

<sup>21</sup> R. SOUSA, *The Meaning of the Heart Amulets in Egyptian Art*, «JARCE» 43 (2007), pp. 59-70, in part. p. 65.

<sup>22</sup> SOUSA, *The Meaning* cit. nt. 21, p. 65. In the papyrus of Nesipautitai, the *Bennu* bird and the scarab were depicted next to the heart amulet, since their images were quite often engraved on the surface of large heart amulets, frequently with an inscription with chapter 30 B of the Book of the Dead on the reverse. Thus, these depictions found in front of the heart amulet in the papyrus of Nesipautitai may very well evoke the symbols that were supposed to be represented on the reverse of the object, following the inscription. Therefore, it seems highly plausible that this entire composition could be used to recall the consecration ceremony of the heart amulet, which embodied the purity and knowledge of the deceased required in the court of Osiris in order to be admitted to the underworld and to undergo a solar rebirth. Cf. SOUSA, *Heart of Wisdom* cit. nt. 3, p. 35.



Fig. 1 – The golden vase heart amulet decorated with the *Bennu* bird (Cairo Egyptian Museum JE 61866. Height: cm 5,6; Gold inlayed with glass), from the Tomb of Tutankhamen (KV 62).



Fig. 2A



Fig. 2B



Fig. 2C

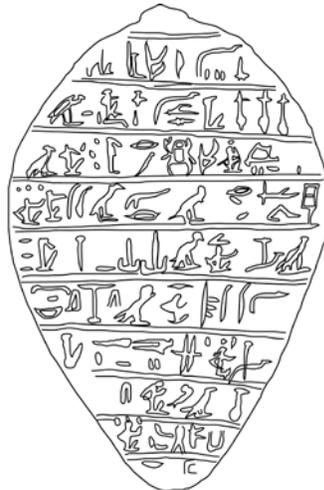


Fig. 2D



Fig. 2E

Fig. 2 – Engraved Glass heart amulet Preserved in Cairo Egyptian Museum, JE 92635.

A. Shows the front side of Engraved Glass heart amulet: the figure of the *Bnwt* is incised. B. Facsimile of the figure of the *Bnwt*. C. The back side shows ten horizontal lines inscribed/engraved with Book of the Dead spell 30 B. D. Facsimile of the ten horizontal lines. E. Transcription of hieroglyphic text.

## § II. Engraving of Glass in Ancient Egypt

The art of engraving glass was practiced from 18<sup>th</sup> dynasty on beads and small vases with hieroglyphic signs. Pharaoh Ahmose I (1550-1525 BC), founder of the New Kingdom (about 1550-1070 BC), was the first king to engrave his throne name (Neb-Pehtj-Ra) on a bowl made from obsidian and on man-made glass. From that time until the end of Pharaonic Egypt, engraving would remain the pre-eminent method of inscribing glass<sup>23</sup>.

Engraving on glass is probably developed from stone and gem cutting trade, being executed mostly with the same pointed instruments<sup>24</sup>. On the Mohs scale, glass has a value of 5,5, approximately the same value as lapis lazuli, and it can be cut or ground by harder materials, such as quartz or flint (scratch hardness 7,0).

First to obtain the heart shape it was achieved by using open-face mold just as in the production of faience. The molds were probably made of fired clay or, more rarely, stone and have not been discerned with certainty from those used for faience<sup>25</sup>. Then the glass would have been annealed, an essential process in glass working involving the slow cooling of the glass object.

The process of engraving or the cold-cutting below the surface of the glass is the only technique that involves the removal of glass from a cold mass as it was developed from working on gem-stones, in ordinary the text or the design are scratched (line engravings) on the entirely surface producing very fine lines, using a tool with needle sharp point (round or oval section), the burrs resulting from this process are removed by the needle tool following the direction of the lines, at the end. Both sides of the glass surface receives the final treatment of polishing.

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<sup>23</sup> See SCHLICK-NOLTE-WERTHMANN-LOEBEN, *An Outstanding Glass* cit. nt. 8, pp. 11-44; S. DAVISON, *Conservation and Restoration of Glass*, (Butterworth-Heinemann Series in Conservation and Museology), Oxford-Burlington MA 2006<sup>2</sup>, pp. 95-98; RAPP, *Archaeomineralogy* cit. nt. 18, pp. 106-107.

<sup>24</sup> D.B. HARDEN, *Ancient glass I: Pre-Roman*, «Archaeological Journal» CXXV/1 (1968), pp. 46-72; then DAVISON, *Conservation* cit. nt. 23, p. 96.

<sup>25</sup> J.D. COONEY, *Glass Sculpture in Ancient Egypt*, «Journal of Glass Studies» 2 (1960), pp. 10-43, in part. 13. Cf. NICHOLSON, *Glassworking* cit. nt. 2, p. 6.

## § II. MATERIALS AND METHODS

### § II.1. Visualizing the Glass Heart

The refractive properties of the irregular glass surface created an effect that cannot be achieved with any other material or technique and optical light microscopy (OLM). We employed two complementary approaches for understanding and interpreting wear and residues on the glass surface as well as the tool-marks. Examination with OLM was carried out to study the morphology of the glass, which can provide relevant information about ancient manufacturing techniques and degradation processes. Reflectance Transformation Imaging (RTI) is an analytical tool to enhance investigation of designs and texts on artifacts, to study technology and production methods, and to examine the state of the artifacts with regard to conservation.

### § II.2. Interpretation of the Results Using OLM

By observing the surface of the inscribed heart, we can obtain information about the phases of work that preceded engraving. The engraving technique and the tool-marks could be distinguished by observing the inscribed glass heart photographs, taken with OLM, that show the different carving techniques that were employed.

The curved lines were engraved with an oblique technique, in which the tool was held at an angle of about 35 to 45 degrees relative to the surface (Fig. 3), while the straight lines were engraved with an uptight technique, and the tool was held perpendicularly. The tiny points may have been engraved by dragging action end of the tool which reveals the level of accuracy achieved by this fine tool (Fig. 4). After the engraving had been completed, the surface received the final polishing and the carved hieroglyphics were filled with yellow pigment (Figg. 5-6)<sup>26</sup>.

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<sup>26</sup> This technique of pigment infilling was used in the early dynastic period on ivory and bone labels; see K.E. PIQUETTE, *Re-Materializing Script And Image*, London 2008: by observing some engraving objects incised with text and applied on gem stones from 18<sup>th</sup> and 19<sup>th</sup> dynasty, we found the same technique used the infilling the incised writing with pigment.



Fig. 3



Fig. 4

Fig. 3-4 – OLM images show the technique executed on the glass surface for curved and straight lines, also for the tiny point using the needle point instrument.

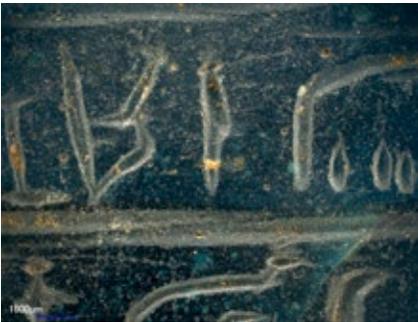


Fig. 5



Fig. 6

Fig. 5-6 – OLM images show traces of yellow pigment that was used as infilling pigment for the engravings.

### § II.3. Interpretation of the Results using RTI Highlight

Reflectance Transformation Imaging (RTI) has been widely used in archeological applications. It offers an additional approach to study and examine the morphology of the glass at the microscopic levels, and also adapted to the shiny material.

RTI visualization of the inscribed glass heart enabled precise details about the manufacture technique<sup>27</sup>. The colour of the glass demonstrate a

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<sup>27</sup> S. NEWMAN, *Applications of Reflectance Transformation Imaging (RTI) to the study of bone surface modifications*, «Journal of Archeological Science» 53 (2015), p. 537.

variation in the blue from transparent to dark probably as a result of poor mixing and melting of the ingredients, and some adjustments in the engraving lines, a deep crack penetrating the core of the glass due to a chock happened to the body of the glass heart (Fig. 7 A-B).

Details of the sharp tool-marks used for the engravings, which were probably made with quartz or flint, were revealed through the engraving lines. The very rough engraving which loses many of the details of the hieroglyphics due to the very small size of the amulet and the difficulty of free hand engraving of such fine details on the very hard glass surface (Fig. 8 A-B).

On the front, layers of iridescence cover the upper part. A small hole appears above the *Bennu* Bird, probably due to some changes in the design during the engraving work and unwanted scratches appeared on the back-



Fig. 7A



Fig. 7B

**Fig. 7 A-B** – RTI using Coefficient unsharp masking mode.

- A. shows the variation of the blue glass, and an adjustment of the straight line in the middle;  
 B. shows a crack also appeared on the right side.



Fig. 8A



Fig. 8B

**Fig. 8 A-B** – A. Coefficient unsharp masking mode.

- B. Diffuse gain mode shows the use of the needle quartz tool for engraving and the difficulties specially in carving the small figures which appeared almost deformed.

ground area. The polishing surface on both surfaces shows traces of the final treatment of the surface by warming or re-melting the glass surface, and coated it by resinous material probably wax (Fig. 9 A-B).



Fig. 9A



Fig. 9B

**Fig. 9 AB** – A. Coefficient unsharp masking mode shows the damage area above the *Bnw* figure. B. Luminance unsharp masking mode shows the polishing surface on the front side (different surface finish), possibly for correcting or removing unintended incised lines.

## Conclusion

The inscribed glass heart of the lady *Nfrw* is the oldest known example of engraved glass. The glass was developed from the carving of stones and gemstones, and executed with the same pointed instruments. Investigations using optical light microscopy (OLM) and reflectance transformation imaging (RTI) were conducted to study the different techniques of preparing and treating the surface before engraving, as well as the various carving techniques and the tool-marks. This study has increased our understanding of engraving on glass during the Ramesside Period (19<sup>th</sup> Dynasty) to establish an effective new approach for studying the engraving technique and the tool-marks.

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#### ABSTRACT

The present study focuses on one of unseen treasures which is an engraved glass heart amulet incised with *Bnw* bird on the front and hieroglyphic text on the back. The heart glass is carved from transparent, greenish blue glass decorated with trace of pigment; eyelet on top. This glass amulet is preserved at the Egyptian Museum, Cairo EMC, JE 92635, and belongs to collection of the Lady *Nfrw* – Ramesside period 19<sup>th</sup> dynasty – discovered among other objects in 1957 at Saqqara Necropolis. It is the oldest known example of glass made using the engraving technique. The aim of this study is to analyze the glass heart using Reflectance Transformation Imaging (RTI) and Optical Light Microscope (OLM) to reveal more information related to the engraving technique and the tools used on the glass surface.

KEYWORDS: Heart glass, *Bennu* Bird (Phoenix), Reflectance Transformation Imaging (RTI)-Optical Light Microscope (OLM).



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