A CRITICAL ANALYSIS OF SELECTED EGYPTIAN BRONZE ARTEFACTS IN THE NATIONAL CULTURAL HISTORY MUSEUM (NCHM)

by

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I, VENUS FELICIA GRAVETT, declare that **"A CRITICAL ANALYSIS OF SELECTED EGYPTIAN BRONZE ARTEFACTS IN THE NATIONAL CULTURAL HISTORY MUSEUM (NCHM)"** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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MRS V F GRAVETT DATE

SUMMARY

This dissertation will critically analyse a gilded bronze Osiris statuette from the Middle Kingdom Period. An attempt is made to verify its authenticity, provenance and probable date of origin, while also gathering information which will help in placing the artefact and others like it in their proper cultural context. Furthermore the value of several investigative techniques employed during the course of this research is also explored.

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INTRODUCTION

The National Cultural History Museum (NCHM) of Pretoria houses a collection of ancient Egyptian artefacts, including several small bronze statuettes, which had never been subjected to any in depth research. There was a need in particular to verify the authenticity of the bronzes – considering the widespread occurrence of Egyptian forgeries – and that became the impetus for this study. A gilded bronze Osiris figurine was chosen as the main subject of analysis, based on two factors: firstly, despite its severe state of preservation it was the only statuette embellished with gold foil (see Figure 7); secondly, the figurine was representative of a larger set of bronzes which were supposedly dated to the Middle Kingdom Period. Nonetheless it must be kept in mind that the research approach used for the analysis of the Osiris as well as the data related to bronzes in general may in due course be applied to the remaining group of metal statuary.

HYPOTHESIS

The main objective of this dissertation is to establish whether the NCHM Osiris is an authentic Egyptian bronze. If that proves to be the case, the subsequent goal will be to verify the statuette's Middle Kingdom Period provenance. In searching for these answers, this study will investigate the artefact as fully as possible; therefore Middle Kingdom artistic trends, ancient Egyptian metallurgical practices as well as bronze statuary are explored. Furthermore the developing role of Osiris in Egyptian religion and funerary

culture is examined. It is also necessary to review the most suitable techniques used in the examination of Egyptian bronze statuary. Lastly this study expects to provide any additional information which might shed light on the figurine's manufacture, function and historical context. It is hoped that the result will ultimately add historical and educational value to the museum collection.

METHODOLOGY

By employing a multidisciplinary or holistic approach it was possible to arrive at more definite conclusions about the statuette. In very broad terms this research is based on archaeological principles, which include the collection, analysis and interpretation of evidence: an artefact (in this case a bronze figurine) represents the material remains of a past society and by studying it, information is supplied about the culture which produced it (Renfrew & Bahn 1993: 9; 61). In this regard Trigger (1986: 8) observes that 'there is no way in which either the archaeological record or material culture can be understood without relating both of them to human behaviour.'

Some archaeological methodology, such as the classification of typologically similar objects and relative dating, are also widely used in Egyptology. In addition the latter discipline employs both historical (textual) and archaeological (art) sources (Renfrew & Bahn 1993: 98; 162). Historical research can provide more background regarding the find site and possible time period, while art historical studies are useful to some extent in interpreting iconography as well as regional stylistic features of the figure. Elemental

analysis was not performed but its future use could greatly contribute to the existing data in narrowing down a possible date for the object, based on composition. For this reason some of the most important percentages in copper alloy composition are included in Chapter 3, along with their related time frames. All the above avenues were followed in studying the NCHM Osiris – not merely for the sake of a physical analysis but also to assist in explaining its role in Egyptian cultural and religious contexts. The thorough multidisciplinary method of researching Egyptian bronzes, used by Marsha Hill in particular (Hill 2007; Hill & Schorsch 2005), was found to be the most suitable for the purpose of this dissertation. The application of stylistic, iconographic and metallurgical studies was thus combined with an investigation into the statue's recent history as well as archaeological context. However, it was deemed necessary to go even further by exploring the broader mythological and religious significance of the Osiris cult.

From the outset it was imperative that the analysis be approached in an objective manner; no preconceived assumptions were entertained about the object's authenticity. Accordingly any existing information regarding the artefact (including catalogue entries and the certificate of authenticity) had to be critically evaluated and verified as far as possible. To begin with the background of the statuette was investigated by obtaining all the available data concerning its recent history and ultimate arrival at the museum. This process involved consulting the acquisitions register of the NCHM which contained entries for each artefact in their collection; the entries recorded the provenance of the object, date of acquisition, name of the donor and a short physical description. During the course of these investigations the original authenticity certificates for some Egyptian artefacts, including

some bronzes, were discovered. These documents of authenticity were endorsed by the Cairo Museum and they certified that the antiquities were authentic.[1] They also carried the name of the dealer, cryptic information on where the objects were found and the name of the buyer.

The dating of the statue itself proved to be a major challenge. The NCHM Osiris, along with several other bronzes, was attributed to the Twelfth Dynasty of the Middle Kingdom Period but it soon became clear that such a date was problematic. Compared to documented examples, trends in bronze statuary and certain manufacturing techniques of that time it seemed more likely that the bronze belonged to a later date. Furthermore the vast majority of bronze figurines in museum collections today belong to the Late Period of Egyptian history (Hill 2001: 203). Be that as it may, other indicators could not rule out the late Middle Kingdom as a possible time period. These apparent inconsistencies meant that all the relevant findings had to be documented and assessed before a tentative conclusion could be reached. It therefore became necessary to draw upon more than one field of study during the course of this analysis, as was outlined above.

During the course of this research, Necsa (the nuclear energy corporation of South Africa) offered the NCHM a rare opportunity to take advantage of a new non-destructive technology which would aid the analysis of the statuette. Subsequently the museum allowed the gilded Osiris together with a sample group of their other Egyptian bronzes to

[1] This was confirmed in a personal meeting with Dr Wafaa El Saddik, the now former Director General of the Egyptian Museum of Antiquities in Cairo.

be examined. This took place with the aid of thermal neutron radiography which was done at the SANRAD facility of the SAFARI-1 nuclear research reactor (operated by Necsa at Pelindaba). All the scans were performed by Mr F de Beer, chief scientist of Neutron Radiography and Tomography. The author is grateful to Ms Anja Smith from the museum's conservation department for the interpretation of the tomography images. This application of a relatively new technology was invaluable in adding to the existing knowledge of the object, particularly with regard to its means of manufacture and current state of preservation.

OUTLINE OF CHAPTERS

Chapter 1 describes the group of Middle Kingdom bronzes from the museum collection and examinations that have been performed on some of them, commenting on any similarities in production features they may share with the gilded Osiris statuette. Recommendations are also made on their potential for future analysis.

Chapter 2 provides a brief background of the Middle Kingdom Period and the Twelfth Dynasty in particular, as this date was assigned to several of the bronzes in the museum collection. More importantly the Twelfth Dynasty's contributions to art, literature and material culture are explored, highlighting certain features of royal portraiture which may be applied to the eventual stylistic analysis of the Osiris statuette. Special attention is also paid to the implications of the rise of the Osiris cult.

Chapter 3 traces the development of mining and metallurgy in ancient Egypt, specifically with regard to copper and its alloys. This is of importance because bronze is but one type of copper alloy and several trends in cupreous metal composition took place over the course of ancient Egyptian history. Certain elemental percentages associated with different time periods are noted to serve as reference, if future elemental analysis is ever conducted. As the Osiris statuette is partially covered in gold foil, ancient Egyptian gold working is also explored.

Chapter 4 investigates the manufacturing techniques used in the casting of Egyptian bronze statuary. Physical traces of their production are often detected on metal sculpture and some of these features which may be useful in dating or authenticating an object, are described. Such indicators will later be applied to the analysis of the Osiris figurine.

The aim of chapter 5 is to follow the evolution of copper alloy statuary in ancient Egypt, again paying close attention to data from the Middle Kingdom Period. The cult and votive functions of these artefacts are also studied, with particular reference to divine imagery.[2] Furthermore the ritual and chronological implications of temple deposits are discussed.

Chapter 6 explores the diverse technologies and disciplines available today that may be employed in the analysis of Egyptian bronzes – including the potential of the new non-

[2] All the bronzes in the NCHM collection are representations of divinities.

destructive method of neutron radiography. Researchers are also made aware of the inherent problems associated with the study of these artefacts.

The goal of chapter 7 is to place Osiris in his religious context. His cult's rise in prominence and its role in Egyptian funerary beliefs are examined along with any significant developments in the god's iconography and representations. Special attention is paid to geographic variations in his stylistic depictions and these will be applied to the statuette's analysis.

Chapter 8 endeavours to analyse the NCHM Osiris statuette using a multidisciplinary approach. Accordingly the figure's provenance from Memphis is investigated by looking at the site's archaeological record. Next, the statuette is investigated visually, stylistically and internally. The ensuing results are used to provide information regarding the artefact's authenticity, manufacture and religious function. These findings are summarised in the Conclusions section of the dissertation.

A NOTE ON CHRONOLOGY

Scholars define ancient Egyptian chronology by dynasties or ruling families. These are further divided into broader time periods namely the Old, Middle and New Kingdom. This timeline and associated dating – based largely upon ancient king lists and the third century writings of Manetho – is not infallible by any means (Redford 2006a: 305-308). Absolute

dates in the chronology are often the subject of debate and review; therefore some discrepancies in dates will inevitably occur when comparing one Egyptologist's work with another. This dissertation will make use of the general chronology as outlined by Clayton (2006).

CHAPTER 1

A SURVEY OF EGYPTIAN BRONZES[1] IN THE NCHM COLLECTION

1 INTRODUCTION

The gilded bronze Osiris which will be the main focus of analysis in this study belongs to a larger group of fourteen small metal statues in the ancient Egyptian collection housed at the NCHM in Pretoria. Five of these were dated to the Twelfth Dynasty of the Middle Kingdom while three were reportedly from the Eighteenth Dynasty of the New Kingdom Period.[2] According to the museum's acquisition register the majority of the bronzes were obtained from the same antiquities dealer in Cairo by a Lieutenant Bowyer between the period of 1944 and 1946, before they were eventually donated to the museum at a later date.

The purpose of this chapter is to briefly review certain selected Middle Kingdom artefacts because they form part of the same collection and furthermore to highlight the results of recent investigations that were conducted on some of them. The diverse methods of

[1] The term "bronze" will be used for convenience in describing these objects since no analysis has yet been performed to establish their precise copper alloy composition. In essence they can be referred to as cupreous statuary.

[2] This information was provided on their certificates of authenticity (see for example Appendix A).

analysis that were employed in the interpretation of these objects will be explored further on in the dissertation. Wherever relevant, comparisons will be made with the gilded Osiris statuette which will be examined in detail in Chapter 8.

2 COLLECTION OF OSIRIS FIGURINES

The museum collection includes five bronze figures representing Osiris; three small standing figurines, one seated and one large gilded Osiris which is the subject of this study. The gilded Osiris has been assigned to the Twelfth Dynasty on its certificate of authenticity, the only one of this group to be given a date.

Figure 1: Three small Osiris figurines. ARG 85/20, 9687 and 4098 (Courtesy of NCHM, Pretoria)

Stylistically the three small standing Osirises (Figure 1) can be analysed to reveal their production sites, as various postures on bronze statuary may indicate regional differences (Griffiths 1980: 85-86; Ogden 2000: 148).[3] Therefore catalogue numbers ARG 4098 and 6987 may have a possible Middle Egyptian origin with their arms held at the same level while ARG 85/20 probably came from Lower Egypt, since one arm is positioned higher than the other. These three figurines appear very crudely made and may well date from around the Late or Ptolemaic Period when similar small votive objects were mass produced. Existing examples from that time show a tendency for bronzes to be made with heavily leaded alloys (Ogden 2000: 155, 160).[4] Only elemental analysis could show whether that was the case with these three artefacts.

Figure 2 shows a bronze seated Osiris (catalogue number ARG 9301/1). It is without its original throne and now rests on a modern wooden seat (not shown in the photograph). A tang underneath the feet and buttocks would have been used to secure the statue to a base made from metal or wood. Its metal surface has a reddish tone with some signs of green corrosion product but overall it is still in reasonably good condition. The figure appears finely crafted and the facial features in particular are delicately modelled; the contrast is striking when compared with the robust countenance of the gilded Osiris (see Figure 8). A white substance was used as inlays for the eyes. This statuette was included in a group of bronzes which were scanned using neutron radiography and the resulting tomography images show clear evidence of its manufacturing process. Several chaplets or internal core

[3] See Chapter 7 for the regional iconographic variations of Osiris.

[4] Chapter 3 explores the relation between composition and date in more detail.

supports are plainly visible on the reconstructed image (Figure 3), indicating that support pins were used to secure areas at the crown, back and legs on the original clay model during the casting process. The same features were discovered on the gilded Osiris and thus prove that both statues were cast with the lost wax method (compare with Figure 10). Chapter 6 will demonstrate how such production features are used to interpret the possible date and means of manufacture of bronze statuary.

Figure 2: Seated Osiris

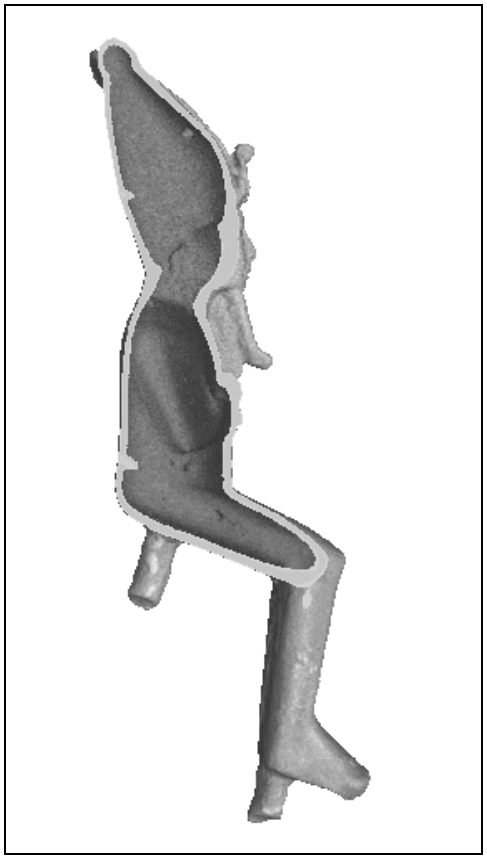

Figure 3: Neutron radiography scan showing chaplets

(Courtesy of NCHM and Necsa)

3 ISIS NURSING HORUS

Catalogue number ARG 85/26a is a bronze representation of the goddess Isis seated on a modern replica wooden throne. She is breastfeeding a separate infant figure (ARG 85/26b) which is identified as her son Horus (not included in Figure 4).

Figure 4: Nursing Isis

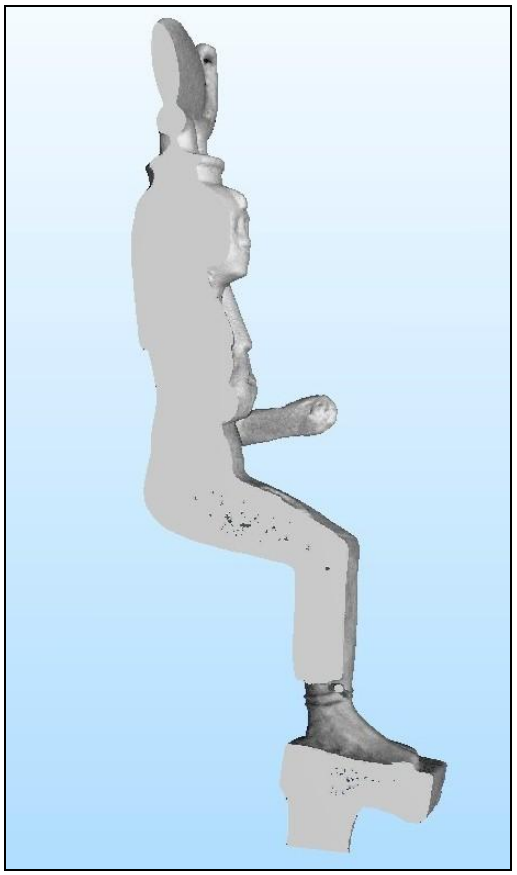

Figure 5: Scanned image showing solid casting

(Courtesy of NCHM and Necsa)

The young Horus was originally cast onto the lap of Isis but has since broken off. He is portrayed in the conventional manner with a side lock of hair which indicates youth and childhood. Isis is wearing a traditional tripartite wig with a royal uraeus or rearing cobra as well as a small crown. This is surmounted by a Hathor-style headdress composed of a large sun disc and cow's horns. Her slender, well-proportioned body is clad in a tight-fitting sheath dress which is only indicated by a hem at her calves. A footrest with tang suggests that the statue was originally fitted to a base, probably a seat, which is now missing.

The goddess Isis features strongly in the ancient myth of Osiris as his loyal consort and mother of their son Horus. She formed a significant link in the portrayal of the divine kingship of the pharaoh, since the latter was equated with Horus in life and Osiris in death. As mother of the god (and by implication the king) Isis reinforced the notion of the pharaoh's divine connection, especially when portrayed in such nursing statues (Griffiths 2001: 188). However she became most revered for her maternal and protective aspects; one of her most common epithets was 'Great of magic'. In this guise Isis was popular with commoners and royalty alike. Her protection was particularly invoked for childbirth, illness and poisonous bites (Pinch 2006: 29). The horned sun disc which was at one time exclusively associated with the goddess Hathor was also assimilated into her iconography. From the Late Period onward the practice of donating bronze votive statues to temples gained momentum and many showed Isis in this well-known pose suckling the infant Horus. In the Greco-Roman era the Isis cult became so popular and widespread that some of her traditionally Egyptian attributes disappeared (Malaise 1976: 229-231). In fact,

many scholars believe that her influence was so strong that the later Christian Madonna and Child iconography derived from the so-called Isis Lactans figures (York & Schlossman 1981: 39).

The bronze figure's certificate of authenticity assigns it to the Twelfth Dynasty of the Middle Kingdom Period, but this date is problematic for several reasons. The earliest known statue of Isis in this enthroned pose dates to the eighth century BC. Furthermore representations of the nursing goddess wearing the horned headdress were adopted in canonical form for statuary only from the beginning of the Third Intermediate Period (Hill 2007: 12-13).[5] This clearly conflicts with the assigned time period of the Middle Kingdom.

The statuette was reportedly discovered at Ihnasya el-Medina near the Faiyum area, known in ancient times as Herakleopolis. The first recorded occupation of the site was during the First Intermediate Period when it became the capital city of the northern rulers. The Herakleopolitan kings encompassed the Ninth to part of the Eleventh Dynasties (Grajetzki 2006: 8-9). Although the area is largely associated with the First Intermediate Period, there is evidence of occupation until the Roman era. No royal burials have been found but there are remains of the temple of a local god Herishef which was in use from the Twelfth Dynasty through to the Late Period. Inscriptions indicate that important repairs were done at the temple during the Twenty-sixth Dynasty. Some excavations were carried out on the site but the original town and temples are still in ruins (Gomaà 1999: 369). The only other

[5] The Third Intermediate Period dates to approximately 1069-525 BC and spans Dynasties 21 to 26 (Clayton 2006: 172).

remains of archaeological importance in the area are the cemeteries with tombs for First Intermediate and Eighteenth Dynasty officials. Furthermore the town seems to have developed a strong connection to Osiris and as a result he had a cult centre in the vicinity (Gomaà 1999: 369-370).

Taking the previously mentioned iconographic indicators into account and keeping in mind the broad historical context of the discovery site (including connections to Osiris), one can only conclude that the earliest date for the Isis statuette is the late New Kingdom or more likely the Third Intermediate Period. As was shown earlier it seems improbable that the assigned date of the Middle Kingdom is accurate. This figure seems to belong to the large corpus of votive bronzes in museums today, among which many similar nursing Isis statues are found. There is potential for obtaining more a precise dynastic date if further stylistic examinations are performed, for example analysing facial features and dress style. Additional information was provided by neutron tomography which revealed that the statuette was solid cast; air bubbles that were trapped inside the molten metal during the original casting process could still be detected on the inside (see Figure 5).

4 HORUS THE CHILD

It is interesting to note that the most significant ancient Egyptian triad of gods – namely Isis, Osiris and Horus – are all represented among the bronzes in the NCHM collection. Horus the Child (Figure 6, catalogue number ARG 85/23) completes the divine family. He is shown in his most common guise as an eternal child with a large curled side lock of

youth, wearing a royal uraeus and is seated on a modern stand. His eyes are inlaid with a white material and a black substance was used for the pupils. The hands are positioned next to his thighs, palms facing downward. According to its certificate the statuette was found in the region of Memphis and was yet again dated to the Twelfth Dynasty of the Middle Kingdom.

Figure 6: Horus the Child (Courtesy NCHM, Pretoria)

In 2007 the Horus bronze was damaged and broke in half while being fitted onto a new display stand. The break revealed tantalising traces of inner core material and as a result

the museum took this opportunity to investigate the object further. Samples of the broken material were analysed with X-ray fluorescence (XRF) and X-ray diffraction (XRD) techniques and after restoration the statuette was also subjected to neutron radiography and tomography. The various findings of these examinations were subsequently published by Smith *et al* (2008). The latter's aim was to provide scientific information regarding the authenticity and manufacturing techniques of the artefact, as well as its conservation status.

A wealth of new data was produced by the above analysis, including the composition of the organic core material and confirmation of the fact that extensive restoration work had been performed on the statuette at some point in the past. Neutron radiography showed the presence of metal chaplets and the position of the internal clay core which proved once again that the figure was manufactured using the lost wax technique, as was found to be the case with the gilded Osiris.[6] Most valuable for the museum was the information that neutron radiography provided regarding Horus' internal corrosion, which cannot be observed from the outside; tomography images showed how the corrosion product has begun to migrate into the core material (Smith *et al* 2008: 89). Similar type of corrosion was also observed around chaplets of the large Osiris (see Figures 9 and 10). The implication of this finding for the Horus statue was important as it showed how fragile the figure's condition was. As a result the museum's conservation department is aware of and will monitor the deterioration, whilst any handling of the object is now restricted (Smith *et al* 2008: 89).

[6] See Chapter 8.

The above report is a good example of the various types of scientific analysis that may be applied to the study of ancient Egyptian bronzes in order to establish their manufacturing techniques, authenticity and general condition. Although it may not always be possible for researchers to obtain samples for elemental studies or gain easy access to a facility that performs neutron radiography, it does prove the value of such tests for museum artefacts in particular. The only aspect that has not been addressed is the Twelfth Dynasty date of the Horus figurine. A future evaluation based on the statuette's stylistic elements and provenance would certainly complement the analysis that has so far been conducted. The figure's clear and delicately modelled facial features in particular could assist in assigning the bronze to an appropriate time period; its heart-shaped face with full lips set in a slight smile is reminiscent of works from the Ramesside period as well as Twenty-sixth Dynasty examples showing the so-called 'Saite smile' (Tiradritti 1999: 247, 359). Moreover there is also the possibility to consider that the statuette may represent a royal rather than divine child.

5 CONCLUSION

The above discussion briefly highlighted a few of the related 'Middle Kingdom' Egyptian bronzes housed at the NCHM and the additional insight that scientific studies can provide with regard to how and where an object was produced. Attention was also drawn to some similarities they have in common with the gilded Osiris. There is certainly scope for future research, not only on the selected examples but several others which form part of the collection. These include a charming statuette of the sage Imhotep, an Apis bull, the goddess Sekhmet in her leonine form, a small bronze amulet of Anubis, seated cats

representing the goddess Bast and a crouching ibis from the cult centre of Thoth at Hermopolis Magna. Investigations into the Imhotep and ibis figures for example could add to the educational value of the museum objects, giving insight into the widespread practice of votive donation at their pilgrimage sites as well as the significance of animal cults in ancient Egypt. The combination of historical, stylistic and technical research can only contribute to placing these small objects in their proper chronological and cultural context. This will be illustrated with the analysis of the gilded Osiris statuette.

CHAPTER 2

MIDDLE KINGDOM ART AND CULTURE

1 INTRODUCTION

One of the goals of this study is to place the bronze NCHM Osiris statuette within its proper chronological context if possible. Although the statue's original certificate of authenticity dates it to the Twelfth Dynasty of the Middle Kingdom, no further evidence is supplied to support such a date. This chapter will give an overview of that time period along with the associated artistic and cultural developments that took place, which may be applied to the ultimate analysis of the figurine and others assigned to the same period.

The Middle Kingdom Period of ancient Egypt spanned the Eleventh to Thirteenth Dynasties, around 2040-1782 BC. While Grajetzki (2006: 68) includes the Thirteenth Dynasty in this chronology, other authors such as Clayton (2006: 90) place it within the Second Intermediate Period. Despite notorious uncertainty regarding its absolute chronology, this was to be a new era of stability that followed on the chaos of political disunity of the First Intermediate Period. Later generations of Egyptians would regard it as a classical period in which literature as well as the fine arts reached the highest standard (Wildung 2001: 91). The Middle Kingdom, especially the Twelfth Dynasty, provided prototypes which were upheld for many centuries and several new concepts in religion and funerary culture originated during this time (Grajetzki 2006: 1). The royal birth legend,

for instance, was a product of the Twelfth Dynasty (Schulz & Seidel 1998: 105). The cult of Osiris is given unprecedented importance during the Middle Kingdom, which would greatly impact on how people saw their role in the afterlife (Grajetzki 2006: 57). Long-distance trade routes are expanded and close ties are formed with other Near Eastern city-states (Schulz & Seidel 1998: 105). In short, the Middle Kingdom Period was a time of new artistic innovation, political stability and prosperity – at least for the privileged classes. Even climatically certain changes during the Second Millennium BC meant improved conditions for Egypt as higher Nile inundations occurred (Bell 1975: 260; Redford 2006a: 102).

2 POLITICAL BACKGROUND

2.1 REUNIFICATION AND THE DAWN OF THE MIDDLE KINGDOM

The First Intermediate Period was characterised by civil unrest in the country, when several smaller kingdoms were ruled by various warlords (Clayton 2006: 71). Local nomarchs or governors vied for power in the provinces and eventually two powers emerged fighting for control of the country. The so-called Herakleopolitan kings rose up from the area of Herakleopolis and ruled as the Ninth and Tenth Dynasties over the North. For the next hundred years they were engaged in military clashes with rulers from the small kingdom of Thebes in the South who, under Mentuhotep I, eventually managed to unify Egypt again under one king (Grajetzki 2006: 8-9; Redford 2006a: 93). The Theban conquerors belonged to the Eleventh Dynasty and this reunification marks the beginning of the Middle Kingdom Period.

Mentuhotep I's birth name ('Montu is content') was an apt reminder of his reign's hard fought-for unity, since Montu was a Theban war god; he was also given the title 'Unifier of the Two Lands'. As fourth king of the Eleventh Dynasty his long reign of about fifty years brought peace and stability to the country (Clayton 2006: 73-74). During this time various building projects were resumed, including construction of his unique temple-tomb at Deir el-Bahari in western Thebes (Wildung 2001: 75).

Mentuhotep II succeeded the throne upon his father's death and although his reign lasted only about twelve years, he seems to have maintained the same course of action in ruling the country (Clayton 2006: 75). The areas south of Egypt's border were exploited for trade goods and expeditions were also sent to collect raw materials such as stone from Wadi Hammamat in the Eastern Desert and turquoise from Sinai (Schulz & Seidel 1998: 106). One of the main objectives of these expeditions was to supply construction material for the pharaoh's extensive building programme across the country. Mentuhotep II was probably buried not far from his father's tomb complex at the cliffs of Deir el-Bahari, near Thebes. Very little information exists regarding the brief reign of his successor Mentuhotep III. However it seems his vizier Amenemhet brought the Eleventh Dynasty to a close by overthrowing the king and establishing himself as ruler (Clayton 2006: 76-77; Redford 2006a: 97).

2.2 THE TWELFTH DYNASTY (1991-1786 BC)[7]

Amenemhet I came to power in what seems to have been a military coup and founded a new dynasty (Aldred 1970: 29). Indications are that his origins as a commoner from Upper Egypt might never have been far from his mind; possibly this was reflected in the title he adopted: "Repeater of births" or Renaissance (Redford 2006a: 97). However dubious in its inception, the Twelfth Dynasty would become one of the most stable and prosperous periods in Egyptian history. In many ways Amenemhet I's reign did herald a Renaissance for his country (Simpson 2001: 454).

As if underlining the fact that this was indeed a new era Amenemhet I founded Itj-tawy, a new capital city south of Memphis near Lisht; this also became the site of his pyramid complex (Schulz & Seidel 1998: 107). Perhaps mindful of the fact that he was a usurper and feeling the need to legitimise his kingship, the move north away from the old power centre in Thebes would also distance Amenemhet I from the memory of the previous regime (Redford 2006a: 98). In due course he managed to consolidate his power and establish a stable foundation for the Twelfth Dynasty. He built numerous forts along the eastern border of the Delta, launched campaigns into Nubia and his allegiance to the Theban deity Amun also marks the beginning of the god's rise in popularity (Clayton 2006: 78-79; Wildung 2001: 84).

[7] This is the accepted time range for the Middle Kingdom, although the date has lately come under review due to various factors (See Simpson 2001: 453).

Amenemhet began a co-regency with his son Senwosret I during his thirty-year reign and this practise was to become a well-known feature of rule in the Twelfth Dynasty. Indications are that the king was assassinated through a harem plot (Redford 2006a: 99). The event would deeply impact on the way subsequent pharaohs from this family would rule and even influenced royal propaganda literature. Under Senwosret I the *Instructions of Amenemhet* was written, meant to be instructions from the dead king to his son (Simpson 2001: 453). Amenemhet supposedly describes his own assassination and then advises his heir on how to rule as a king. The most significant point he makes is telling Senwosret not to trust others, nor place too much faith in them. This attitude of keeping somewhat distant from their subjects was adopted by other pharaohs of this dynasty (Redford 2006a: 99). Senwosret I's forty-five year rule was also marked by numerous building projects and forts up to the Second Cataract maintained Egypt's grip on Nubia. It seems that the king had a few years' co-regency with his son Amenemhet II who succeeded him after his death (Clayton 2006: 80-81).

The reign of Amenemhet II is noted for two important facts. First the Faiyum area was cultivated with crops for the first time and the Bahr Yusuf canal was widened for improved irrigation (Clayton 2006: 82). Second, there is evidence which reflects Amenemhet II's foreign policy towards other Near Eastern rulers and Middle Kingdom Egypt's contact with cities such as Byblos (Hansen 1969). Records show that the exchange of diplomatic gifts with other Near Eastern rulers was a common occurrence. The king's cartouche was found on jewellery from the royal tombs of Byblos, while a cache of silver Aegean

artefacts was discovered in the foundations of the temple at Tod (Stevenson Smith 1969: 280).

Senwosret II succeeded his father as pharaoh. His reign was characterised by the good relationship that existed between the provincial governors and the pharaoh. The rock-cut tombs of these local dignitaries were vividly decorated with scenes from daily life and often referred to the royal honours bestowed upon them (Grajetzki 2006: 28).[8] Most well-known of these is the tomb of Khnumhotep II (BH 3) from Beni Hasan in Middle Egypt. Its beautifully painted mural depicts a group of Semitic people bringing trade goods to the area and it provides an interesting glimpse of foreigners in Egypt at that time (Schulz & Seidel 1998: 124). Intricate gold jewellery found in the tombs of the royal ladies was further proof that highly skilled craftsmen were at work during this period (Simpson 2001: 456).[9] Senwosret II chose the site of Lahun for his pyramid and was succeeded by his son (Clayton 2006: 83).

Senwosret III is regarded as one of the greatest pharaohs of the Twelfth Dynasty. His image is very distinctive among the royal portrait sculpture and according to reports he was of great stature, which must have enhanced his reputation as a military leader (Clayton 2006: 84). Senwosret III implemented various reforms in government and administration as well as directing resources towards agricultural projects. He also managed to curb the

[8] Most of these tombs were located at Elephantine, Beni Hasan and Asyut.

[9] Some of the most outstanding examples of jewellery were found in the tomb of princess Sit-Hathor-Yunet, discovered at Lahun (Clayton 2006: 80).

ambitions of provincial governors who were threatening to become too independent (Redford 2006a: 103). However, it is his Nubian campaigns for which Senwosret is most well-known. He ruthlessly secured the southern border further than before, ensuring Egypt had access to trade routes and the highly sought-after mineral resources, especially gold (Redford 2006a: 107). Some forts along the border even had cult chapels dedicated to Senwosret III and in Nubia itself the king was worshipped as a local god (Grajetzki 2006: 52; Seidlmayer 2000). He prided himself on having forced the Nubian tribes into submission and from a stela inscription from the fort at Semna near the Second Cataract, it is clear that Senwosret expected future pharaohs to follow his example (Seidlmayer 2000: 239).

Senwosret III had his pyramid built at the cemetery in Dashur. He is believed to have reigned for about thirty-seven years and some scholars suggest that some of this time was a co-regency of twenty years shared with his son Amenemhet III (Simpson 2001: 455). The latter rose to the throne and built upon his father's successes. Amenemhet III vigorously encouraged mining expeditions to the turquoise mines of Sinai and utilised the quarries for raw materials (Grajetzki 2006: 60).[10] Egypt enjoyed great economic prosperity during his long reign of forty-five years. He was also responsible for completing the long-standing irrigation project in the Faiyum and even constructed one of his two pyramids nearby at Hawara. The accompanying mortuary temple with its vast maze of corridors was praised by later Classical writers who compared it to the mythical Labyrinth of Knossos (Grajetzki

[10]Over fifty rock inscriptions in the Sinai region attest to the frequency of these expeditions during the time Amenemhet III ruled Egypt (Clayton 2006: 87-88).

2006: 58-59; Redford 2006a: 104, 106). Amenemhet III was the last great ruler of the Middle Kingdom and after his death Egypt seems to have entered a period of decline.

2.3 THE CLOSING PHASE OF THE MIDDLE KINGDOM

The Twelfth Dynasty came to an end after the short reign of Amenemhet IV and that of his successor Queen Sobeknefru, who ruled as king in her own right (Grajetzki 2006: 61). Queen Sobeknefru was the last ruler of the 'House of Amenemhet'. The new Thirteenth Dynasty consisted of ten pharaohs who ruled a total of about seventy years. Not much information is available regarding these kings apart from their names and a few burial sites at Dashur and Saqqara (Clayton 2006: 90). Although the government must have been reasonably stable, somehow these kings were never able to recapture the successes that their Twelfth Dynasty counterparts enjoyed. In addition, Bell (1975: 260) suggests that the cessation of regular Nile inundations might have contributed to the country's economic hardship. A further decline in royal power led to an inability to effectively maintain the country's borders and a weakened state therefore became vulnerable to invaders (Redford 2006a: 113-114).

A period of rapid deterioration followed, with a Fourteenth and Fifteenth Dynasty establishing themselves in the Delta area in opposition to the last kings of the Thirteenth Dynasty (Clayton 2006: 93). These Semitic people have been entering Egypt over a period of time when the country's borders were no longer kept secure. They would eventually rule as the foreign Hyksos. For whatever reasons, Egypt finally slipped into another dark

age of chaos and instability, known as the Second Intermediate Period (Redford 2006a: 112).

3 ACHIEVEMENTS OF THE TWELFTH DYNASTY: ART AND MATERIAL CULTURE

The stability and prosperity provided by long reigns and increased economic activity could have been contributing factors to the success of the Twelfth Dynasty in particular. It produced a centralised administration system, utilized the Faiyum's potential for agriculture and established good diplomatic relations with other states in the Near East (Simpson 1974: 101). Mining expeditions to Sinai and stone quarries in the Eastern Desert enabled Egypt to supplement her wealth, while a strong presence along the southern border ensured that the mineral riches and trade goods from Nubia were always accessible (Aldred 1970: 28; Simpson 2001: 457). Above all the Twelfth Dynasty was a golden age for art, introducing new trends in areas such as sculpture and funerary traditions.

3.1 SCULPTURE AND ROYAL PORTRAITURE

Throughout the tumultuous First Intermediate Period the material culture in Egypt underwent some changes; the uniform style of art that was implemented across the country during the Old Kingdom by craftsmen from the royal residence deteriorated and regional differences in art production developed (Grajetzki 2006: 16; Petrie 1996: 17). However, Grajetzki (2006: 17) believes that this should not necessarily be viewed as a decline but

rather as examples of new beginnings in the different areas when contact with the official craftsmen no longer existed. In the area of Memphis itself though, the standards of the Old Kingdom were still adhered to and high quality work was still being produced by the workshops. A testament to the strong influence of the Old Kingdom artistic tradition in the region is the fact that it is often difficult to determine whether an artefact belongs to that time period or the First Intermediate Period (Grajetzki 2006: 17). Reunification, new royal commissions and prosperity stimulated the arts and the demand for well-trained craftsmen increased throughout Egypt (Aldred 1970: 28; Grajetzki 2006: 23).

The strong artistic influence of the Old Kingdom gradually made way for new innovations once craftsmen from the royal residence started working in the capital of Thebes and elsewhere in the country (Grajetzki 2006: 23, 44; Petrie 1996: 22). In this way the tradition of the so-called Memphite School of art spread to other provincial centres, although some craftsmen also developed their own local interpretations of the style (Aldred 1970: 28). Thus, as Thebes grew in importance for the first time the town became the driving force for new trends in art and architecture (Wildung 2001: 75). A new type of private stone sculpture that appeared during the Middle Kingdom was the block statue, showing a seated individual with legs drawn up to the chest. These statues were to become very popular in later periods although undergoing some stylistic changes (Tiradritti 1999: 124). Aside from sculpture the Memphite craftsmen were also renowned for producing finely carved reliefs (Grajetzki 2006: 23; Petrie 1996: 52).

Early on during the reign of Mentuhotep II royal portraiture began to imitate examples of kings from the Old Kingdom (Kahl 2010: 2).[11] Aldred (1970: 30) points to the long line of the inner canthi or tear-ducts of the eyes, relief eyebrows and thick grimly set lips as some of the stylistic elements that were borrowed from older models of pharaohs. This was the first (but not last) instance of archaism in Egyptian art (Aldred 1970: 30; Tiradritti 1999: 93). Much later sculpture from the Eighteenth Dynasty again revived this early Middle Kingdom trend, as can be seen in a sculpted head of king Ahmose; it shows the artist applying the same style of wide slanting eyes and deeply cut canthi to the subject's features (Romano 1976: 104). In addition, Kahl (2010) remarks that the phenomenon of archaism not only occurred in the realms of art but in architecture, names, titles and literature as well. It is interesting to note that over time there was also a tendency of certain geographical areas preferring the style of particular past eras. Memphis seemed to favour models from the Old and Middle Kingdoms while the Theban area utilised New Kingdom examples (Kahl 2010: 2, 6).

Under the reigns of Senwosret III and Amenemhet III royal portraiture became very distinctive, showing a less idealised or god-like image of the king (Grajetzki 2006: 57). This was in contrast to representations from the Old Kingdom when rulers appeared uniformly aloof, distant and divine (Aldred 1970: 27). Middle Kingdom sculptures of the pharaoh began to portray a weary ruler preoccupied with the welfare of his people, illustrated by realistic care-worn facial expressions (Simpson 1974: 101; Tiradritti 1999:

[11] One such portrait of Mentuhotep was found at his temple in Deir el-Bahari (Aldred 1970: 30).

96)[12]. One reason for this may have been that the country experienced some political difficulties. Aldred (1970: 39) however advanced another possible explanation for these changes. He believes that a series of coronation statues were produced at the beginning of the king's reign which established the style for all his subsequent official portraits. In the event of the pharaoh celebrating a jubilee the royal portraiture was deliberately altered, often showing changes in the ruler's appearance. It is significant that Middle Kingdom private statuary were no longer intended for tombs; instead they were placed in temples for the first time, along with royal statues (Tiradritti 1999: 97; Wildung 2001: 87).

3.2 DEVELOPMENTS IN RELIGION AND FUNERARY CULTURE

The period under Senwosret III saw significant changes in the material culture of Egypt and a larger variety of items began to form part of the funerary equipment (Grajetzki 2006: 57). Intricate wooden models representing people engaged in daily activities, for example herding cattle or weaving, were placed in tombs (Tiradritti 1999: 114, 118). They functioned as a reflection of the continued existence of the deceased and became a feature of the burial practice during this period along with *shabti* figurines[13] (Schulz & Seidel 1998: 130-131; Simpson 1974: 104). Canopic burial jars containing the mummified internal organs of the tomb owner also gained special significance during the Twelfth Dynasty. The four jars with carved human heads were usually housed in alabaster chests to keep them safe (Tiradritti 1999: 97-98). Another new element is the placement of scarabs

[12] A striking example of this 'realistic' brooding style is the diorite head of pharaoh Senwosret III as a sphinx in the Metropolitan Museum (Aldred 1970: 43).

[13] *Shabtis* or 'answerers' were placed in tombs and would magically perform all the hard physical labour that was expected of the tomb owner in the Afterlife (Schulz & Seidel 1998: 130).

and jewellery on some mummies (Grajetzki 2006: 34). All these innovations in burial practices seem to indicate that a change was taking place in how ancient Egyptians viewed their transition from life to death.

Against this background the cult of Osiris began to rise in prominence during the Middle Kingdom. So-called Osiride pillars were incorporated into royal architecture which represented a mummiform statue of the pharaoh. This was a visual way of connecting the earthly ruler to the king of the dead (Schulz & Seidel 1998: 135). Abydos, sacred to Osiris, became a pilgrimage site during the Twelfth Dynasty (Simpson 2001: 456). Mummification which was associated with this god became a prototype for the royal burial and eventually that of all Egyptians (Griffiths 1980: 56). The desire of the deceased person to identify with the god of the dead and being granted resurrection was no longer reserved for royalty alone – everyone could become an "Osiris" in death (Hornung 1996: 96).

To this end more people were being buried in anthropoid coffins, the inside of which was painted to represent a mummy (Schulz & Seidel 1998: 129). A significant religious development of the Middle Kingdom is the magical spells called Coffin Texts which began to appear inside the sarcophagi of officials and other non-royal individuals (Simpson 2001: 456). Some of these glorification spells were revised versions of the Pyramid texts while other material was new.[14] The occurrence of this trend is often cited by scholars as proof for what is called the 'democratisation of the dead' in Egypt, but Smith (2009: 2, 4)

[14] The Pyramid Texts were exclusively used to assist the king's transition to the Afterlife during the Old Kingdom.

questions whether this was truly the case. He believes the Coffin Texts were only used by those non-royal persons who could afford them and that it marked a change in practice rather than belief.

Another insight into the funerary culture of the Middle Kingdom can be obtained through the changes that took place in tomb architecture of the time. Under the king of reunification, Mentuhotep II, the country's elite began building rock-cut tombs on the west bank of Thebes (Wildung 2001: 75). The pharaoh chose the cliff site of Deir el-Bahari to create an impressive mortuary temple for himself and it is regarded as his greatest achievement (Clayton 2006: 74).[15] In contrast to Old Kingdom pyramids which reached to the heavens, this royal tomb stretches deep into the mountainside and the underworld (Wildung 2001: 75). Nonetheless the following Twelfth Dynasty pharaohs abandoned the tradition of rock-cut tombs which was favoured by their Theban predecessors and instead resorted to the Old Kingdom convention of pyramid building – yet another example of the archaism of this time (Aldred 1970: 39). Some examples of this trend were the pyramid complexes build at Lisht by Amenemhet I and Senwosret I. These monuments seem to copy the old Sixth Dynasty models (Grajetzki 2006: 44). Subsequent pyramids were also constructed at Lahun and Dashur (Clayton 2006: 83, 87).

Looking at the archaeological record it is clear that temple building became a priority across the country during the Middle Kingdom. In fact, most royal statuary from this

[15] Although Clayton (2006: 74) attributes the building work to Mentuhotep I, it is generally accepted that his son Mentuhotep II was responsible (Wildung 2001: 74 and elsewhere).

period originates from temple sites (Aldred 1970: 27-28). It is possible that the changing political conditions at the beginning of this period contributed to this phenomenon. In order to express their own identity the individual districts in Egypt that rose to power began honouring their local gods by erecting shrines to them (Wildung 2001: 82). Older temples that had fallen into ruin during the disorder of the First Intermediate Period were also restored (Simpson 2001: 454). Karnak, the largest and most sacred temple complex in all of Egypt, had its humble beginnings during the Twelfth Dynasty when a shrine was erected to the local god Amun. Closely situated to the Amun temple is the beautiful 'White Chapel' of Senwosret I which was built for his jubilee and the structure is considered one of the most significant dating from the Middle Kingdom Period (Wildung 2001: 75).

3.3 LITERATURE

As was mentioned earlier, the Twelfth Dynasty also produced a great amount of literary works. With the founding of Itj-tawy as capital for the royal residence, an efficient scribal school was established. Tutors not only trained the new scribes in administrative forms of writing, they also produced creative writers. Existing texts were used as teaching models which were copied out and memorized (Redford 2006a: 99). Well-known literary works produced by the scribal schools were the popular *Tale of Sinuhe* (written during the reign of Senwosret I), the *Prophecy of Neferti* and *Instruction of Amenemhet* (Grajetzki 2006: 45). The latter two works also make reference to the political situation under the relevant kings (Baines 1982: 38). Others include *The Eloquent Peasant*, *Satire on the Trades* and *Instructions for Merikare* (Simpson 2001: 457).

In the *Tale of Sinuhe* the falsely accused hero of the story flees Egypt and has several adventures in foreign countries before returning home at the request of his king, Senwosret. Subsequently his innocence is established and all ends well (Grajetzki 2006: 45). This masterpiece of Egyptian literature encapsulates certain elements which were close to the hearts of all who read it, namely the superiority of Egyptian values and traditions, and the central role played by the pharaoh in all of society (Baines 1982: 37). In the case of *Sinuhe* the story also adroitly conveys a message to the reader that their benevolent king is quite willing to forgive the transgressions of his subjects (Redford 2006a: 101).

These works of fiction were eventually regarded by Egyptians as masterpieces, but their intent at the time was foremost to portray the pharaoh as compassionate and just, as well as legitimising the rule of the new Twelfth Dynasty. Redford (2006a: 101) describes this type of writing as 'literature of persuasion', although Baines (1982: 38) argues against the label of propaganda literature in the case of the *Tale of Sinuhe* since he regards it as a unique work in its own right.

4 CONCLUSION

The above discussion has shown that the Middle Kingdom and specifically the Twelfth Dynasty was worthy of being called Egypt's golden age. The stability and economic prosperity was largely due to the long reigns and co-regencies that featured during this time, but other factors also contributed to the country's success. A sound administration

developed and the increased mining activities and trade with Nubia are among the great achievements of that period but none would eclipse the artistic masterpieces for which the Middle Kingdom became renowned. In particular certain traditions in representational art were established which would become favoured models for later times. Above all the rise in prominence of the Osiris cult had a lasting impact on Egyptian funerary culture.

CHAPTER 3

ANCIENT EGYPTIAN METALLURGY

1 INTRODUCTION

The following discussion will shift the focus onto the sources of metal and the origins of metallurgy. Accordingly the development of ancient Egyptian metalworking will be reviewed, highlighting certain relevant materials as well as some established elemental characteristics of metal objects which could have bearing on future scientific tests of the selected museum artefacts. This chapter will concentrate mainly on the use of copper and its alloys in ancient Egypt, since the development of copper alloys is central to the emergence of bronze statuary. A section on gold-working is also included because the Osiris statuette which will be analysed is covered in gold foil.

The first use of metals and the development of metallurgy are widely accepted to have taken place in the Ancient Near East.[16] Ancient people would first have utilised metals that were found in their natural state (such as gold or so-called native copper) to manufacture simple objects like beads. Çambel and Braidwood (1970: 151) found tentative evidence for the earliest intentional use of metal at Çayönü Tepesi in Turkey, dated to about 7,000 BC. Objects from this site included tools made from native copper. As people became familiar with the various properties of certain materials they would experiment with techniques of

[16] However, Renfrew and Bahn (1993: 297) suggest the possibility of three centres of origin.

applying heat to metal in order to obtain different results. This understanding of the techniques used to extract metal from ores and the ensuing production of metal artefacts is known as metallurgy (Gunter 1995: 1545-1546; Sharer & Ashmore 1980: 317).

A combination of the local environment, economic needs and cultural development probably stimulated this new technology. Once man realized the potential of manipulating a material to change its properties, further advances would follow. The impact of metallurgy in the Ancient Near East, including Egypt, was widespread: it led to the production of better tools, inspired new artistic techniques and not least of all influenced warfare through the manufacture of improved weaponry, especially after the introduction of iron (Gunter 1995: 1540-1541). It is clear looking at the vast array of artefacts that the principal metals used in ancient Egypt were gold, copper, silver, tin and lead. The most popular alloys were bronze and electrum (Lucas 1962: 195).[17] These metals were employed for the manufacture of both utilitarian and ritual objects (Schorsch 2007: 190).

2 COPPER

As was mentioned earlier the first metal that seems to have been used intentionally in the Ancient Near East was copper. Evidence of this was found at several early farming sites both in Turkey and Iran (Renfrew & Bahn 1993: 296). In ancient Egypt this metal was possibly employed before gold as far back as the Badarian and Predynastic Periods (Lucas 1962: 200; Petrie 1996: 98). The oldest copper artefacts in Lower Egypt were found at

[17] Electrum is an alloy of silver and gold.

Maadi and Trigger (1983: 26) suggests that it was brought to the Nile Valley through trade with Palestine at that time.

2.1 MINES AND OTHER SOURCES OF EGYPTIAN COPPER

Copper was first used in its native form as nuggets and the only work done on it would have been simple hammering with a stone to create the required shape for an object. However there seems to be consensus that in ancient Egypt native copper ore was rarely used on its own (Lucas 1962: 201; Ogden 2000: 151). Sinai and the Eastern Desert were the most important copper-bearing regions exploited by the Egyptians and evidence of their mining activities that were found includes crucibles, moulds and copper slag.[18] In the Sinai area the main copper-working sites were at Timna, Serabit el-Khadim and Wadi Magharah (dating back to the Old and Middle Kingdom). The Timna site is of particular importance to archaeologists studying the development of metallurgy in ancient Egypt because it provides the best evidence for the exploitation of copper in the Sinai region. Ores were mined and smelted on site since the fourth millennium BC and activities were intensified during the Twelfth Dynasty of the Middle Kingdom Period. The height of mining at Timna occurred in the Nineteenth and Twentieth Dynasty (Ogden 2000: 149-150).[19]

Within the borders of Egypt copper deposits are found at sites along the Eastern Desert into Nubia. Old copper mines at Wadi Sitra (east of Luxor) may have supplied the temple

[18] Slag is a waste product that results from the smelting process (Goffer 1980: 232).

[19] Ogden further remarks that there is no indication of copper exploitation at Timna during the Late Period.

metal workshops at Thebes with material, although this is only speculation. The Hammash region (north east of Aswan) has both ancient copper and gold workings which go back to Middle Kingdom times. Evidence also points to sources of copper further south at Abu Seyal and it seems some of that ore was smelted at Quban (Ogden 2000: 150-151). This is borne out by a stela found near Aswan dating to the Twelfth Dynasty. It is from the reign of Senwosret I and the inscription refers to an official named Hor who had been instructed to collect 'copper from the Land of Nubia' (Lucas 1962: 209). Many other rock inscriptions were found that support the metallurgical evidence of widespread copper mining during the Middle Kingdom Period. Most of these were left by ancient Egyptian expeditions in Sinai. Lucas (1962: 203) remarks that forty-five records left at Magharah date mainly to the Old and Middle Kingdom, while ten of the fifteen inscriptions at Serabit el-Khadim are from the Twelfth Dynasty. The archaeological evidence therefore substantiates what is known about Middle Kingdom exploration for raw materials.

The first references to copper being imported into Egypt from further afield date to the New Kingdom and they mention Syria, Mesopotamia and Punt (Lucas 1962: 209). Renfrew and Bahn (1993) believe that the metal was also traded from Cyprus. The Ulu Burun shipwreck found off the coast of Turkey contained a cargo of various commodities, including six tonnes of copper; they were in the form of so-called oxhide ingots and were mined in Cyprus. Other goods included an Egyptian gold scarab dating to the fourteenth century BC, tin from Anatolia and bronze tools (Renfrew & Bahn 1993: 328). This discovery supports the idea of copper being imported into Egypt from an East Mediterranean source during the New Kingdom Period (Ogden 2000: 151).

2.2 PRODUCTION TECHNIQUES

Most metals are found in nature in the form of ores or mineral compounds, which were easily identified by prospectors in antiquity. Due to the fact that these deposits were restricted to certain geographical regions, ancient mining centres were situated in those areas (Goffer 1980: 200). Initially the Egyptians collected copper from surface deposits and only needed stone tools to extract the ore, which was then crushed and sorted by hand. Underground mining was employed later on by cutting out shallow shafts with metal tools (Lucas 1962: 210-211). At the Timna mines in Sinai a series of such cylindrical mining shafts have been discovered, which were all connected by an underground passage (Ogden 2000: 151).

The next step in the metallurgical process involved separating the metal from its ore, which was done through smelting. This meant that sufficient heat had to be applied to a furnace in order for the metal oxides to be reduced to their metallic state. Wood or charcoal were used as fuel for heating the ores but could influence the quality of the end product if it contained impurities (Goffer 1980: 202). Pyrotechnology was closely linked with advances in metallurgy and by controlling the temperature of the smelting process further developments would follow in due course. During smelting the liquid metal separates from other impurities, which float to the surface. This layer of waste product, called slag, was drawn off and it then solidified (Goffer 1980: 203-204; Gunter 1995: 1546).

Initially the ancient Egyptians employed very basic methods of smelting and the copper they retrieved must have been relatively impure (Ogden 2000: 151). Nonetheless it seems the process of smelting was first used in Egypt as early as 4,000 BC. To begin with, blowpipes and simple crucibles provided reasonably low temperatures but as metallurgical techniques developed, larger furnaces and pot bellows (from the Middle Kingdom onwards) replaced these. Copper production became more efficient when higher temperatures could be created. Furthermore adding a flux such as iron oxide to the melting process facilitated the separation of the copper from other materials (Ogden 2000: 151). Techniques continued to develop with the introduction of so-called 'tapped slag' furnaces, which involved running off the molten slag and the concertina bellows. The reduced metal that resulted from smelting was broken into smaller pieces or cast as ingots that were easier to work with and these were transported to copper working factories around Egypt. Most of these workshops were located at temples. Here metal smiths would use the ingots to manufacture not only ornaments but also weapons and tools (Ogden 2000: 155). As methods for copper production improved, cast objects became more common and reached a peak during the Late Period (Ogden 2000: 152).

3 COPPER ALLOYS

Ancient metallurgists gradually developed new methods of manipulating copper based on their experience and knowledge of its properties. They realised that pure copper did not cast very well, having a tendency for making bubbles which resulted in a porous object (Ogden 2000: 152). It was also apparent that too much hammering made copper brittle, although reheating or annealing could soften the metal enough to be more workable (Lucas

1962: 213). The discovery of the alloying process overcame these problems and was a major advance in metallurgy. Copper alloy was created when another metal was intentionally added to the smelting process with the aim of improving the properties of the end product. The addition of either tin or arsenic resulted in harder objects that was less brittle when worked on and it made better castings (Renfrew & Bahn 1993: 299). It is also possible (though no conclusive evidence have been found) that the ancient Egyptians may have attached a magical or supernatural element to the whole process of metal working. In this regard Budge (1988: 20) remarks the following:

> Thus, side by side with the growth of skill in performing the ordinary processes of metalworking in Egypt, there grew up in that country the belief that magical powers existed in fluxes and alloys; and the art of manipulating the metals, and the knowledge of the chemistry of the metals and of their magical powers were described by the name "*Khemeia*"[20] that is to say, "the preparation of the black ore"....

What follows is a description of the most common copper alloys found in ancient Egyptian objects, with particular focus on bronze or copper-tin alloys. Some elemental compositions will also be mentioned which could have bearing on the chronological information of the selected museum objects, should they be scientifically analysed in future.

3.1 COPPER-ARSENIC

The presence of arsenic in Egyptian cupreous objects was the cause of some debate in the past. Traces of this substance are found in ores as well as many ancient Egyptian copper

[20] The modern word for Alchemy is derived from the Arabic *Al-Khemeia* and refers back to the ancient Egyptian name for their country, known as *Kemet* or 'the black land' (Budge 1930: 443).

and copper alloy artefacts (Schorsch 2007: 191). It is now believed that arsenic was intentionally added to copper from the Old Kingdom onwards because it resulted in a much harder metal and improved the casting process. Another possible reason for its use in metal statuary was the fact that arsenic-rich copper lent an appealing silver colour to statuary. If cupreous objects contain more than 1% arsenic, it is believed to have been used deliberately (Ogden 2000: 152). However, after the New Kingdom copper alloy mostly contain less than 1% arsenic and if higher levels are present it came about by chance. An exception to this is the Late Period cat figurines. Their high arsenic content appears to be deliberate (Ogden 2000: 153). A possible reason for the eventual discontinuation of arsenic use might have been its high toxicity (Goffer 1980: 215).

Antimony often occurs along with arsenic as a trace element in Egyptian copper alloys.[21] Nonetheless Ogden (2000: 153) believes it was only used intentionally in Egypt during the New Kingdom and occasionally after that time. Antimony levels of over 1% in cupreous objects are not common, although in rare cases up to 4% have been detected in artefacts dating from the Late Period.

3.2 COPPER-TIN (BRONZE)

True bronzes are objects produced with an alloy of copper and tin. In modern times bronze is strictly defined as consisting of 10% tin, but the ancient alloy was more variable in composition (Lucas 1962: 217). The combination of tin with copper brought many

[21] Antimony compound was sometimes also used in ancient Egyptian eye paint, though green malachite was more common (Lucas 1962: 196).

advantages to the manufacturing process of metal and the actual use of objects. When tin is added to the smelting process, it lowers the melting point of copper and also improves casting operations by making the molten liquid more fluid without forming bubbles. Furthermore the metal was easier to work on because repeated hammering (hot or cold) did not make it brittle but rather hardened it further. Bronze weapon blades were much harder, sharper and durable than ones made from copper and for this reason it became the material of choice for weaponry in the ancient Near East (Renfrew & Bahn 1993: 299; Sharer & Ashmore 1980: 319).

It is accepted that the intentional production of bronze already took place in the Near East by 3,000 BC. Lucas (1962: 217, 219) argues that the technology reached Egypt much later and that the alloy was initially quite scarce in that country due to its foreign origin. Over time the Egyptians ceased to rely on bronze imports, instead manufacturing the metal locally. Although intentional copper-tin alloys were still rare during the Middle Kingdom Lucas regards it as the beginning of the Bronze Age in Egypt. During the New Kingdom both copper-tin and copper-arsenic alloys were being produced but copper was still used on its own as well. For example, the tomb of Tutankhamun contained more copper than bronze artefacts. Only from the Ramesside period onwards did tin become the dominant element in bronzes (Ogden 2000: 153).

Most Egyptian bronzes contain around 10% tin. Higher levels do sometimes occur but the 16% found in a Twelfth Dynasty bracelet must be regarded as a rarity for that time. During the Late Period high levels of tin become more common in bronzes and it could perhaps be

linked in some cases to the symbolism of the silver colour that such an alloy would produce (Ogden 2000: 154).[22] Controversy still exists about the origin of ancient tin because it was quite scarce and no major sources for it have been positively identified in the Near East, with the exception of Anatolia (Sharer & Ashmore 1980: 319).

3.3 LEAD COPPER ALLOYS

Lead ores were widely found in nature and were easy to smelt as well. Useful information can be gleaned from the analysis of lead isotopes such as the location it was mined at (Goffer 1980: 207, 220). The addition of large amounts of lead to copper alloys marks the transition to the Late Bronze Age (Ogden 2000: 154). It was a characteristic element in metal statues made during the Late Period in Egypt but was rare in copper alloys from the Middle Kingdom. Lead levels of over 2% were also uncommon until the late New Kingdom. In the Ptolemaic era objects that were analysed have revealed a 20 to 30% lead content. High levels of this substance were advantageous for the casting process of copper alloy artefacts because it lowered the melting point of the metal and limited porosity (Ogden 2000: 154-155).

3.4 ZINC COPPER ALLOYS (BRASS)

A brief mention has to be made of copper alloys that contain zinc, as it may have some bearing on the possible authenticity of Egyptian objects. Ancient brass was made with an

[22] See Chapter 4 for more information on the factors that played a role in the choice of metal for the manufacture of an object.

intentional mixture of copper, zinc ore called calamine and charcoal (Goffer 1980: 227). Very few late Ptolemaic statuettes from Egypt were made from copper-zinc alloys and it is mostly associated with the Roman Period. If such objects contain more than 2 or 3% zinc and is supposedly from the Dynastic era, experts regard it as either intrusive in the excavation context or a fake (Ogden 2000: 155).

4 GOLD

Gold in its native state is widely distributed in nature and was easy to recognise and extract by ancient prospectors. It was one of the oldest metals known to the Egyptians though it seems that for some reason they initially exploited copper more (Lucas 1962: 224). Gold certainly held great symbolic value for them and Egypt's rulers would soon go to great lengths to obtain this precious metal in order to decorate temples, adorn sacred objects and make jewellery. They regarded gold as a divine substance, unable to perish and therefore representative of eternal life as well as the sun. According to Egyptian myth the flesh of the gods was made of gold and it seems only natural that many of their statues representing deities had to be fashioned from this metal (Wilkinson 1999: 83).

Gold occurs either as alluvial deposits or in veins of quartz rock; in Egypt it was found in both settings. The simplest and probably earliest method for working alluvial gold was by hand-picking and later panning which involved washing gravel from stream beds in order to reveal the gold nuggets. Veins in rock were mined, the raw material was crushed and the gold was extracted by a simple smelting process (Goffer 1980: 205). It is believed that Egyptian gold was for the most part used in its 'as found' state, that is to say no refining

took place. Later it was alloyed with other metals such as copper and silver for aesthetic reasons. The refining or purification of gold only occurred regularly from the Late Period onwards (Ogden 2000: 163).

Ancient Egyptian sources mention three principal gold mining areas which fall in the area between the Nile and the Red Sea, along the Eastern Desert. The '*gold of Coptos*' refers to the region around Wadi Hammamat, the '*gold of Wawat*' originated further south from the Wadi Allaqi area and the '*gold of Kush*' was obtained from the most southern source in Sudan. Gold mining at the mines in Kush was already under way during the Middle Kingdom. Written records mention Coptos and Nubia as the sources of gold in the Twelfth Dynasty (Lucas 1962: 225, 227). Egypt's campaigns into Nubia during this time were certainly motivated in part by a need to control the sources of gold in this region.[23] According to Ogden (2000: 161) gold from these southern mines played a vital part from the Middle to late New Kingdom but Redford (2006b: 52-53) argues that too much has been made of Egypt's dependency on Nubia's mineral wealth. Although the precious metal was also imported into Egypt as tribute or plunder, this did not occur on a large scale.

The scientific analysis of gold can provide useful information regarding where it was mined as well as possible alloying that took place. For instance, it has been noted that gold originating from Egypt's southern regions is more pure (Ogden 2000: 162). Nevertheless one has to keep in mind that the composition of native gold can vary considerably. The

[23] Several Middle Kingdom stelae refer to expeditions to the South in order to obtain gold, including one dated to the reign of Amenemhet II (Ogden 2000: 162).

term gold is usually employed if the metal consists of over 75% gold. The purity of ancient Egyptian gold can range from under 50% up to more than 90% but levels of over 85% purity seem rare in objects before the Late Period. Ogden (2000) however cautions against the long-held belief that high gold purity was proof of authenticity. Silver is the most common trace element found in gold although copper, iron and tin may also occur. In fact it is believed that copper was often a deliberate addition to gold-silver alloys, giving the metal a more ‘golden’ colour. These copper levels can be in the region of 10% especially in artefacts from the later New Kingdom (Ogden 2000: 162-163).

5 CONCLUSION

This chapter revealed the impact that metallurgical developments had on the end product which ancient Egyptian metalworkers created. More importantly the aim was to underline the potential for scientific analysis of metal objects, which could give valuable insight into the provenance of the materials, production techniques and above all suggest a possible chronological time slot for the artefacts. For this reason certain composition levels were noted which could be used as a yard-stick if the museum objects in this study were to be tested in future. It would certainly add to the little knowledge we currently have on the Osiris statuette and offer a clearer picture of its origin. The following chapter will focus more closely on the manufacturing techniques that were employed in creating a finished metal statue.

CHAPTER 4

THE MANUFACTURE OF BRONZE STATUARY

'...equip his everlasting statue. Execute the very secret things...' [24]

An understanding of the manufacturing techniques employed in the production of metal statuary is essential before attempting to analyse a particular bronze figurine. As this chapter will show, certain features found in bronze works were associated with a specific time period. Such characteristics could therefore be useful indicators for placing an object within a chronological time frame or even point out possible forgeries. Hill (2007: 30) argues that the careful mapping of technological phases could be helpful in identifying distinctions among some bronze works. It must be stressed, however, that manufacturing traits are only one aspect of analysis and in order to obtain a credible result they must be used in conjunction with other types of examination.[25]

1 FACTORS THAT PLAYED A ROLE IN THE PRODUCTION OF METAL STATUARY

Evidence of metal workshops has been found at several sites in Egypt. It is believed that the ingots from the mines and other scrap metal were brought there to be fashioned into finished products such as weapons or temple ornaments (Ogden 2000: 155). Many tomb

[24] From the Abydos stela of Thutmoses I (translation in Breasted 1962: 38 §92).

[25] For more discussion on the various types of analysis used on metal statuary see Chapter 6.

paintings contain metal-working scenes that show a variety of activities, including the casting of bronze objects.[26] Scholars base their belief that most metal statues were produced at temple workshops on the ritual or religious nature of most of the figures (Hill 2007: 3; Russmann 1995: 232).[27] If temples and other places of worship were indeed closely involved in the production of metal statuary, they must have had some influence on the outcome of the finished object. Russmann (1995) certainly believes this to be the case for all sculpture and relief from the Twenty-fifth Dynasty. After all, some statues were to be used in complex rituals while others became cult statues of the patron deity of local temples. An important link has also been made between metal statuary and temple relief narratives. Iconography and costume styles of metal figures, for example, were more often similar to depictions in temple reliefs than those shown on stone sculpture (Hill 2007: 3-4).[28]

It is clear that some importance was attached to the creation of divine statues. Some members of the priesthood of Ptah also held the title "Chief Controller of Craftsmen" and they were often connected with the royal workshops (Van Dijk 2001: 74). As a creator god Ptah was associated with arts and crafts from an early period. Indications are that he was regarded as patron deity of craftsmen, artists and builders for he was worshipped in most areas where these people were active. It therefore seems possible that the creative process

[26] The tomb of Rekhmire (TT100) from the Eighteenth Dynasty at Thebes contains the most well-known metal-working scenes. It shows the casting of metal doors for the temple at Karnak (Davies 1973: Plate III).

[27] It is also likely that the production areas of figurines were separate from those of weaponry due to the difference in metal composition they required (Spencer 2007: 48).

[28] The independent development of metal statuary from stone sculpture is discussed in more detail in Chapter 5.

performed by human artisans were likened to that of Ptah, the divine craftsman (Van Dijk 2001: 74, 76). Closely associated with Ptah at Memphis was the god Sokar. During the Old Kingdom he was the patron of craftsmen and particularly metalworkers (Brovarski 1984: 1056).

There is also a possible regional connection between the poses or forms that deities were portrayed in and the various temples across Egypt. Earlier studies by Roeder (1937) show that metal figures of gods may have had similar attributes to that of the particular cult deity of the temple where they were manufactured. While local religious traditions must have played a role in influencing the style of statuettes, undoubtedly more practical concerns such as the available resources and skill of the resident metalworkers would also have been factors that impacted on the end-product (Ogden 2000: 148).

Recent studies have shown that colour consideration and choice of metal were far more intentional in the process of creating metal statuary than previously thought. For obvious reasons precious metal such as gold was used to add economic value to an important statue, but it seems that symbolic value counted equally, if not more, for Ancient Egyptians.[29] Élisabeth Delange's study on metal polychromy of bronzes from the Musée du Louvre has provided new insight into the intentional use and manipulation of specific alloys in order to create particular patinas and subtle colour hues (Delange 2007). In some

[29] Gold was regarded as a metaphor for divinity and eternal life. The flesh of the gods was believed to be made of gold and their bones of silver. Adding these metals to a god's statue underlined this concept (Wilkinson 1999: 83- 84).

cases even the hidden presence of gold would suffice, while other copper alloy statuettes have a deliberately high tin content which resulted in a silver colouring for symbolic reasons (Ogden 2000: 154). It illustrates the understanding that Egyptian metalworkers had of their medium, carefully exploiting certain chemical properties in order to achieve an artificial effect which would enhance the symbolism of a ritual statue.

2 METALWORKING TECHNIQUES

2.1 HAMMERING

Egyptian metal statues are in most cases freestanding figures and were produced by either hammering or casting. Copper and especially bronze were well suited for these purposes. Hammering was the simplest technique used for shaping metal artefacts and it had the added advantage of hardening copper. However, too much hammering could also make this metal brittle (Lucas 1962: 213). The technique required a greater intensity of labour but much less raw material was needed for this process than casting. For this reason hammering was often used when working with precious metals like gold. Hand-held stones were commonly used to hammer out a sheet of metal which could then be cut or bent into the desired shape. These pieces could not be duplicated as was the case with cast objects (Gunter 1995: 1547).

This technique was mostly used for the creation of vessels and blades, although the two copper figures of king Pepi I from the Old Kingdom period is a notable exception (Lucas 1962: 214). One large sized statue and another smaller one were discovered in a pit at the

Horus temple in Hierakonpolis; both are now housed in the Egyptian Museum in Cairo. After much restoration work to counter their severe state of corrosion, it was possible to study the manner in which they were constructed. Both were created with large sheets of beaten copper, which was shaped and then assembled with small nails (Tiradritti 1999: 89). Both Lucas (1962: 215) and Hill (2001: 204) reject earlier suggestions that the statues might have been partially cast with the lost-wax method and it is now generally accepted that the figures were hammered to shape. Nonetheless, by far the majority of copper alloy artefacts from Egypt were produced by casting them into their final form.

2.2 CASTING WITH THE LOST-WAX TECHNIQUE

Casting was a practical and efficient way of producing multiple but identical objects, such as beads or blades. In addition molten metal's ability to take almost any shape opened up new possibilities for metal smiths. Solid casting was the most basic type of casting used in antiquity and small solid-cast copper figures were common by the Middle Kingdom Period in Egypt (Taylor, Craddock & Shearman 1998: 9). Molten metal would be poured into open moulds carved from stone or made in the sand. Once the metal has solidified it takes the shape of the mould. Further hammering could be applied to finish off or decorate the end-product (Gunter 1995: 1546). According to Lucas (1962: 213) this technique was already employed in Egypt as far back as the Predynastic Period.

The majority of Egyptian bronze statuary was produced by using investment casting, also known as the lost-wax method or *cire perdue*. It probably originated around the third

millennium BC in the Near East before spreading to ancient Egypt (Noble 1975: 368). Spencer (2007: 44) states that this technique was first used during the Old Kingdom and Lucas (1962: 215) believes it possible that small objects could even have been made in this manner in Proto Dynastic times. This type of casting allowed for the creation of both solid and hollow cast figures. The basic process of the lost-wax method involved the modelling of a figure in a substance that was easily shaped but had a low melting temperature; often wax was used for this purpose (Ogden 2000: 157). An investment material such as clay was used to coat the model and it was then fired. During the heating process the wax inside melted and flowed out – hence the name "lost" wax (Nobel 1975: 368). This left a hollow cavity into which molten metal was poured through a hole that was made for that purpose. Once the metal had solidified, the outer mould was broken to reveal the solid casting. The statue's surface could be decorated further and polished to remove blemishes (Ogden 2000: 157).

To create hollow-cast figures, a central core consisting of clay and other organic material was shaped to create the intended sculpture and covered with a thin layer of wax. Metal support pins or chaplets were often used to hold the form in place (Schorsch & Frantz 1997-98: 21; Spencer 2007: 45). These chaplets were necessary to prevent the central core from moving about and resulting in a flawed casting (Noble 1975: 368). It was then covered as before with a heat proof mould of clay which was fired, resulting in the wax running out. The baked clay mould was turned upside down and molten metal was poured into the resulting gaps left between the core and the outer mould. Holes or runners allowed for the mould to be completely filled when molten metal was poured into them. These

"pouring points" of solidified metal would become the tangs of the statue, used to secure it onto a base of wood or stone (Spencer 2007: 44-45). After the statue inside had cooled down, the outer casing was broken away and the inner core removed, which left a cavity inside the figure. Each casting is unique, due to the loss of the original wax model inside (Noble 1975: 368). The craftsman still had to polish and remove any surface irregularities such as those left by the chaplets that held the core in place (Spencer 2007: 45).

Hollow casting had more advantages for metal smiths than solid casting. It was more economical, especially for larger works, because it saved metal and on a technological level there was less possibility of distortion or shrinkage inside the mould (Noble 1975: 368; Schorsch 2007: 192). Nonetheless faults and distortions still sometimes occurred as the result of impurities in the metal or uneven temperatures. Even in the Third Intermediate Period the fine, thin-walled hollow castings had a tendency for the cores to expand and crack during manufacture. This happened if the core retained any moisture. Therefore such distortions on statues cannot always be attributed to post-burial corrosion (Ogden 2000: 159). Complex statuettes often consisted of separate components that were cast onto the object or were mechanically joined. Most commonly pegs or mortise and tenon joints were used to join areas connecting arms or legs to the body, or to attach a headdress (Ogden 2000: 159; Schorsch 2007: 189-190).[30] In this regard Ogden (2000: 159) makes the important observation that as a rule soldering found on Egyptian copper alloy statuettes is either the result of modern day repairs or a forgery.

[30] See Schorsch (2007: Figure 80) for an example of such mortise and tenon joints appearing on an X-ray radiograph of a metal statue.

3 PRODUCTION FEATURES USEFUL TO DATING

Some evidence of the manufacturing process can often be detected on bronze statuary and these could be useful indicators of authenticity or the time of production. Traces of the original chaplets or support pins that were mentioned earlier can frequently be detected on radiographs of statues, where they appear as dark squares (Spencer 2007: 45). Noble (1975: 368) notes that the chaplets were sometimes made from the same metal as the casting. Such support pins are used as a dating tool for uninscribed statuary if they were made of iron; armatures and iron chaplets were only used from Third Intermediate Period onward (Hill & Schorsch 2005: 173; Schorsch 2007: 193). Furthermore fake Egyptian bronzes seem to have far more core supports than authentic ancient works (Ogden 2000: 159). Schorsch and Frantz (1997-98: 22) point out that the mineralised condition of chaplets inside bronze figures (as observed on radiographs) is often the most compelling evidence of an object's authenticity because they have corroded in situ.

Another trace of the casting process which often remains on metal statuary is their tang, used to secure the figure onto a base. Schorsch (2007: 193) believes that these tangs underneath the statues can also be helpful indicators of a possible date: before the New Kingdom they appear irregular in shape and size, while afterwards taking on a canonical form of being rectangular with a flat end.

Interior cores that remained inside hollow-cast statues without openings underneath can be valuable for use in thermo luminescence dating because they consist of sand, clay and

other organic material (Hill & Schorsch 2005: 172). During the casting process these cores absorbed some of the wax and then burnt, turning black in colour. They are typical of Egyptian as well as other ancient hollow-cast bronzes (Ogden 2000: 158). Petrie (1996: 101), Lucas (1962: 222) and Hill and Schorsch (2005: 171) all describe the discovery of such core material inside Egyptian bronzes. More recently similar core material was also discovered inside a bronze figurine of Horus the Child which is from the same museum collection as the Osiris statuette selected for this study (Smith *et al* 2008).[31] The core was exposed after the bronze accidentally broke into two pieces. Samples were sent for analysis and the results revealed a composition of two types of clay; this indicates layering of the core material that took place during its manufacture (Smith *et al* 2008: 76, 84).

4 SURFACE DECORATION

Once imperfections on the statue had been smoothed out, the surface could then be burnished or polished to produce a lustrous reflective surface onto which the craftsman could add any decorative elements that were required (Taylor 2007: 65). In some cases the work was inlaid with coloured glass, lapis lazuli or precious metals such as gold or silver. This was done in order to create a polychrome effect and it was used to highlight details on a figure's garment or a specific inscription. Eyes of figurines were either inlaid with white limestone or quartz (Spencer 2007: 45, 47; Taylor 2007: 65). The most characteristic type of decoration found on Third Intermediate Period bronzes were symbols and texts applied to the bodies of certain figures, many representing kings and high status women with the

[31] This statuette was discussed in Chapter 1.

title “God’s Wife of Amun”. These inscriptions were created by hammering thin strands of gold, silver or electrum into channels in the bronze (Taylor 2007: 65).

Although inlays and some chasing done by hand were added to the finished product, it is believed that most surface detail on hollow-cast statues was done before the casting process (Schorsch 2007: 197). Incised decorations were simply modelled into the wax prototype before it was encased in the clay mould. After the wax had melted, the incisions remained on the mould and were reproduced in the metal casting (Noble 1975: 368). Another popular method of surface decoration was the use of sheets of gold, electrum or silver to cover copper alloy objects. One method of doing this was to simply press and shape the metal foil over the figure, fastening it by means of mechanical folds or nails (Lucas 1962: 231). Gilding became more common in the late New Kingdom. This technique involved the application of extremely thin gold leaf to the copper alloy object by means of an adhesive layer of gesso. In some cases linen was glued onto the metal and then covered with the gesso. The gold leaf can be as thin as 0.005 millimetres or less (Ogden 2000: 160, 164).

5 CONCLUSION

Although it would be of great use to scholars, it is not yet entirely possible to establish some kind of linear evolution for bronze casting techniques. The fact that so few bronzes survived from the Middle and New Kingdom periods can only be the result of gaps in the material record; it does not necessarily imply the use of less advanced technology. Statuary

found in the Faiyum cache point to considerable technical expertise in hollow casting with the lost-wax method during the Middle Kingdom (Taylor *et al* 1998: 10). Other collections of fine thin-walled castings made with multi-part assembly techniques from the same period also reflect the remarkable ability of their creators (Ogden 2000: 158). Even in later periods when statuettes of a high standard were produced, casting flaws still occurred. The difference in quality among even contemporaneous works can most likely be attributed to the varying skills of individual metalworkers (Delange 2007: 45).

As an artefact created by a craftsman, any metal statuette may hold clues to its historical context, means of manufacture as well as its physical history (Schorsch 2007: 189). This would include natural deterioration and also modern day attempts at cleaning or restoration. It can therefore be regarded in some ways as a time capsule, containing potential information that could shed light on its time of origin. Fortunately, as this chapter has shown, Egyptologists are beginning to interpret these clues that were left behind on bronze statuary at the very moment of their creation; interior cores, chaplets and tangs all have the potential for dating bronze figurines. Schorsch (2007:189) justifies the value of studying of these intricate objects as follows:

> Technical examination informs our understanding of each statue...as a unique entity, created in a medium chosen with forethought, requiring for its manufacture and embellishment a complex sequence of processes involving multiple steps, all necessitating decisions on the part of the maker.

CHAPTER 5

BRONZE STATUARY IN ANCIENT EGYPT

1 INTRODUCTION

Bronze statuary formed part of the larger corpus of Egyptian sculpture which used diverse materials such as stone, metal and wood to depict a variety of themes. The main types of statues were those representing gods, royalty and private individuals. Divine statuary in particular will receive closer attention in this study since the museum object that was chosen for the research has been identified as a portrayal of a deity. As will be seen later on, bronze statues of gods (in both human and animal form) can be classified as one of two types: cult or votive statue. This chapter will give an overview of the development of metal statuary – and that of bronze in particular – in ancient Egypt, as well as highlighting the known styles that were typical of various time periods.

Metal statues are not only to be admired for their aesthetic qualities or economic value. To be sure, they are closely related to Egyptian religious practices and in some cases were seen as being inhabited by gods (Kozloff 2001: 242). Therefore they could also carry great symbolic value. As Hill (2007: 3) remarks, the study of these objects give scholars insight into production techniques and the artistic skills of different time periods but it also provides tantalizing clues to people's interaction with their deities, whether through temple rituals or acts of votive donation. The very properties of metal – its lustre, symbolic

associations with the gods and value – would have been the most significant factor in contributing to its use in temple worship (Hill 2007: 3). In fact the vast collection of known bronze statuettes depicting deities is predominantly from temple, not funerary, contexts (Ogden 2000: 156). Metal statuary became distinct from the traditional and more well-known stone sculpture in Egypt because of its ritual functions, portability and places of production. The temple workshops were probably the main manufacturers of metal statues and it is reasonable to assume that these craftsmen operated separately from the stone sculptors (Hill 2007: 3).

To illustrate the possible independent development of metal statuary to that of stone sculpture, the following example can be mentioned. Studies of certain groups of copper-alloy statuettes have revealed that their facial expressions and iconography are different from contemporary stone statues.[32] Hill (2007: 4-5) believes these discrepancies can be better explained using period definitions that are related to socio-religious changes in Egypt rather than political phases, when classifying metal statuary. For example the Middle Kingdom up to the pre-Thutmoside New Kingdom can be regarded as a continuous phase while the Kushite Period is often included with the Third Intermediate Period by scholars in this field. This implies that these objects changed not so much during each political period (like stone sculpture) but had closer links with broader religious development. It is therefore important to approach the study of metal statuary with caution because, as Hill (2007: 4) observes: 'These considerations are indicative, first, of how

[32] This stylistic group is comprised of so-called 'kneeling kings'.

strongly our views of Egyptian art and society have been formed by the study of stone statuary and, second, of how these views are shifted by explorations of metal statuary.'

2 DEVELOPMENT OF CUPREOUS STATUARY IN EGYPT

This discussion will focus on copper and copper-alloy objects. Strictly speaking bronze is an alloy of copper and tin but the word bronze will be used here as a broad term when referring to cupreous statues.[33] The study of metal statuary from Egypt poses a variety of difficulties, much of it related to dating and chronology. The problem is compounded by the fact that the greatest number of these objects was produced during the Third Intermediate Period and the Late Period. In addition many bronzes in museum collections today have unknown provenance (Hill 2001: 203). However several sources are available that provide a broad framework of the development of bronze working in ancient Egypt (see for example Ogden). Certain scholars are also conducting studies which will hopefully fill in the many gaps that still exist in this field. Authors like Taylor, Craddock and Shearman (1998), Hill (2001) and others have all stressed the importance of continued research in this field in order to advance our limited knowledge of the topic.

Egyptian craftsmen had apparently acquired enough skill in working with copper to produce a statue in this medium by the end of the Second Dynasty, around 2690 BC. Unfortunately this is only known from written records (Taylor *et al* 1998: 9). The earliest physical evidence of such a statue from the Old Kingdom Period was found at

[33] The term cupreous refers to objects containing copper.

Hierakonpolis in temple context and represents a life-size king Pepi I dating to the Sixth Dynasty (Hill 2001: 204; Taylor *et al*: 1998: 9). It is now housed in the Cairo Museum. The figure was made of hammered sheets of copper which were then nailed together. Throughout the First Intermediate Period and the Middle Kingdom small cupreous statues appeared which were solid-cast. A copper and silver standing figure of a Twelfth Dynasty high-ranking official is regarded as one of the earliest Egyptian examples of hollow cast statuettes dating from that period (Schulz & Seidel 1998: 333). Nonetheless it only makes up a small group of work and this limited pool of reference adds to the problem of this study which attempts to place a certain bronze within its proper time frame.

Scholars seem to agree that bronze works started to emerge from around the late Middle Kingdom Period. Copper from Sinai was extensively mined during the Twelfth Dynasty and it is assumed that in rare cases where tin was added to create 'true' bronzes, it was still derived from tin ore (Ogden 2000: 150, 153). Other cupreous metal statuary was still produced. A copper-alloy censer decorated with the prostrate figure of a king has been identified as portraying pharaoh Senwosret I, based on its inscription and facial features. As a result it can be dated to the Twelfth Dynasty. It is interesting to note that the prostrate pose used on this figurine only appears in stone statuary during the Eighteenth Dynasty, again highlighting the differences in style that can occur when comparing metal figures with that of stone (Hill 2007: 9).

Other examples that can be dated to the Middle Kingdom come from an archaeological find made in the Faiyum area. The Faiyum cache is very important in tracing bronze

working technology during this early period in Egyptian history. It provides examples of early hollow casting of the metal through the lost-wax process, inlays and the use of so-called black-bronze alloy (Hill 2001: 204; Taylor *et al* 1998: 9-10). All these can be regarded as quite sophisticated production techniques. Among the finds in this group is a striking bust of king Amenemhet III from the Twelfth Dynasty, figures of high officials and the god Sobek in his crocodile form. Two other statuettes that are not part of the Faiyum collection can likewise be dated to the late Middle Kingdom and are made of arsenical copper. They portray squatting women nursing babies. This pose may have links to later figures of the goddess Isis breastfeeding Horus, but the matter is still under debate (Hill 2007: 9, 12). It has to be stressed however that 'true' bronzes[34] were still the exception rather than the rule during the Middle Kingdom, as Ogden (2000: 153) points out.

The use of both copper and copper alloys continued into the New Kingdom.[35] Tin however became more available. It is present in most copper alloy objects from the Ramesside period onwards (Ogden 2000: 153). Although few examples of metal statuary have survived from this time to give an accurate picture, it can be assumed that the manufacturing techniques from the Middle Kingdom were still in use. Metal sculptures that do exist from the Second Intermediate Period and New Kingdom were mostly solid-cast (Taylor *et al*: 1998: 10). A so-called black bronze of a kneeling king Tutankhamun however indicates that fine hollow castings were also produced by the end of the

[34] Objects created by deliberately using an alloy of copper and tin.

[35] These include alloys that contain either arsenic or tin.

Eighteenth Dynasty. Other examples of cupreous statuary were dated to the Ramesside Period (Ogden 2000: 158). Hill (2007: 23) notes that New Kingdom metal figures may seem somewhat inferior in quality when compared to earlier types from the Middle Kingdom. This phenomenon has yet to be explained satisfactorily.

Production of copper and bronze objects certainly continued during this period, a fact which is supported by several sources. New Kingdom texts and temple reliefs list the vast riches that temple treasuries accumulated and they include references to metal statuary of gods and kings (Hill 2007: 23). On the Abydos stela of the Eighteenth Dynasty (translated in Breasted 1962: 38 §92) King Thutmoses I instructs his chief treasurer in the embellishments of the temple statue of Osiris:

> ...equip his everlasting statue. Execute the very secret things, no one seeing, no one beholding, no one knowing his body. Make for him the portable chapel-barque of silver, gold, lapis lazuli, black copper, every splendid costly stone.

Other texts mention vast quantities of gold, silver, copper and tin which Ramesses III donated for the manufacture of sacred images. During this time there is a noticeable increase in royal metal figures but fewer representations of private individuals, as was the case in the Middle Kingdom with metal sculpture of high officials. This can perhaps be explained by the widespread use of small statuary of the king during religious processions and other temple rituals (Hill 2007: 23-24).

Without doubt the majority of Egyptian bronzes found in museum collections today originated from the Third Intermediate and Late Period. They show a high standard of metal craftsmanship and by far the greatest range of topics (Taylor *et al* 1998: 10). As a result most of the research and analysis available on Egyptian bronze objects relate to these periods. Gods, kings, high-ranking women and other officials were depicted in precious metal as well as copper-alloy statuary. Experts agree that these works represent heights of artistry in the particular medium (Hill 2007: 51). More importantly they encompass a wide range of manufacturing and decorative techniques: objects were both hollow and solid cast, the lost-wax process was used and elaborate surface decoration was distinctive of the Third Intermediate Period. Large metal figures from this era were even excavated at a temple on the Greek Island of Samos, sparking speculation of Egyptian influence on Greek bronze-working (Hill 2007: 62).

Temple deposits have provided examples of important cult statues but also thousands of small votive bronzes. Royal statuettes depicted kings in striding, kneeling and sphinx pose (Hill 2001: 205). Religious and political developments as well as the increased role women played in temple rituals resulted in new types of metal statues, for example the 'God's Wife of Amun' figures. These portrayed female relatives of the pharaoh as a symbolic wife of the god Amun and they were usually decorated with hieroglyphic texts or inlaid with precious metals (Hill 2007: 51). A beautiful example is the figure of the God's Wife of Amun Karomama, now in the Louvre museum, from the Twenty-second Dynasty. There seemed to be a preference for statuary that show individuals engaged in ritual acts, as can be seen in the type of so-called kneeling kings – especially those of Kushite rulers. The

depiction of the goddess Isis with Horus on her lap also begins to appear for the first time in formal metal sculpture (Hill 2007: 13, 55).

By the Late Period (664-332 BC) the quantity of bronzes increased; it is possibly due to this mass production of figurines that the quality of workmanship of many are poor compared to examples from the previous time period. It seems there was especially a demand for objects to be left as temple offerings (Ogden 2000: 160). Scholars have difficulty in distinguishing between bronzes of the Late Period and that of the subsequent Ptolemaic Period due to a lack of inscriptions or dubious archaeological context. Royal metal statuary continued to be made and some showed the king along with a group of deities. The majority of bronze statuettes however represented the gods in either human or animal form. Among these Osiris was the most popular depiction (Hill 2001: 206-207).

3 THE PURPOSE AND FUNCTION OF METAL STATUES

Metal statuary of royalty and high officials were probably made to be placed in temples and funerary chapels as donations or used during ritual processions, as was the case with small ‘kneeling king’ figures (Hill 2001: 204). Deities were depicted in various materials such as stone, wood and ceramic and could be used as funerary guardian figures, cult statues, votive statues as well as amulets (Kozloff 2001: 242). However, divine images made from metal were probably limited to cult or votive purposes.

3.1 CULT STATUES

There is no consensus among scholars on whether any surviving Egyptian artefact could be classified as a cult statue, in other words a figure which would have been the centre of ritual devotion or worship.[36] Furthermore it is likely that smaller, more portable statues were also used for festivals and processions (Robins 2005: 2). The earliest cult images were probably made from stone and later wooden figures were covered in metal sheets and semiprecious stones. By the Middle Kingdom Period they were also made from metal alone. It is clear that because of their importance cult statues were produced using costly materials; this same economic value in all likelihood resulted in them being looted during certain periods of instability (Lorton 1999: 126). Another important factor to keep in mind is the symbolic value these metals held for the ancient Egyptians. Gold was regarded as divine and imperishable, a metaphor for eternal life and the flesh of the gods; bronze was sometimes used as a substitute for gold. Silver was symbolic of the moon and the bones of the gods were believed to be made of silver as well (Wilkinson 1999: 83-84).

Robins (2005: 1) aptly describes ancient Egyptian statues as vehicles for the manifestation of non-physical entities such as gods or the spirits of the dead, providing them with physical bodies. In order for these images to be recipients of ritual actions, they had to be animated or filled with divine life force. Thus, once a craftsman had completed the manufacture of a sacred statue, a ritual was performed called 'Opening of the Mouth' (Lorton 1999: 149). This ceremony was initially enacted in the Fourth Dynasty on funerary

[36] One possible example of a surviving Egyptian cult statue is the solid gold image of the god Amun in the Metropolitan Museum of Art (Robins 2005: 5).

statues representing the deceased king. An adze was used to touch the mouth of the statue and this gesture would magically animate it for the Afterlife. Over time the rite was also performed on mummies as part of the Osirian funeral tradition and on temple statues (Griffiths 1980: 71-72).

Cult statues were usually kept inside a portable wooden shrine which fitted into a slightly larger stone one, located within the sanctuary of the temple. It is interesting to note that research into the size of these shrines suggests that cult statues were probably smaller than often thought – just over thirty centimetres in height. As representations of deities cult statues were housed inside temples, which were regarded above all as the abode of gods (Lorton 1999: 128, 131). The temple, contained by an enclosure wall, protected the sacred energy of the deities that existed within it and provided the rites necessary for maintaining these charged objects. Only the king and priests, who were ritually purified, were admitted into the innermost sanctuary where the cult statue stood inside its shrine (Pinch 1982: 138; Robins 2005: 6-7).

The daily temple ritual, whether it took place in smaller local temples or the great religious complex at Karnak, centred on the cult statue. Each day at sunrise a priest would break the seal of the shrine to awaken the god and tend to his needs. The statue (as a physical manifestation of a particular god) would therefore be washed, fed, clothed and anointed. By performing these vital rites the priests ensured the continued well-being of the deities and maintained the cosmic balance, of which the temple was a reflection (Robins 2005: 8-9). The daily temple ritual was therefore carried out by high ranking priests on behalf of

the entire community (Pinch 1982: 138). Statues other than the main cult image were probably used for processions during special festivals. They were carried hidden inside a shrine, on a sacred barque outside the temple precincts and ordinary Egyptians would thus get a rare opportunity to be in the presence of the divine (Robins 2005: 10).

3.2 VOTIVE STATUES

Objects dedicated to a particular deity are usually referred to as votive offerings or dedications. These terms imply some intention or prayer associated with the figure (Osborne 2004: 5). Pinch (1982: 139) suggests that they were offerings 'made in anticipation of a desired effect' while Bell (1948: 83) probably gives the best definition of votive offerings when he describes them as revealing 'the gratitude of a worshipper for some deliverance or favour received or express a petition for a favour to come.' These dedications certainly seem to have been an attempt to establish a personal rapport between the deity and the donor, although it was an optional practice in ancient Egypt (Pinch & Waraksa 2009: 1-2).

Surviving votive statues largely date to the Third Intermediate and Late Period and most represent gods in standing or enthroned poses. Some examples even show groupings of more than one deity (Hill 2001: 206). Statuettes were usually between twenty and thirty centimetres tall. Royalty, officials and private individuals would donate such objects to temples or shrines with the expectation that the particular deity would bless them, provide an answer to prayers or as a gift of thanksgiving. Pinch and Waraksa (2009: 2) maintain

that the Egyptian tradition of placing objects in shrines was an old religious custom which probably dated to a time when local temples were accessible to all people. They further argue that as entry into temples became more restricted offerings were only made by the king, which is reflected by the paucity of Middle Kingdom votive offerings. Nonetheless it must be remembered that lack of preservation in the archaeological record could also have contributed to this state of affairs. Furthermore access to metal and bronze sculpture would initially have been restricted to those who could afford to commission such costly works; with the increasingly widespread use of bronze by the Late Period thousands of votive figurines were being produced and many ordinary Egyptians were able to simply buy them at temples where the objects were also dedicated (Kozloff 2001: 243-244). As with cult statues, votives of deities probably also underwent a ritual 'Opening of the Mouth' ceremony to animate the small figures and purify them before they were accepted by the temple (Pinch & Waraksa 2009: 6).

Votive bronzes with known provenance are invariably from temple context. Excavations have revealed large caches of bronze statues as well as ritual equipment at various sites from this period, or slightly later. They are referred to as temple or foundation deposits. The cache at Kharga Oasis contained numerous votive Osirises and similar finds were made at the Sacred Animal Necropolis of Saqqara (Gosling, Manti & Nicholson 2004; Hill 2001: 206-207).[37] The ongoing work at Saqqara is beginning to shed valuable light on the votive functions of bronzes as well as their archaeological context in foundation deposits

[37] In addition to votive figures of gods, archaeologists also discovered small bronze ceremonial water carriers called *situlae,* (Gosling *et al* 2004: 2). They were brought to the temple by worshippers and were probably used for a short period by temple personnel before being added to votive deposits (Pinch & Waraksa 2009: 5-6).

(Davies 2007: 185). Osborne (2004: 7) believes that foundation deposits may in fact contribute in creating special status for the place of the deposit. Ancient Egyptian votive caches were created when large quantities of ritual equipment and statuary were periodically cleared out and buried under the temple building. From excavations it is clear that these objects were still treated with care and respect; many statuettes of gods were found wrapped in linen (see Emery 1970: Plate V). This makes sense considering the fact that divine images were regarded as being supernaturally charged, even at the end of their official 'lives'. Their potent energy still had to be contained within the protective precinct of the temple, albeit underground (Davies 2007: 185).

Animal cults in particular rose in popularity from the Twenty-sixth Dynasty onwards. Cats, baboons and ibises (to name but a few) were mummified and buried in their thousands, thereby acting as sacred votive offerings (Ray 1978: 152, 154). Some bronze statuary even concealed the remains of these animals that were regarded as manifestations of certain deities (Jett, Sturman & Drayman Weisser 1985). Animal cults stimulated the production of small bronze statuettes which portrayed the particular god in his animal form. The Apis bull cult was perhaps the most famous of these, as can be seen from the numerous votive figurines of bulls that can be found in museum collections around the world. Throughout the first millennium BC bronze figures of deities were made in large numbers and were purchased by religious pilgrims who visited sacred sites and shrines in Egypt. The figurines were dedicated to specific gods and were then left as offerings on behalf of the pilgrims at the particular temple. This practice reached its greatest heights in Egypt by the time of the Late and Ptolemaic Periods (Ray 1978; Spencer 2007: 27, 32).

4 CONCLUSION

The above review of bronze statuary in ancient Egypt shows that it is possible to identify certain stylistic types or categories of statues that developed during different time periods. Royalty was a constant subject although copper-alloy representations of some gods can be attributed to a late Middle Kingdom date. Surviving bronze Osirises thus far are from a later time.[38] The gilded Osiris from the NCHM which will be discussed in Chapter 8 could perhaps be identified as a cult statue due to the use of precious metal. It is also possible that it is merely one of thousands of votive offerings once left at a temple site. Unfortunately the figurine has no accurate archaeological context available. Furthermore the cult of Osiris did rise to prominence during the Middle Kingdom. Another stylistic type of bronze figurine among deities is Isis in the traditional pose nursing Horus. This can only be traced back to the Third Intermediate Period. Despite the attempts that have been made to create some basic chronological order for these objects, there still remain too many gaps. This may only change once more data is published on this kind of statuary found in collections around the world and comparative studies can be done, although properly documented provenance remains a challenge.

[38] A large deposit of Osiris figurines from Medinet Habu dates to the Twenty-sixth Dynasty (Hill 2007: 128).

CHAPTER 6

THE STUDY OF ANCIENT EGYPTIAN BRONZES

1 INTRODUCTION

The aim of this chapter is to highlight some of the most common analyses and technologies that are available as tools in the study of ancient Egyptian bronze statuary. These aids can be used to identify and authenticate such objects more efficiently. This particular field of research has certainly seen much development in recent years and it is hoped that in using an interdisciplinary approach, a clearer picture will emerge of bronze statuary itself as well as its chronological development. As Goffer (1980: 347) points out, the most practical approach to authentication should make use of both artistic and scientific criteria which will complement one another.

2 PROBLEMS ENCOUNTERED IN THE STUDY OF EGYPTIAN BRONZE STATUARY

Certain inherent difficulties exist in the study of Egyptian metal statuary and researchers have to be familiar with these complications. Firstly, the sheer number of copper alloy figurines that are to be found in museum collections around the world today illustrates the extent of the field of research, compounded by the fact that especially bronze was a very popular medium for works produced during the Third Intermediate and Late periods (Hill

2001: 203; Pinch & Waraksa 2009: 4). This means that a vast amount of analysis has to be performed and published before the data can be interpreted as a whole.

Another problem often encountered when studying Egyptian bronzes concerns the archaeological context of an artefact, which is crucial for its interpretation and dating. This context consists of the object's provenance within the archaeological layers as well as its association with other finds (Renfrew & Bahn 1993: 42). Egyptian bronze statuary, however, can often present difficulties in this regard. In controlled scientific excavations an artefact's exact location and relation to other objects are carefully recorded because it may hold vital clues to the object's function or age. Unfortunately in the case of most votive bronzes in Egyptian collections their provenance is unknown or uncertain at best (Hill 2001: 206). This can be attributed to unscrupulous collectors from the past that paid no heed to recording archaeological data in their search for antiquities, local people who illegally removed objects to supply dealers or farmers who simply stumbled across a foundation deposit while working in their fields (Breasted 1906: 1; Davies 2007: 185). The end result is a lack of any precise context for many bronzes. As Hill (2001: 203) remarks, the problem is further compounded by the fact that they often have no inscriptions which could have been useful for dating.

A further complication related to the context and dating of Egyptian metal statuary is the common occurrence of temple deposits, a phenomenon which was discussed in the previous chapter. Excavated bronzes are frequently found in these deposits, which were created when temple personnel buried large numbers of statuary and ritual equipment after

long periods of use in temples (see for example Davies 2007, Emery 1970 and Gosling *et al* 2004). Such caches may therefore contain votive and cult statuary that are representative of several different dates (Pinch & Waraksa 2009: 5-7). In this respect archaeology has been of limited use in providing accurate dating (Hill 2001: 203).

The widespread occurrence of forgeries can be a further obstacle in the study of Egyptian bronzes (Hill 2001: 203). With the renewed interest in Egyptian artefacts that occurred during the seventeenth century the popularity of these exotic works sparked a desire in Europe and elsewhere for collecting such antiquities. Inevitably the great demand for ancient Egyptian objects stimulated the production of copies and forgeries, which dates back at least to the beginning of the nineteenth century (Steindorff 1947: 53). In this regard Steindorff (1947: 55) mentions how German Egyptologist Ludwig Borchardt successfully traced forgeries that had appeared on the market to the workshop of an Italian marble worker in Egypt. In some cases it can be very difficult to ascertain whether an artefact was merely restored or if it is a fake. Forgers often used the remains of a genuine work as the foundation to which they added new features, for example inserting new inscriptions onto an ancient piece of sculpture (Goffer 1980: 348). Genuine artefacts may also be reworked or 'restored' to make them more interesting to collectors (Steindorff 1947: 53, 55). Fortunately there is analysis available today which can help in identifying the frauds among Egyptian bronzes and researchers should be encouraged to utilise them.

The issue of possible recycling of metals also deserves further consideration, especially since it could potentially influence the result of metal analysis. Scholars are still divided as

to what extent (if any) the ancient Egyptians melted down older metal statuary in order to produce new works. One point counting against large scale recycling is the occurrence of large temple deposits of bronzes mentioned above, such as the assemblages discovered at North Saqqara[39] and at the temple of 'Ayn Manâwir in the Kharga Oasis.[40] Thousands of votive statues and other copper alloy temple equipment were found carefully buried, many of them even wrapped in linen (Emery 1970: Plate V). It may be that these sanctified objects were still regarded as possessing some kind of ritual potency even after their use in temples; as such they were generally buried inside the sacred confines of temple complexes rather than being recycled for scrap metal (Davies 2007: 185). This view is also shared by Ogden (2000: 156) and Pinch and Waraksa (2009: 7). The latter go as far as proposing that it might even have been sacrilegious to destroy votive objects which were originally consecrated to the temple.

3 INVESTIGATIVE TECHNIQUES

3.1 VISUAL EXAMINATION

In the past researchers relied almost exclusively on their experience in visual judgment to establish the authenticity of antiquities. Even though more scientific methods are now available for this purpose, visual examination can still provide useful information about a bronze statuette (Goffer 1980: 349). Furthermore in cases where inscriptions appear on

[39]Most bronzes from the Sacred Animal Necropolis of North Saqqara were excavated between 1964 and 1976. See Davies (2007), Emery (1970) and Gosling *et al* (2004) for some of the discoveries made at the site.

[40] Large deposits of bronze votive Osirises were among the artefacts discovered by a French team of archaeologists (Wuttmann, Coulon & Gombert 2007).

votive statues it could reveal the name of the donor who dedicated the work to a temple or give clues to its date, although not many of them carry such texts (Hill 2001: 203). One example of a typical inscription is found on the wooden base of a bronze Osiris and it mentions the name of the person who dedicated the statuette:

> Osiris Wennefer, elder god, lord of Busiris, ruler of eternity, giving life, soundness, and health to the astronomer of the House of Amun, Ibeb, son of the astronomer of the House of Amun, Ankhpekhered, justified.... (Hill 2007: 204).

The patina of ancient bronzes was often regarded as the best indicator of authenticity, but Goffer (1980: 349) cautions that its importance has been overrated since a convincing false patina can be created with chemicals. A natural patina sometimes forms on the surface of ancient bronze artefacts as the result of certain corrosion products, creating a thin crust of green and blue.[41] If this layer occurs in a uniform manner it may enhance the object and for this reason noble patinas are greatly admired as well as imitated. This process of bronze corrosion is the result of a reaction between the metal and its environment; the deterioration depends on factors such as the soil the object was buried in and surrounding moisture levels. Ultraviolet examination is a useful aid in the detection of fake patinas because it will highlight repainted or patched areas on bronze (Goffer 1980: 252, 255).[42]

Erosion or tool marks on the surface of bronze works can be studied visually as well by using a microscope. The final process of polishing a statuette leaves behind distinctive

[41] Goffer describes these as basic copper carbonates and related blue mineral azurite.

[42] Since many materials fluoresce under ultraviolet light - none of them in the same manner - this type of examination can be used to detect differences in the surface of an artefact (Goffer 1980: 351).

traces of the implements that were employed and these can provide useful information regarding its authenticity (Goffer 1980: 350). For example, forgers would use the easiest methods available to them in order to mass produce artefacts, yet modern files and abrasive materials leave behind tell-tale parallel marks that can be detected on surfaces (Goffer 1980: 350; Steindorff 1947: 55). Visual examination may also reveal in a limited manner which casting techniques were used to create the bronze figure. Ancient Egyptian bronzes were generally made with the lost-wax process which made use of a one-piece mould and resulted in unique works of art. On the other hand modern forgers often cast a piece in halves. The presence of a casting fin on the surface of a figure will therefore be an indicator that the work is in fact a fake (Goffer 1980: 350).

Furthermore, the size and shape of metal tangs on Egyptian statuettes can be scrutinized in order to provide a possible date for uninscribed objects. These protrusions were formed during the casting process and they were used to secure a statue onto a base. According to Schorsch (2007: 193) irregularly shaped tangs were a feature of earlier metal statuary from before the New Kingdom. Standard rectangular shapes with flat ends only became common on works from the ensuing periods.

3.2 STYLISTIC ANALYSIS

Comparisons can also be made with known works from other collections in addition to using stylistic and other art historical analysis, although these methods can encounter some difficulties. Complications may arise when an Egyptian bronze figure is examined

stylistically because many of these objects originated from a time during which deliberate archaism became popular, namely the Third Intermediate and Late Periods (Hill 2001: 203; Kahl 2010: 5). It means that the majority of statuettes so far discovered were manufactured at a time when it was fashionable to incorporate artistic traditions from previous eras into votive bronzes (Hill 2001: 203). Incidentally Kahl (2010: 1) makes the important distinction between copying, which took place as a continuous tradition, and archaism, which was a conscious return to past styles after a long period of disuse.

Several Egyptologists have made detailed studies of various stylistic aspects of ancient Egyptian art in an effort to date uninscribed statuary more accurately; Aldred (1970) focussed on royal portraiture from the Middle Kingdom, Josephson (1997) studied Late Period sculpture while Russmann (1995) dealt intensively with Kushite headdress styles, to cite but a few examples. Comprehensive as they may be, these analytical studies have yet to be integrated and consensus regarding interpretation does not always follow. Nonetheless such art historical research can provide useful indicators for dating small detail, for example the shape of eyes on sculpture from the Eighteenth Dynasty (Romano 1976: 104) or the symmetric double loop of a uraeus (Josephson 1997: 7). It is important however that they be used tentatively. When conducting stylistic studies, Davis (1989: 63) stresses the importance of recognising that: '...an individual image made sense to an original viewer in terms of some overall understanding already in his possession, a wealth of possible iconographic distinctions, associations, and transformations.'

Scott and Dodd's analysis of a gilded bronze Osiris statuette serves as a good example of the application of stylistic analysis in dating an uninscribed Egyptian metal figurine (Scott & Dodd 2002). The fact that they combined this with elemental analysis as well as other scientific examinations resulted in a well balanced multidisciplinary investigation which contributed in narrowing down a reasonable time period for the statue, namely the Third Intermediate Period. Many other authors have also analysed the style, fashion and iconography of bronzes in an attempt to date them more accurately. An early example of this is Hall (1930) using the known trends of Eighteenth Dynasty royal portraiture to identify a bronze Osiris as a representation of Tuthmoses III.

3.3 CHEMICAL ANALYSIS

The chemical analysis of metals can supply valuable information to researchers. Above all such tests can show the differences in elemental composition between objects from different archaeological periods, as gradual changes took place in alloyed metals (Hill 2001: 203). It is of particular importance in the study of Egyptian copper-alloy statuary because it may help place a statuette within a certain chronological time slot. This is based on the results of tests that show definite trends in the composition of metal objects of various periods. High levels of lead, for example, were characteristic of copper-alloy statues made during the Late Period but were a rarity in those from the Middle Kingdom.[43] In the same way levels of more than 2 to 3% zinc in bronzes supposedly from Dynastic context would mean the object is actually of a later date or a fake (Ogden 2000: 155). Compositional analysis can also be employed to reconstruct the original and sometimes

[43] Refer to Chapter 3 for more information on the various elemental indicators.

complex colour schemes of metal statuary, as shown by the recent discoveries of metal polychromy used by ancient Egyptians.[44] Furthermore, by pointing out intentional alloying, compositional data provide more information on the varying levels of skill that existed among the craftsmen (Schorsch 2007: 190). Nonetheless it is important to note that compositional studies can only provide broad indicators of date ranges and therefore it is best to use them in conjunction with other types of technical analysis, such as art historical examination (Hill 2001: 203; Schorsch 2007: 190).

In the past, accurate chemical analysis required such a large sample to be removed from an artefact that it sustained considerable damage. Today there are a large number of sophisticated tests that can be performed varying in cost, destructiveness and accuracy. Some techniques need only samples of microscopic size while other methods are totally non-destructive (Goffer 1980: 352). X-ray fluorescence spectrometry (XRF) for example usually requires the extraction of a sample from the interior of a metal object which is not contaminated by the outer layers of corrosion and this is tested to determine the overall composition of the material (Renfrew & Bahn 1993: 317). According to Rant *et al* (2005: 181) the use of destructive examination techniques should only be considered if non-destructive analysis did not provide satisfactory results.

The importance of analysing the major and minor elemental composition of copper-alloy statuettes cannot be stressed enough. Though this technique has its limitations it could be

[44] This research, headed by Élisabeth Delange, was carried out on bronzes in the collection of the Musée du Louvre (Delange 2007).

invaluable in assisting the dating and authentication of objects which would otherwise be hard to place within their proper context. In this regard Ogden (2000: 148) makes the following valid point: 'Firm chronological distinction will not be possible until analysis of metal finds becomes as standard a practise in Egyptology as it is in some other archaeological fields. Analysis is now an integral and useful part of archaeology and art history.'

3.4 X-RAY RADIOGRAPHY

Radiography is a non-destructive method that can be used to investigate the internal structures of an object and for this reason it is valuable in the authentication of bronzes. The process is based on the fact that X-rays are absorbed by different materials in varying degrees (Goffer 1980: 351). Images are produced which, when closely observed, can provide additional information on a bronze statuette and hidden features are revealed which would be impossible to detect by mere optical inspection.[45] Radiography is one of the most common tools for studying ancient manufacturing and casting techniques of metal statuary and its use has become routine in such investigations (Rant *et al* 2005: 181; Schorsch 2007: 192).

There are several manufacturing features that can be detected and analysed on radiographic images of Egyptian bronzes. First of all it is possible for researchers to see

[45] For example, the study conducted by Jett *et al* (1985) on bronze falcon figures revealed the presence of animal bones inside the statues.

whether the object is hollow or solid, which is not always easy to gauge by simply handling the statuette (Schorsch 2007: 192). In the case of hollow castings the core cavity inside can be studied as well as the thickness and quality of the metal walls. Features that were separately cast onto the figure, such as arms, can also be observed together with the kind of joins that were used (Hill & Schorsch 2005: 171-173; Schorsch 2007: 193). If core supports or chaplets are present they appear as small dark squares on the X-ray and it can be used to date the object (Spencer 2007: 45). More importantly if these chaplets are in a severely mineralised condition, Schorsch and Frantz (1997-98: 22) regard this as the most convincing evidence of the bronze object's authenticity. Cast-in repairs that were done in antiquity to fill flaws are sometimes found on ancient Egyptian bronzes but they are not visible on the exterior because the surface was polished to disguise them. However these repairs are revealed during radiography and are identified as irregular patches which are more radio-opaque than the surrounding surface (Schorsch & Frantz 1997-98: 23).

By studying the above phenomena researchers are given valuable information about the manufacturing process of the statuette; for example casting flaws like internal porosity, visible on X-ray images, can reveal much about the alloy composition that was used for the casting as well as the preparation of the core and investment (Schorsch 2007: 193). In the case of a high quality casting the figure's walls will have an even density and little porosity. The latter is usually caused by impurities or air bubbles trapped in the molten metal at the time of production. The addition of arsenic as de-oxidant could reduce porosity and help create a better end result (Spencer 2007: 43, 45). This reflects the skill of

the ancient metallurgists who managed to control the alloying and casting process successfully.

3.5 NEUTRON RADIOGRAPHY

In some cases X-rays are not effective and reveal nothing because the material being scanned is too dense or thick (Goffer 1980: 73, 351). A further drawback to its use in archaeological applications is that metals such as gold and lead are almost opaque to X-rays and therefore alternative methods of investigation have to be explored (Rant *et al* 2005: 182). Neutron radiography is a relatively new method of analysis that has become a valuable complimentary technique to X-rays in the study of archaeological artefacts. It is particularly successful in exploring hidden internal features of metal objects such as crevices and passages that are inaccessible by other means (Goffer 1980: 73).

Neutron radiography is proving itself to be very useful in the study of metal statuary as well as other museum artefacts; this can be ascribed to the unique properties of neutrons which are used in the process. Different materials have varying degrees of neutron attenuation and by using this technique information regarding the object's structure and composition can be revealed (Goffer 1980: 72-73). Neutrons can successfully penetrate through metals and it is therefore possible to observe detailed structures inside thick metal layers which would otherwise not be picked up through X-ray radiography (Rant *et al* 2005: 182). Neutrons are also sensitive to various kinds of organic materials and neutron beams can detect variations between materials that would appear similar on an X-ray

image (Goffer 1980: 73). However Rant *et al* (2005: 183) advises that neutron radiography is not suitable for use on pottery objects, as they do not provide good contrast.

The process of neutron radiography involves a sample being bombarded with a beam of neutrons (sourced from the core of a nuclear reactor) while rotating around an axis of 360 degrees. The beam penetrates the object and is partially absorbed or scattered. This attenuated beam is transformed as a digital image on a camera. Two dimensional (2D) radiographs provide data which is interpreted by computer software and is used to reconstruct a 3D tomography image of the object (Smith *et al* 2008: 83). Although the sample becomes radioactive during this process, it is usually free of any radioactivity after a few days of being kept in a secured area (Jett *et al* 1985: 115). This technology requires complex and expensive equipment which includes a neutron source (usually from a nuclear reactor) as well as a neutron collimator, filters, beam shutter and neutron shielding and radiological protection equipment (Rant *et al* 2005: 183).

By far the greatest advantage of this technique is that it is completely non-destructive even though objects are investigated internally in 3D. This is invaluable when precious archaeological artefacts need to be examined to determine their mode of manufacture or to decide on conservation procedures, without causing damage to the objects (Rant *et al* 2005: 181-182). However due to the necessity of using a nuclear reactor, this technology is not available to most researchers because they do not have easy access to such facilities. An example of the application of this method on a bronze Egyptian Osiris is briefly discussed in Rant *et al* (2005: 186).

In South Africa neutron radiography has only previously been used twice to scan artefacts (see Smith *et al* 2008 for its use on a bronze Horus statuette). On the third occasion it was used to investigate a group of ancient Egyptian bronze statuettes from the collection of the National Cultural History Museum and it included the Osiris figurine analysed later in this study. This relatively new technology is proving to have great potential for the future study of archaeological artefacts but has yet to be fully exploited by researchers and conservationists in that arena.

4 CONCLUSION

It is clear from the above discussion that many scientific methods are now available to assist researchers in the authentication of metal statuary. The composition, internal structure and manufacturing techniques of these objects can all provide clues to their time of origin and even shed light on the skill of their makers. This can be regarded as positive evidence of authenticity. Negative evidence in this regard will be the result of any inconsistencies in composition, meaning an object does not fit the date assigned to it, or proves that it is a fake (Goffer 1980: 349). Even as more studies are being conducted on Egyptian metal statuary and the data is made available, there still remains a lack of methodology that integrates scientific analysis with other disciplines such as art history (Schorsch 2007:190). This chapter has shown that researchers will achieve a better result in their analysis of these artefacts by making use of available new technology (especially neutron radiography) and insights from other fields of study. Although one cannot be expected to be an authority on all of these disciplines, it is imperative for scholars today to be cognisant of what tools are at their disposal which could add value to their research.

CHAPTER 7

OSIRIS IN CONTEXT: HIS ROLE IN EGYPTIAN MYTHOLOGY AND THE DEVELOPMENT OF HIS CULT

As part of the historical research into the museum statuette it is now necessary to investigate the broader religious context of the god Osiris before continuing with the physical examination of the bronze figurine. To this end his evolution will be traced as it developed in ancient Egypt, taking specific note when certain important changes occurred in his cult and iconography.

1 ORIGIN AND SIGNIFICANCE OF THE ORIGINAL MYTH

Scholars are not in agreement as to the origin and meaning of the name Osiris (*Wsir*), the Egyptian god of death *par excellence*. Popular explanations for the name range from 'seat of the Eye' to 'the Mighty One' (Griffiths 1980: 94; Hornung 1996: 67-68). It is believed that the anthropomorphic god of Busiris in Lower Egypt, Andjeti[46], was assimilated early on with Osiris (Hornung 1996: 72). Hornblower (1941: 97) held the opposite view, believing him to be of Upper Egyptian origin, based on the white crown always associated

[46]He was a local king, deified after his death (Andrews 1998: 47).

with him. Griffiths (1980: 123) disagrees with the notion that Osiris was originally an historical king.[47] He further maintains that Osiris was initially a jackal god associated with Anubis, Khentamenthes and Wepwawet (1980: 143). It is difficult to establish whether Osiris already existed as one of the Predynastic deities. However there are clues which may indicate his antiquity. Andrews (1998: 15-16) asserts that most of the deities with entirely human form were very ancient: they were originally primordial gods who were worshipped as inanimate objects before being anthropomorphised. Furthermore primordial male deities have bound legs, for example Ptah and Min. Osiris was usually represented in mummiform, his legs bound together.

Putting aside the question of whether or not he had ancient beginnings, Osiris was already mentioned in some of the Pyramid Texts by the time of the Old Kingdom. Utterance 213 (§134) reads:

> O King, you have not departed dead, you have departed alive; sit upon the throne of Osiris, your sceptre in your hand.... (translated in Faulkner 1969).

The Pyramid Texts were a collection of spells inscribed inside the royal pyramids from the Fifth Dynasty (2498-2345 BC) onward. They were meant to magically assist the soul of the dead king on his journey into the afterlife and tried to identify the earthly ruler with Osiris in the context of death. Although Osiris is first mentioned in funerary texts of king

[47] Plutarch was one of the early Greek writers that portrayed Osiris as a once-human ruler in his work *De Iside et Osiride*, 13 (in Griffiths 1970: 137).

Unas of the Fifth Dynasty, it seems likely that his cult was already established by that time (Griffiths 1982: 625-626).

None of these early religious texts provide a full account of the so-called Osiris myth, but various references, some quite vague, are made to mythological events related to him. By piecing together that information it is possible to reconstruct the main events of the original myth in the following summary. Osiris was the son of Geb and Nut.[48] His wife Isis was also his sister and they had a son named Horus. Osiris had two other siblings namely Seth and Nephtys. Reference was made to a myth about an earlier feud between Seth and Horus, in which the conflicting statement is made that they were brothers. Horus eventually triumphed in this battle but Seth became the arch enemy of Osiris. The story relates how Osiris was slain by his nemesis but there is also a tradition that he drowned in the Nile. Isis and Nephtys, who had gone in search of him, found Osiris and mourned his death. Seth was brought before the gods in Heliopolis and put on trial for his actions. Osiris was awarded the kingdom of heaven and earth, though it is not clear whether he really died. It is possible that a reference to Isis and Nephtys making him 'better' may mean that he was resurrected. During the process Isis also conceived their son Horus the Child.[49] Some scholars believe this was not a posthumous event. Judging by certain conflicting elements in the story, it is likely that the earlier Horus myth was incorporated into the Osiris myth (Griffiths 1980: 8-15). This was done to strengthen the important link between kingship and the god Osiris.

[48] Geb was god of the earth and Nut was the sky goddess.

[49] The conception is described in astral terms as a union between Osiris-Orion and Isis-Sirius (Griffiths 1980: 13).

It is clear from its use in the Pyramid Texts that the Osiris myth was deeply entwined with the royal funerary cult, as Griffiths (1980) has shown in his detailed study on the cult of Osiris. Ancient Egyptian kings were considered divine and in his lifetime the pharaoh was equated with Horus but upon his death the king was identified with Horus' father, Osiris. As he ruled the kingdom of the dead, it was only natural that the deceased king would also aspire to such a role in the Afterlife. Spell 219 (§167) of the Pyramid Texts of Unas (translated in Faulkner 1969: 46) serves as one such example of how this association with the god ensured eternal life for the earthly ruler:

> O Atum, this one here is your son Osiris whom you have caused to be restored that he may live. If he lives, this King will live; if he does not die, this King will not die; if he is not destroyed, this King will not be destroyed....

In order to further stress the king's connection with Osiris, various elements from the myth were referred to in the mortuary texts and reflected in the funerary rituals. The so-called 'Opening of the Mouth' ceremony, performed on a statue of the dead pharaoh, was carried out by a priest who assumed the role of Horus, his 'son' (Griffiths 1980: 26). Furthermore Isis and Nephtys became associated with mourning the deceased in funerary art, echoing their role as mourners for the dead Osiris in the original myth (Griffiths 1980: 49). One of the most important aspects of the cult, however, was the careful preservation of the body through mummification; it was vital for the king's continued existence in the Afterlife that his remains be kept safe and whole, as was the case with Osiris. The mummification of Osiris therefore became a prototype for the royal burial and, in later times, for that of all Egyptians (Griffiths 1980: 51, 56).

In summary it can be said that the cult's greatest concern was the immortality of the physical body. Through the process of mummification and the recitation of magic spells, resurrection or continued life could be ensured in the hereafter, as it happened for Osiris according to myth (Griffiths 1980: 66, 68). Even as this process evolved over time he remained central to its concept of salvation. Another crucial role that became associated with Osiris was that of judge of the dead, an idea which also had its roots in earlier myth (Griffiths 1980: 184; Hornblower 1941: 95). However, he also had an early connection with water and vegetation. The latter is evident from the presence of so-called 'corn mummies' and 'Osiris beds' that were placed in tombs.[50] Nonetheless it must be stressed that Osiris' primary role was never that of a fertility god (Griffiths 1980: 167-170). This idea of the god as a regenerative force that caused crops to grow developed much later, yet some authors still overemphasize that particular aspect of the Osiris cult (see for example Hornblower 1941).

2 DEVELOPMENT OF THE MYTH IN OTHER ANCIENT SOURCES

Arguably the most significant non-Egyptian work dealing with the Osiris myth was Plutarch's *De Iside et Osiride*. Written in Greek around 120 AD, it remains an influential source of information about Isis and Osiris. As Griffiths (1970) points out, authors still make generous use of Plutarch's account because the Egyptian sources do not contain a single comprehensive narrative on the story. Nonetheless the *De Iside et Osiride* also contains new elements which could not be traced to the original Egyptian texts that dealt

[50] Corn mummies were made from soil in the shape of the god and contained seeds which eventually sprouted; this symbolised renewed life after death. Osiris beds from the New Kingdom relied on the same principle, though the effigy was placed on top of a wooden frame with a papyrus mat.

with the myth, as will be shown below. During Plutarch's brief visit to Egypt he did gather some information from cult priests but he had no knowledge of the local language; it seems he relied mostly on compilations of literary works by other authors, including the celebrated Egyptian priest Manetho, when he wrote his account of the Osiris story (Griffiths 1970: 78- 98).

In *De Iside et Osiride* Plutarch approached Egyptian religion with respect and tolerance. He even proclaimed the belief that the Greeks shared a common heritage with Egyptians regarding their gods (66, 377 D, translated in Griffiths 1970). The value of the work was that it had the sole purpose of explaining the Osiris myth and in the process supplying great detail about the cult especially in Hellenic times. Since the Ptolemaic era the so-called Mysteries of Isis and Osiris began to develop in popularity. It was a concept that pertained mainly to the initiation into secret rites of the cults and those involved were not allowed to disclose information regarding these ceremonies to the uninitiated (Griffiths 1970: 33, 42). Against this background it must be remembered that throughout his work Plutarch provided a Greek interpretation of mythical events (Griffiths 1970: 48). This is evident in the way Egyptian gods are equated with Greek deities, for example Osiris is one and the same as Dionysus (28, 362B) while Typhon is named as the Greek equivalent of Seth (41, 367D).

The broad outline of Plutarch's account correlates with the original Egyptian elements of the myth. Thus his tale about the murder of Osiris is basically sound; the chest which contained the god's body reflects the Egyptian tradition of his sarcophagus and similarly

the victory of Horus over Seth (Typhon) is from the original myth. However, some new episodes also appear in the *De Iside et Osiride* which are not based on Egyptian sources. One such example is the events that unfolded in Byblos when Isis travelled there to find the chest containing the body of her husband (chapters 15-17). It is possible that Plutarch based this tale purely on the existence of the cults of Isis and Osiris which were practiced at Byblos (Griffiths 1970: 54). Furthermore the statement that Osiris, as an earthly king, introduced agriculture and civilization to the Egyptians (chapter 13) can be seen as a Greek interpretation of Osiris as Dionysus.[51] The affinity between the two gods was only strengthened by Osiris' association with corn (Griffiths 1970: 53, 309).

3 RISE OF THE OSIRIS CULT THROUGHOUT THE MIDDLE KINGDOM TO LATE PERIOD

Although it is not possible to identify the exact origins of the Osiris myth, it was shown at the beginning of this chapter that his cult was probably established by the Fifth Dynasty. Following the internal unrest of the First Intermediate Period the material culture of Egypt's stable Middle Kingdom Period seems to have undergone some significant changes. For example, pottery and coffins became more uniform, less influenced by traditions of the First Intermediate Period (Grajetzki 2006: 44).[52] These developments had great bearing on future generations, as they came to regard the Middle Kingdom as the prototype for arts and literature (Wildung 2001: 91). As will be shown, the cult of Osiris in

[51] Plutarch himself compares these two gods (28, 362B in Griffiths 1970: 137).

[52] One possible reason for this is that royal craftsmen were now working throughout Egypt, maintaining the same styles in different areas (Grajetzki 2006: 44).

particular had far-reaching impact on mortuary beliefs. The greatest changes started under the reign of Senwosret III, when Egypt became more centralised and the administration was reorganised. A wide variety of items were now placed in tombs, especially those with magical connotations (Grajetzki 2006: 1, 57).

An important phenomenon often associated with the Middle Kingdom was the so-called 'democratisation of the dead' which began around the First Intermediate Period, when courtiers started using royal symbols in their burial and the deceased was identified with Osiris – previously the sole prerogative of the pharaoh (Grajetzki 2006: 57). This practise was eventually adopted by ordinary Egyptians and found expression in the Coffin Texts; these contained some spells taken from the earlier Pyramid Texts as well as new material (Smith 2009: 2). However Smith also argues that a true 'democratisation of the afterlife' never occurred, pointing to the fact that non-royal people already had access to glorification spells.

Osiride pillars appear in royal architecture at temples showing a mummiform statue of the king, again making a connection between the worldly Horus-king and his 'father' the ruler of the next world (Schulz & Seidel 1998: 135). Even a new motif was added to the traditional scenes painted on tomb walls: the pilgrimage to Abydos, ancient cult site of Osiris. It illustrated the deceased making a symbolic voyage along the Nile to visit one of the holiest places in Egypt where it was believed the final resting place of the god was situated. In this way people expressed a wish to become an 'Osiris' in death and access his power of resurrection (Schulz & Seidel 1998: 124). At this point it must be mentioned that

there is no clear indication of where the original cult centre for Osiris was located. Nevertheless Abydos had a longstanding association with the god, as did the site of Busiris. There is also evidence of an early connection between him and Heliopolis (Griffiths 1982: 625-626).

The statuette which will be analysed in this study was reportedly discovered somewhere around Memphis. For this reason it was necessary to see if some connection between Osiris and the religious site of Memphis could be made. This was indeed possible because of a syncretism between him and other gods that were worshipped there. Sokar was originally venerated at Memphis as an earthbound funerary deity but already during the Old Kingdom he came to be overshadowed by Ptah in the area (Brovarski 1984: 1056, 1058). The latter was regarded as a creator-god and had a temple complex at Memphis in his honour. His association with Sokar led to the emergence of Ptah-Sokar and during the Middle Kingdom this deity also adopted attributes of Osiris. This resulted in the funerary god Ptah-Sokar-Osiris. Osiris also appropriated the *djed* pillar which was originally associated with Ptah at Memphis (Griffiths 1982: 629). By the Late Period in particular the most common representation of Ptah-Sokar-Osiris was a mummiform wooden figurine with a human head, ram's horns and sun disc. These figures were frequently placed in tombs (Budge 1930: 154-155).

Another link between Osiris and Memphis was the cult of the Apis bull. Although there is some reference to the Apis as early as the First Dynasty, most information regarding its cult comes from the period after 1300 BC when the Serapeum was constructed at Saqqara

(Ray 1978: 151). A special calf was selected to be crowned as Apis and spent the rest of its life pampered in luxury at the great temple of Ptah at Memphis. At the time of its death the greatly venerated bull was embalmed and identified with the *ba* or soul of Osiris.[53] It was referred to as Osiris-Apis or the Roman Serapis in the Late Period. This cult began to reach unprecedented heights from the Twenty-sixth Dynasty and throughout the Late Period, at around the time other animal cults also gained momentum. Eventually the Serapeum became a vast site of pilgrimage where oracles or healing could be obtained and where worshippers could leave bronze or mummified votive offerings (Ray 1978: 151, 153).

By the time of the Greco-Roman Period the cult of Osiris as well as Isis became so popular that it spread beyond the borders of Egypt into the rest of the Mediterranean world. This was in large part due to the equation of these two gods to their Hellenic counterparts (Griffiths 1970: 41). To illustrate how far-reaching these cults were it will suffice to mention the discovery of various votive bronzes across France (ancient Gaul). These statuettes represent a variety of Egyptian gods, including Osiris, and probably date to the Roman era (Podvin 1989). It must also be remembered that many different foreign communities had settled in Egypt by that time, incorporating some of the more appealing local deities into their belief systems.[54] Bell (1948: 82-84) cites several examples in which Osiris is included in the prayers and dedications of these foreigners. Although Osiris was generally still regarded as the means to deliverance from death, Isis began to play an

[53] Plutarch also refers to the connection between Osiris and Apis (*De Iside et Osiride* 43, 368C in Griffiths 1970).

[54] Bell (1948: 82) lists a wide variety of cultural groups living in Egypt during the Greco-Roman era, including Macedonians, Syrians, Jews, Carthaginians and even Gauls.

increasingly more prominent role as active ‘saviour’ of the god (Griffiths 1982: 629). Tobin (1991: 198, 200) explains this as a result of both Isis and her Greek counterpart Demeter being connected to personal immortality. Furthermore he asserts that the Greeks saw Isis rather than the passive Osiris as the active agent in rebirth.

4 THE ICONOGRAPHY OF OSIRIS

There are several symbols and representations that became closely, sometimes exclusively, associated with Osiris. Griffiths (1980: 85, 87) considers his mummified form and royal insignia (crook, flail and crown) as the most significant indicators of Osiris as a god of the royal dead. Whether he is shown seated or standing in paintings or statuary, there is always an indication of the figure being wrapped in mummy bindings with the legs linked closely together. It reflected his association with death and the afterlife. Furthermore he is always depicted holding a crook and flail in his hands, items which were strictly associated with the pharaoh and later Osiris himself. These insignias originally formed part of the iconography of Andjeti, who was eventually assimilated into Osiris of Busiris (Graham 2001: 165).

Both sceptres seem to conjure up an image of the ruler as a shepherd looking after the welfare of his people, although Griffiths (1980: 29) and Hornblower (1941: 101) negates the notion that Osiris was originally a foreign shepherd-god. Adding further symbolism to this imagery is the fact that the *heka* crook represented the south or Upper Egypt and the *nekhekh* flail (usually held in the right hand) symbolised the north or Lower Egypt

(Griffiths 1980: 86; Wilkinson 1994: 71). It is a reflection of the king reigning over a unified country, or in the context of Osiris a portrayal of his role as ruler of the Afterlife.

The position of the arms in particular varied considerably among bronze figures of the god. In fact studies have revealed that these differences in postures were often linked to regional traditions (Ogden 2000: 148). In Upper Egypt statues of Osiris usually show the arms crossed over each other; Middle Egyptian representations show the god holding them at the same level and in Lower Egypt his one arm is on his chest and the other on his stomach. Similar variations were noted regarding the rest of the body. For example Osiris figures from Lower Egypt do not show the arms through the outer robe, they reveal minimal detail of the god's legs and the false beard is joined close to the neck in solid bronze (Griffiths 1980: 85-86; Wilkinson 1999: 26).

The white crown of Upper Egypt, known as the *nekhbet*, was closely associated with depictions of Osiris and it could occur in several complex variations. One such form was the *atef* crown which is a combination of the white crown, the royal uraeus or rearing cobra, a pair of ram's horns and a tall plume of feathers on either side. Sometimes small serpents with a sun disc were added (Griffiths 1980: 86). The long horizontal horns in this case can be traced to the ram of the *Ovis longipes* species, which featured early on in solar representations of gods such as Khnum (Wilkinson 1994: 61). Wilkinson also states that this animal could be associated with Osiris; during the Middle Kingdom the ram of Mendes was called the *ba* or soul of that god. As discussed earlier, this title was eventually adopted by the Apis bull.

5 SUMMARY

The above discussion has shown how the Osiris cult evolved from an exclusively royal prerogative during in the Old Kingdom to become an integral part of common Egyptian funerary culture by the Late Period. Throughout this long period the myth and ultimate role of this deity developed and changed along with the people who worshipped him and his iconography became standardised, albeit with some regional variations. Ultimately Osiris fulfilled people's need for salvation in the Afterlife, providing them with the comforting knowledge that death could be overcome. Proof of Osiris's enduring appeal can be seen in his lasting popularity even among non-Egyptians of the Greco-Roman era and those living beyond the country's borders, despite the many distortions his myth had undergone by that time. Although later writers such as Plutarch were responsible for many of the misconceptions around the Osiris cult, some of which still persist to this day, their work nevertheless helped in keeping alive this fascinating ancient tale.

CHAPTER 8

ANALYSIS OF THE NCHM BRONZE OSIRIS

Figure 7: Gilded Osiris statuette. Catalogue number ARG 85/22 (Courtesy of NCHM, Pretoria)

1 INTRODUCTION

The bronze figurine of Osiris (Figure 7, catalogue number ARG 85/22) is part of the ancient Egyptian collection of the NCHM in Pretoria. The accompanying certificate states that it was found at Memphis in Lower Egypt and dated to the Twelfth Dynasty of the Middle Kingdom Period.[55] Unfortunately no further information is given regarding the archaeological provenance of the statue or the specific site it originated from. It seems that another individual discovered it before selling it to the licensed antiquities dealer Maguid Sameda in Cairo. The latter in turn sold the figurine to a Lieutenant Harry L Bowyer in 1945. In fact Lieutenant Bowyer bought many other artefacts, including bronzes, from the same establishment in the period from 1944 to 1946. Presumably he was stationed in Egypt for the duration of the Second World War and by the late 1970s or early 1980s his wife donated the objects to the then Transvaal Museum.

In order to understand the figurine in its proper context the previous chapter endeavoured to highlight the role of Osiris in Egyptian religion. Despite, or rather because of, the sparse information concerning its find site and archaeological context, an attempt was also made to link the bronze Osiris to the geographical location of Memphis while also exploring the site's cult associations. To conclude the matter of provenance the following section will briefly review the excavation record at Memphis before proceeding with the physical analysis of the statuette.

[55] See Appendix A.

2 THE ARCHAEOLOGICAL RECORD AT MEMPHIS

The site of ancient Memphis (*Men-nefer* or *Ineb-hedj*) is situated on the west bank of the Nile, twenty-five kilometres south of Cairo, and its ruin field encompasses the modern towns of Mit Rahina and ‘Aziziya. Its location at the head of the Delta as well as the heart of important trade routes made Memphis the obvious choice for the country’s administrative capital (Jeffreys 1999: 488; Redford 2006a: 7). This was the case for most of Egypt’s history from the Old Kingdom onwards (Grajetzki 2006: 124). Large scale archaeological excavations had been conducted in the area since 1828 but the most significant work began during the early twentieth century. Petrie excavated for the British School of Archaeology in Egypt between 1907 and 1913 while Fisher and Anthes both did work for the Pennsylvania University Museum during 1914-1921 and 1955-1956 respectively (Jeffreys 1999: 488). In subsequent years the Egyptian Antiquities Service has also conducted work at Memphis. In fact, it seems the Antiquities Department and Cairo University even managed to excavate there during the Second World War in 1941 (El Amir 1948: 51; Jeffreys 1999: 488). Unfortunately none of the excavation reports would be helpful in explaining the Osiris figurine’s origin since it was not found during the course of a legitimate excavation. The above information is useful to the extent that it shows Memphis was the focus of much archaeological activity, even around the time of the artefact’s discovery.

All the sites of archaeological interest in the area are referred to as *koms* and the ruin field consists of several such mounds. Although the city was founded to mark the unification of Egypt at the beginning of the Old Kingdom, the earliest settlements have been dated to the

First Intermediate Period and there is evidence of occupation in Memphis well into the Greco-Roman Period. Tombs in a cemetery at Kom Fakhry were traced back to the early Middle Kingdom and at Kom el-Rabia there is a sequence of concentrated settlement from the Middle Kingdom to the late Period. Ancient Memphis was most renowned for the great temple enclosure dedicated to the god Ptah. Most of its remains were dated to the Ramesside period onwards although structures relating to the Apis bull cult, such as the embalming house, are from the Late Period around 525-332 BC (El Amir 1948; Jeffreys 1999: 489-490).

Due to this almost continuous occupation of Memphis and its surrounding area, combined with the practice of building over much older structures, Grajetzki (2006: 23) comments that it is almost impossible to date uninscribed objects from this site precisely. Even more so, one might add, if an artefact has uncertain provenance. Moreover Jeffreys, Malek and Smith (1987:11) point out that the problem is further complicated by the fact that most of the past work in Memphis has been poorly published despite the extensive archaeological investigations done in the area.

3 VISUAL DESCRIPTION AND EXAMINATION OF THE STATUETTE

After a close visual examination of the statuette was performed it was possible to make the following observations. The figure measures 23 centimetres in height from the tang to the tip of the crown. The god Osiris is depicted here in typical mummiform shape: feet

together and the appearance given of being tightly bound in linen wrappings. One roughly pointed metal tang is visible under the feet, indicating a possible function as votive or cult statue (Davies 2007: 183). These protrusions were originally used to fit a statue onto a wooden or metal base. His arms are held at the same level. As mentioned before this posture can possibly provide a clue to the figure's origin since regional differences seemed to occur when artisans created this type of Osiris statuette. In Upper (southern) Egypt figures of Osiris would usually show the arms crossed over each other, whereas those from Middle Egypt held them at the same level (Griffiths 1980: 85; Wilkinson 1994: 26). If this principle is applied to our statue, it could indicate a Middle Egyptian provenance. However Aldred (1969: 12) cautions against oversimplifying connections between stylistic elements and geographical provenance. Keeping this in mind, it is equally possible that a craftsman working in Memphis followed artistic traditions of the Middle Egyptian region when he modelled the figure.[56]

The god wears a false beard which is joined close to his neck, a feature which was exclusively Lower or northern Egyptian (Griffiths 1980: 86). It thus confirms the figure's possible Memphite origin. He holds in his hands the traditional insignias of kingship – the crook and flail. This iconography was strictly associated with the pharaoh and Osiris himself. Furthermore the *heka* crook in his right hand represented the south or Upper Egypt and the *nekhekh* flail in his left hand the north or Lower Egypt (Wilkinson 1994: 71). This only reinforces the idea that the king is lord of a unified country and its entire people. In the context of this statuette Osiris is portrayed in his role as ruler of the

[56] It is believed that Memphis did indeed attract craftsmen from other regions in Egypt during the Middle Kingdom, some bringing with them particular local styles (Aldred 1970: 38; Grajetzki 2006: 44).

Afterlife. It was already noted that the identity of the pharaoh and that of Osiris merged after death which explains the many allusions to kingship and royalty.

The clearest indication of the figure's identity and divinity is the elaborate atef crown which is closely associated with depictions of Osiris and it occurred in many complex variations. It is a combination of the white crown of Upper Egypt (the *nekhbet*), the royal uraeus or rearing cobra, a pair of ram's horns and a tall plume of feathers on either side (Griffiths 1980: 86). In this case a solar disc surmounts the top of the headdress. One of the horns shows remnants of a rearing cobra wearing a solar disc. There is a possibility that many of these aspects of the headdress may point to a syncretised form of Osiris and Sokar, the old funerary deity of the Memphite necropolis (Brovarski 1984: 1056, 1063). Even if this is not certain, the various solar references may reinforce the notion of Osiris as the night sun which, as Hornung (1996: 96) describes it, 'awakens the underworld dwellers from the sleep of death.'

Originally the entire statuette was covered in gold leaf but little now remains of this gilding. In fact the figurine's condition had severely deteriorated due to poor preservation of the metal, moisture from the soil it was buried in and subsequent handling. The resulting blue-green layer of corrosion covers large parts of the statue's surface, especially the head and crown. Nonetheless the general effect of a golden deity still remains. The choice of metal was not by chance. As with so many other aspects of ancient Egyptian artistic representations, the symbolic significance of materials also contributed to the overall idea being conveyed. Especially the more rare metals and stone had mythological connotations

or even magical properties (Wilkinson 1994: 82-84). Gold was held in high regard for its seemingly divine ability not to perish or tarnish. The flesh of the gods was also believed to be made of gold. For this symbolic reason it was especially used for representations of deities or other sacred objects, highlighting their importance.

The gilding of copper alloy and bronze objects with extremely thin gold leaf was a commonly used decorative technique from the New Kingdom Period onwards. Both Lucas (1962: 231) and Ogden (2000: 160) attest to foil even less than 0.005 millimetres thick. One way of applying the gold leaf was to first glue strips of linen onto the finished metal object. This helped with the adhesion of a thin layer of gesso painted over it. The fine gold foil would then be applied to this sticky substance. Evidence of this technique is visible in places on the Osiris statuette where the outer layer of gold has disappeared; on close inspection traces of linen strips can be seen. Although not intentional it is tempting to see here a literal reference to Osiris as the mummified lord of the Underworld. Neutron radiography scans later revealed that large areas of the statue were covered with Plaster of Paris containing gold pigment.[57] This was apparently done in the modern era in an attempt to restore the figure. It was not documented when these repairs took place but it resulted in more damage to the statue. Some casting-on was probably done on the headdress during the manufacturing process, adding smaller detail such as the cobras and solar disc. It was also noted that the tip of the crown was glued on in modern times after a break occurred at some point. No traces of a casting fin or obvious joins were detected with the naked eye, which would have pointed to the object being a modern fake (Goffer 1980: 350).

[57] Information provided by Anja Smith of the Conservation Department, NCHM.

4 STYLISTIC ANALYSIS

There are many examples of similar bronze Osiris statuettes both with and without gold foil in collections around the world, although none from the Middle Kingdom period could be found for comparison. They vary greatly in both size and style. Some statues from Roeder's early study on bronzes correspond in some ways to the NCHM Osiris, especially §1235 with the same headdress and hand positions (Roeder 1937: 23-24). Uninscribed statuary such as the one being studied here makes it much harder to date and other methods have to be employed to find an approximate date for the artefact.[58] In recent years stylistic analysis came to be used more frequently when analyzing Egyptian bronzes. It draws on art historical studies that trace the development of Egyptian artistic styles over time, noting when certain trends in representation were more prevalent.[59] Experts in this field will use facial features, style of dress or poses to match a statuette to a similar but securely dated figure. Unfortunately this type of analysis also comes with many complications. Both the Third Intermediate Period and Late Period which produced most of the bronze statuary being studied today were known for deliberate archaism in their art and furthermore there is the possibility that the postures of figures depended on their place of manufacture (Hill 2001: 203; Scott & Dodd 2002: 336). Keeping these factors in mind, the following analysis will endeavour to apply some of the established stylistic indicators in a tentative manner in an attempt to find a possible time period for the statuette. Although the evaluation will draw on some general findings made through art historical studies, it does not in any way profess to be an in-depth stylistic investigation.

[58] However Hill (2001: 207) notes that many supposedly uninscribed bronzes may in fact have been inscribed on wooden bases, which are now missing.

[59] See for example Josephson (1997) and Aldred (1970).

At first glance the NCHM Osiris appears as a slender, elongated figure with a slightly flat profile. The body's general silhouette is similar to an example described by Hall (1930: Plate XLI, figure 3). The lower body shows little detail; the legs are only indicated by swellings on the side and in profile it is possible to see a slight curve that denotes the buttocks. This elongated body shape seems to negate a Twenty-fifth Dynasty (Kushite) origin for the bronze as Osiris shapes were generally squatter during that period (Raven 2007: 128). In contrast Osiris figurines from the Twenty-sixth Dynasty were more elegantly shaped. The back of the shoulders rise gradually towards the neck but there is no sign of a hunchback appearance which Scott and Dodd (2002: 336) state as common with some Osiris figurines. An overall impression is conveyed of a figure tightly wrapped in linen, revealing only the minimal amount of features such as the broad outline of arms held tightly against the chest and the faintest suggestion of legs.

Formal analysis of bronzes partly relies on the facial features that can be detected on a particular figure. It is generally accepted that the face of a divine image resembles that of the reigning king (Hall 1930: 235; Kozloff 2001: 244).[60] Under the best conditions this can be challenging even for experts, but in the case of the NCHM Osiris the severe deterioration of the metal makes it almost impossible to identify individual characteristics with the naked eye. A 3D computer image (Figure 8) reconstructed from the data provided by the neutron radiography scan was helpful for this purpose, showing the outer layer of facial detail more accurately. Nonetheless it is only possible to make certain general observations about the facial features.

[60] Although this generally applied to stone sculpture, it must be kept in mind that the production of metal statuary was probably influenced by other factors as well (Hill 2007: 3).

Figure 8: 3D reconstructed image of the scanned Osiris statuette (Courtesy of NCHM, Pretoria and Necsa)

From the image it is possible to see that the deity has a slightly rounded, full face with symmetric proportions. There is some plumpness in the cheeks but it is not as noticeable as that of Ptolemaic faces, which are also longer than they are wide (Scott & Dodd 2002: 338). The face forms the focal point of the sculpture and looks directly at the viewer. The ears are flat and set slightly towards the back of the head. Corrosion makes it difficult to distinguish detail around the close-set eyes and eyebrows, though there does not seem to

be an indication of a downward slant at the inner corners of the eyes which are common on Ptolemaic representations as well as Middle Kingdom models. Neither are there traces of the well known almond-shaped eyes that often occur on some New Kingdom statues, especially from the Ramesside period (Scott & Dodd 2002: 337). This shape, combined with arched lower rims, was also popular during the Twenty-fifth Dynasty (Josephson 1997: 4). The NCHM statue's eyes seem to have a regular form, arching horizontally on both the upper and lower rims. Presumably the eye sockets were once inlaid with a white material, as can be seen with other bronzes in the collection; unfortunately no observable traces of it were left behind.

Undoubtedly the most dominant feature on the face is the broad triangular nose. Its root starts thinly and high up between the eyebrows before dramatically flaring out below the eyes towards the bottom. Eighteenth and Nineteenth Dynasty examples show similar high-placed nose roots and the continued widening that reaches the nostrils are common on Late Period figures (Scott & Dodd 2002: 337). The sides of the nostrils are not clearly defined with curves where they meet the cheek which means there are no indications of a 'Kushite fold'. Such curves or nasolabial folds extending out horizontally from the nose are a particular feature of Kushite statuary from the Twenty-fifth Dynasty (Josephson 1997: 4). It is impossible to detect an inverted triangular space between the eyebrows, which is characteristic of Late Period sculpture (Scott & Dodd 2002: 337).

The mouth is roughly the width of the nostrils but is not set too closely to the nose. The lips seem to curve very slightly upwards at the corners in what appears to be a hint of a

smile. However it is not quite as sickle-shaped as the so-called Saite smile, common to Twenty-sixth Dynasty statuary, and those from the Ptolemaic Period. Faint indentations are visible at the corners of the mouth. Some representations exist of figures with full lips undercut at the corners dating to the Third Intermediate Period, but it is more prevalent on examples from the Late Period (Scott & Dodd 2002: 338). It must however be remembered that a slight half-smile also appeared on some royal portraiture of the Middle Kingdom which was used in the archaism of later times (Romano 1976: 105).[61]

It is difficult to establish where the false beard is positioned. From the image it seems to possibly cover only the bottom half of the chin, which serves as a dating criteria for the Late Period. Another indicator of Late Period provenance is the body of the uraeus with symmetric, single loops on the headdress. This type of uraeus was rare on freestanding figures of Osiris during the Twenty-sixth Dynasty and instead points to the fourth century BC (Josephson 1997: 7- 8). What can be said with certainty is that the beard is joined close to the neck in solid bronze when viewed in profile, which was characteristic of Lower Egyptian Osiris figurines (Griffiths 1980: 85-86). This type of beard is comparable to that found on the Eighteenth Dynasty example of a bronze Osiris described by Hall (1930: Plate XLI, figure 3).

[61] Some Middle Kingdom examples of this half-smile can be seen in sculptures of Mentuhotep II found at Deir el-Bahari and the Osiride pillar statues of Senwosret I (see Aldred 1969: Plates 11-13).

5 FINDINGS OF THE INTERNAL INVESTIGATION

Thermal neutron radiography was performed on the NCHM Osiris. This was done at the SANRAD facility of the SAFARI-1 nuclear research reactor, operated by Necsa at Pelindaba. During the scanning process two dimensional or 2D photographic images were continuously captured and these can be viewed frame by frame as photo 'slices' cut through the statuette. This made it possible to study any internal features of the object more closely. Special computer software interpreted the data provided by the 2D pictures and reconstructed an accurate 3D tomography image of the object (Smith *et al* 2008: 83). The 2D photos revealed evidence of the manufacturing techniques used to produce the statuette – an aspect which had been open to speculation until the scans were performed. This new information, obtained by non-destructive means, played a major role in the authentication process of the Osiris.

The most obvious feature which was detected while studying the internal footage of the statuette was the presence of a single clay core. This is a typical characteristic of Egyptian hollow cast bronzes and it usually consists of sand, clay and other organic material (Ogden 2000: 158). Similar core material was also discovered inside a bronze Horus statue from the same collection as the NCHM Osiris (Smith *et al* 2008: 74). Figure 9 shows a cross section of the figurine during the scan. The dark gray area represents the inner core while the outer layers consist of bronze or copper alloy, textile, gold foil and the Plaster of Paris which was added later. It is also possible to see that the bronze layer has corroded into the core in some areas as the metal reacted to the organic material it was in contact with. This corrosion shows up as the lighter gray cluster in the photo.

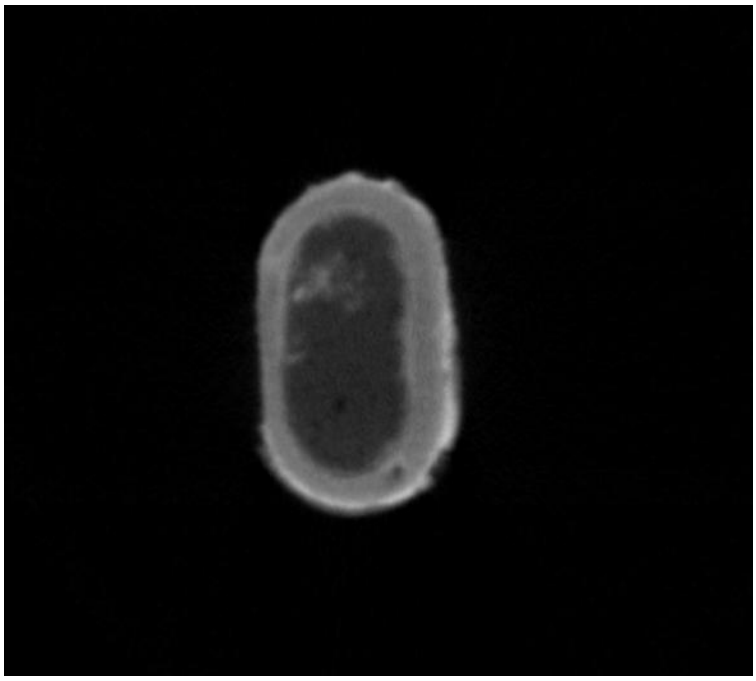

Figure 9: 2D image illustrating the surrounding bronze layer corroding into the clay core. This internal corrosion is reflected by the mottled gray cluster in the middle

(Courtesy of NCHM, Pretoria and Necsa)

Another important feature which was revealed on the scan images was the location of at least three clearly visible chaplets or core supports. These pins were originally used to keep the core in place during the casting process and were made from metal. Two of them show up clearly in Figure 10 as thin grey shapes penetrating into the core. This image also shows that the metal from the upper chaplet has started to corrode into the surrounding clay core. Importantly, this process only takes place over the course of centuries (Smith *et al* 2008: 89). Figure 11 provides a different perspective of all three chaplets, this time in 3D. They can be seen as long jutting shapes pointing inwards. For this image all the outer layers as well as the core was left out using computer software, leaving only the innermost bronze shell.

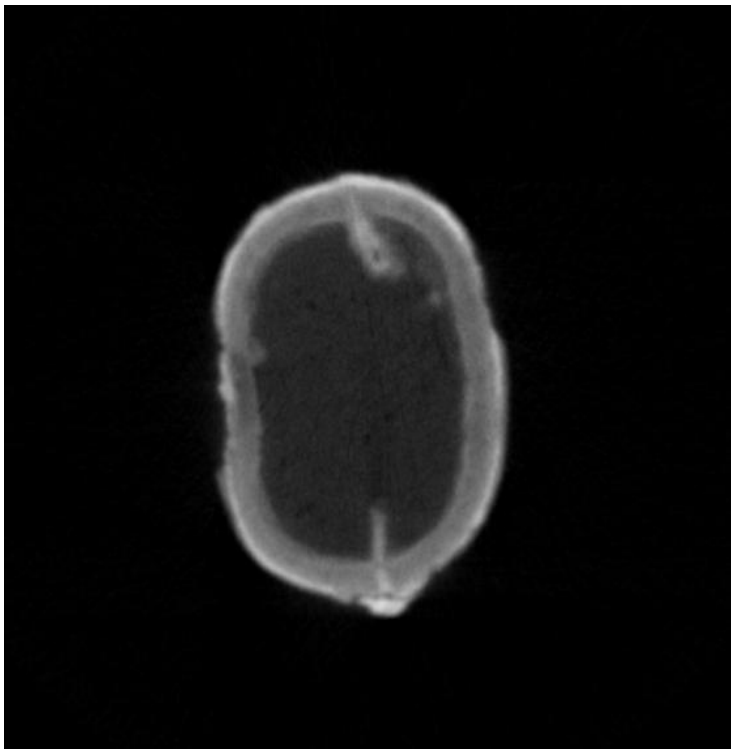

Figure 10: 2D image showing the location of two chaplets at figure's hip area

(Courtesy of NCHM, Pretoria and Necsa)

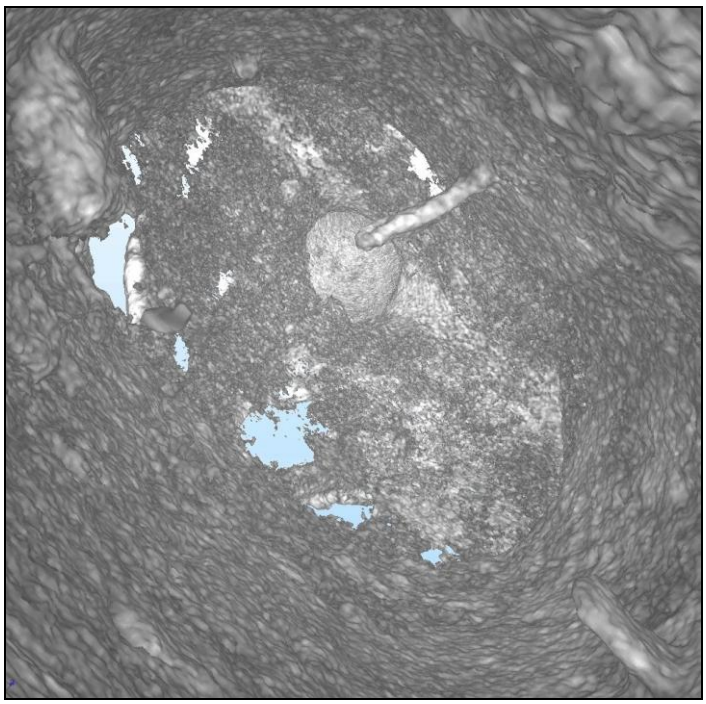

Figure 11: Reconstructed 3D image of statue's interior with all other layers removed. The three chaplets are visible in the top left corner, centre and bottom right corner (Courtesy of NCHM, Pretoria and Necsa)

The discovery of the core and metal chaplets supplied valuable information regarding the manufacturing techniques that were used to produce the statuette; it proved that the Osiris was cast using the lost-wax process. This involved covering a clay core (which is still present, Figure 9) with wax which was then modelled with decorative detail. Small metal pins were inserted through the wax to keep the core stable and the entire model was encased in a heat proof mould such as clay. This was fired so that the wax could melt and run out. The baked clay mould was then turned upside down so that molten metal could be poured into the resulting gap left between the core and outer mould. Once the bronze inside had cooled and solidified, the clay casing was broken away to reveal the statue. The opening or 'pouring point' of solidified metal became the tang which would be used to secure the statue to a base. This tang is still intact on the NCHM Osiris.

The craftsman removed any surface irregularities such as the chaplets that were used to secure the core, but remnants of these pins still remained inside the statuette where they were observed during neutron radiography (Figures 10 and 11). The final step in the manufacturing process was the application of gold leaf which was laid over a layer of textile and gesso. Crucially, the discovery of the severe mineralised condition of the chaplets may be regarded as the most convincing evidence of the figure's authenticity (Schorsch & Frantz 1997-98: 22). Furthermore it has been noted that fake Egyptian bronzes contain far more core supports than authentic works (Ogden 2000: 159).

The use of neutron radiography also provided useful information to museum conservators regarding the physical condition of the statuette. Tomography images showed severe

corrosion as well as weak areas that require special care when handled. The neck, for example, is extremely fragile. A combination of natural corrosion, careless handling since its discovery and modern day attempts at restoration using Plaster of Paris all contributed to the statuette's deterioration. Its condition is critical from a conservation point of view and a decision was made to limit unnecessary handling of the artefact. Conservation experts also advised against future restoration of the Osiris.

CONCLUSIONS

The aim of this study was to analyse the NCHM Osiris objectively in an attempt to verify its authenticity. If the result was positive, any additional information which could help in answering questions regarding the statuette's provenance, manufacture, function and age would also be required. The lack of archaeological context meant that alternative avenues had to be pursued to establish a relative date for the statuette. The investigation applied the study of metallurgical, iconographic and religious developments, stylistic analysis as well as internal examination. What follows is a summary of the most relevant findings.

(1) First of all it is believed that sufficient evidence was found to indicate that the NCHM Osiris is indeed an authentic ancient Egyptian bronze. In addition to the Egyptian Museum certificate (Appendix A) other findings support this statement: no traces of modern forgery could be detected but ample proof was found that confirmed the artefact's authenticity, such as the presence of a clay core, chaplets and the severe nature of the internal corrosion which could only happen in situ over a long period of time (Figures 9-11).

(2) As a result of the internal investigation done through neutron radiography, it can be stated with certainty that the statuette was hollow cast using the lost-wax technique. This conclusion is based on hidden internal features (the core and chaplets) which were only revealed by the tomography images. By interpreting these features with the established

indicators for the lost-wax method, it is possible to reconstruct the statuette's manufacturing process. A clay core (still concealed in the statue, Figure 9) was covered with wax and shaped to resemble the god Osiris, after which metal pins were inserted to keep the model secure. The figure was encased in a mould and heated until the wax ran out from an opening. This space left by the wax was then filled with molten metal, which was allowed to solidify. Finally the outer investment was broken away to reveal a bronze figurine. It is termed 'hollow cast' because the object's interior only contains a core and is not solid bronze right through. All the surface irregularities were polished away, except for sections of the core supports or chaplets which remained inside the statue. Their presence could only be detected with neutron radiography (see Figures 10 and 11). The application of gold foil onto a layer of gesso and textile can still be observed in places where the surface layer had corroded away. Lastly the statue's tang indicates where an open 'pouring point' was left in the mould to pour in molten metal.

(3) The NCHM Osiris was probably manufactured by a temple workshop at Memphis. This is supported by the location of the figure's beard close to its chest, which complies with the unique regional tradition of craftsmen from Lower Egypt. The position of the statuette's arms (held at the same level) however indicates a Middle Egyptian style. This may be explained by the possibility that a craftsman working in Memphis followed the artistic traditions of Middle Egypt when he modelled the Osiris.

(4) The figure's Memphite provenance is further reinforced by the research that revealed Osiris' connection with Ptah and the Apis bull cult in that area. Investigation into the

archaeological record at Memphis shows that excavations were also conducted in and around the area during the early 1940's, although it seems unlikely that the bronze came to light in this manner.

(5) It is possible that the NCHM Osiris could have functioned as a portable cult statue used in processions or other ritual temple performances. Its small size does not necessarily discount a possible cult function and the figure's golden appearance would also make it suitable for this purpose (gold being symbolic for the flesh of the gods). Nonetheless the statuette could easily be classed together with the vast corpus of so-called votives; the phenomenon of temple deposits indicate that the numerous small statues found in such foundation deposits probably had a much more complex function in that religious environment than being mere donations of wealthy patrons. In that context an individual may have had the figure dedicated at a temple or shrine in the hope that Osiris, as Lord of the Dead, will ensure a safe resurrection in the Afterlife.

(6) The Twelfth Dynasty, Middle Kingdom date provided on the certificate will remain problematic. Nevertheless, for the following reasons a Middle Kingdom provenance cannot be altogether dismissed:

- Intentional copper-tin alloys including bronze – although rare – did occur during this time in Egypt (Ogden 2000: 153).
- Hollow lost-wax castings were found among the bronzes of the Faiyum cache, dating from the Middle Kingdom (Taylor *et al* 1998: 10).

- Significantly, the Osiris cult rose to prominence during the Middle Kingdom and this was reflected in the changes in religion and funerary culture of that time (Grajetzki 2006: 57).

- The tang underneath the figure appears to be a rough, irregular shape. Rectangular tangs with flat ends only became the canonical form for post-New Kingdom works (Schorsch 2007: 193). Admittedly, the shape of the protrusion is not easily defined due to severe corrosion and the possibility remains that it could be from a later date.

All of the above must be weighed against evidence that discounts a Middle Kingdom date:

- Gilding of copper-alloy (and bronze) objects only became common from the late New Kingdom Period onward (Ogden 2000: 160).

- The vast majority of votive bronzes that have been recovered date from the Third Intermediate period and Late Period. Furthermore the Osiris cult enjoyed renewed interest during that time and large deposits of votive Osiris statuettes were excavated at Medinet Habu, Kharga Oasis and the Saqqara Sacred Animal Necropolis (Hill 2001: 207).

- Stylistic analysis produced limited results. Based on certain facial features of the statue, a tentative Late Period date (525-332 BC) could be indicated if factors such as elemental composition were to point to a post-Middle Kingdom provenance. It must be stressed though that deliberate archaism in sculpture was practiced during that time; the Eighteenth Dynasty was inspired by Middle Kingdom art while the

Twenty-fifth and Twenty-sixth Dynasties admired Twelfth Dynasty models (Kahl 2010: 6).

- Core supports or chaplets can be used as a dating tool for uninscribed statuary if they were found to be made of iron; chaplets of this type were only used from the Third Intermediate Period onward (Schorsch 2007: 193). It has not yet been established whether the chaplets from the NCHM Osiris do contain iron.

This study concludes with a provisional Middle Kingdom provenance for the statuette, keeping in mind that large gaps still exist in the established chronology of bronze statuary from that period up to the New Kingdom. As unlikely as it seems, it is quite possible that this gilded figure could be a hitherto unknown example of metal statuary from that time that fills such a break in the chronology. The result will remain subject to future findings which could certainly alter this date and place it more accurately. For the moment though it seems unlikely that any chemical analysis will be performed on the NCHM Osiris due to its very fragile condition. Further research on the other bronzes in the collection is also recommended by using the multidisciplinary approach suggested in this dissertation. At the very least it will highlight their cultural context.

In closing, it is hoped that the importance and research potential of neutron radiography as a non-destructive, internal investigative technique has been illustrated during the course of this study. None of the artefact's hidden features would have been detected if this technology had not been employed. It is strongly advised that future researchers will avail

themselves of this valuable tool when studying museum objects and metal statuary in particular.

APPENDIX A

CERTIFICATE OF AUTHENTICITY FOR GILDED BRONZE OSIRIS

Maguid Sameda

MAGUID SAMEDA
EGYPTIAN MUSEUM
LICENSE 108
CAIRO (Egypt

Cairo, Egypt. № 11415

I the undersigned, MAGUID SAMEDA, guarantee that the Bronze figure of God osires *sold by me To Mr* H. L. Bowyer

Date .... *19*45 *is Genuine.*

The object is of the 12th *Dynasty B.C.* 2000

Found at The City of memphis *Date* *19*

(MEMPHITE ART)

and was added to my collection of antiquities from Haharqua *19*

Interpretation of Art or the Heliographic inscription

God osires was seen by the first Egyptian as a God on earth

This Guarantee is given to ensure that the above described object can be examined at any of the world Museums.

No. 1, FUAD STREET
55 Shara Ibraheem Pasha Cairo

MAGUID SAMEDA
Egyptian Museum License No. 108
maguid Sameda

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