

# A Bronze Statuette of Thutmose III

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
THE EGYPTIAN ART DEPARTMENT of the Metropolitan Museum has recently acquired a small, beautifully poised bronze statuette of a king. It is stylistically datable to mid-Dynasty 18 and has on its belt traces of one of the names—Menkheperra—of Thutmose III, one of the greatest of Egypt's kings, renowned for his territorial and intellectual reach (Figure 1).<sup>1</sup> The statuette, the earliest known New Kingdom example of an important series of royal bronze statuettes in kneeling position, would have been used in a grouping with the image of a deity, possibly on a divine bark (a boat-shaped shrine carried by priests when the god made excursions outside the temple). The figure stands at the emergence of two important trends in Egyptian art and culture: the development of a clear bronze statuary tradition and an emphasis on the processional and public aspects of Egyptian religion.

## DESCRIPTION AND STYLISTIC INDICATIONS

The statuette is a solid cast “black bronze”—that is, a bronze intentionally darkened to heighten the luster of precious-metal details. In this case, the left eye socket, the cosmetic lines extending from both sockets, the right eyebrow, and the nipples retain the original gold lining or inlay. The gold in the right eye socket is a modern addition. Missing inlays in the brows and eyes might also have included stone, gold, and silver; and the uraeus might well have been gilded. The silvery-gray sheen to the statuette's dark color is associated with certain archaeological environments.<sup>2</sup>

The kneeling king rests his weight on his knees and toes. The left arm is missing, while the right arm is

held forward from the elbow. The cupped hand holds the small round *nw* pot associated with offerings of milk or wine. The mechanical joining of the arm to the dowel extending from the body has loosened, and the arm now swings downward and rests on his lap. When the edges of the arm and shoulder join are aligned, it can be seen that originally this arm was held up and forward, so that the pot was extended in front of the king's chest. For display purposes, a small insert has been placed in the dowel hole to hold the arm in approximately its proper position (Figure 2). The left arm would have held the same position.<sup>3</sup>

The figure wears the royal *khat* headdress (a smooth kerchief whose ends were drawn together and hung down behind the neck) and *shendyt* kilt (a finely pleated garment with a long front panel). Around his hips is a belt, somewhat wider in back than in front, with a pattern of horizontal zigzags. A rectangle at the front of the belt just below the navel contains traces of three hieroglyphic signs. Previously, these signs had been considered unresolved and the statuette assigned to the Third Intermediate Period (ca. 1070–712 B.C.) because the quality and the black-bronze alloy were still thought unusual before that era. Alternatively, the signs had been interpreted as *mn-hprw-r*, the prenomen of Thutmose IV (r. ca. 1401–1391 B.C.), whose kneeling bronze statuette in the British Museum was then the earliest known New Kingdom instance of the genre. But examination of the evidence with a binocular microscope reveals the following signs:   . These hieroglyphs form the name *mn-hpr-r*, though the signs are written in an unexpected order. The inscription will be discussed further below. Stylistic analysis indicates the figure should be identified as Thutmose III (ca. 1479–1425 B.C.), whose prenomen is *mn-hpr-r*, and precludes attribution to the Third Intermediate Period or in particular to the Theban High Priest of the same name in that era.

Elegance and grace, always inherent in the Egyptian

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Figure 1. Statuette of Thutmose III. Bronze, H. 13.6 cm. The Metropolitan Museum of Art, Purchase, Edith Perry Chapman Fund and Malcolm Hewitt Wiener Foundation Inc. Gift, 1995, 1995.21

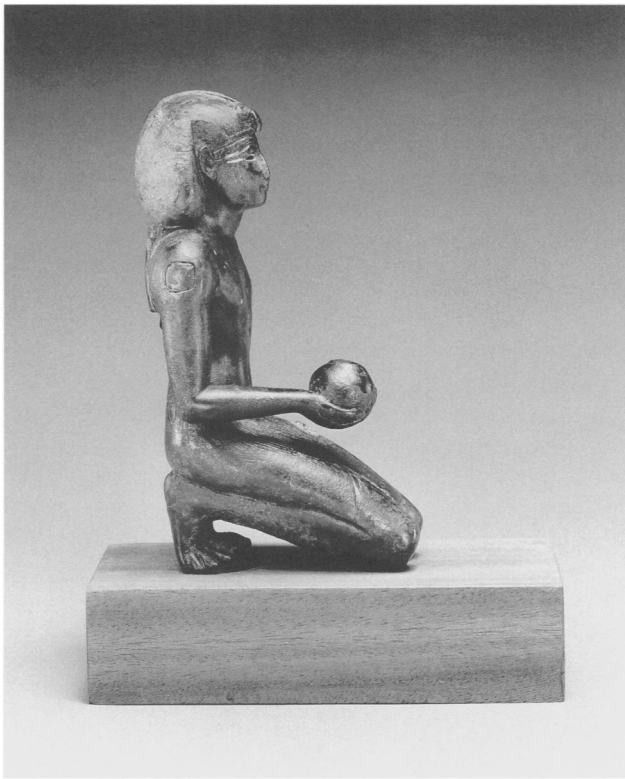


Figure 2. Proper right side of statuette in Figure 1

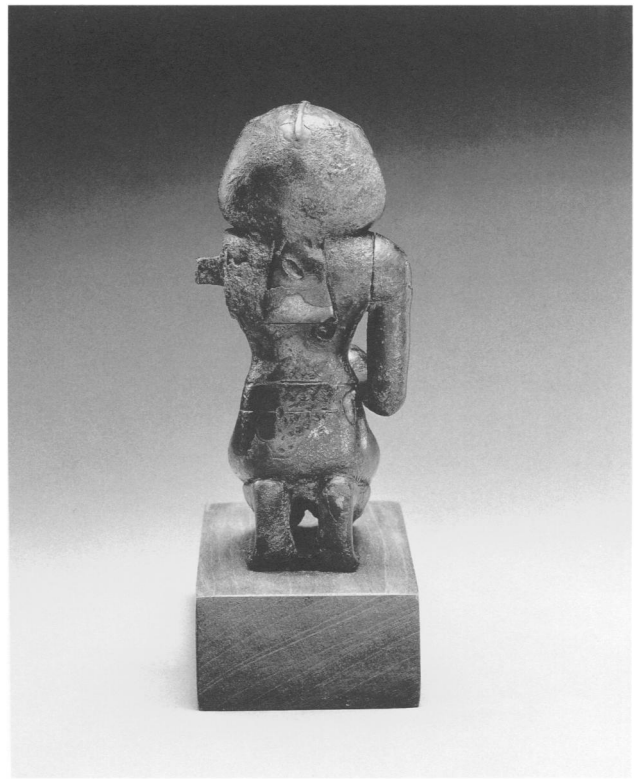


Figure 3. Back of statuette in Figure 1

kneeling pose, are fully expressed in this small bronze. The king has an athletic torso, as is generally favored by the kings of mid-Dynasty 18 (Figures 1, 2). The shoulders are emphasized and the limbs elongated to a greater degree than usual in stone statuary, following a tendency of bronze statuary to an attenuation of forms and to an emphasis on contours.<sup>4</sup> The chest shows defined clavicles, low and broadly spaced nipples, and a hint of bipartition; it passes smoothly into the abdomen with its round navel in a faint teardrop-shaped depression above the tapering belt. These features are in notable contrast to most Third Intermediate Period statuary, which is distinguished by the segmentation of the torso into upper chest, rounded and independent belly with a simple round navel depression, and lower torso.<sup>5</sup> The hips of the Museum's statuette are broad and, from the back, long and well shaped (Figure 3). A particularly good parallel for all these features is offered by the headless statuette of Thutmose III from the Luxor cachette, since that statuette originally wore an upright crown and thus the modeling of shoulders and chest is not obscured by lappets.<sup>6</sup>

The king's *khat* headdress swells in broad heavy curves where it is supported on either side on his

shoulders (Figure 4). In Eighteenth-Dynasty statuary the *khat* enjoyed great popularity with Hatshepsut (ca. 1473–1458 B.C.); it was less favored by her co-ruler and successor Thutmose III and his son Amenhotep II, and its popularity reached a low point in the reigns of Thutmose IV and Amenhotep III, before a



Figure 4. Detail of statuette in Figure 1



Figure 5. *Khat* headdress on head of an over-lifesize sandstone sphinx of Hatshepsut excavated at Deir el Bahri. Cairo, Egyptian Museum, JE 56263 (photo: Egyptian Expedition)

resurgence in the Amarna Period.<sup>7</sup> Though two previously known sculptural representations of Thutmose III in the *khat* are each in its way problematic, the headdress worn by our king is nearest, in shape and in the proportion between the wings of the headdress and the face, to the somewhat variable but always voluminous and heavy examples of the headdress worn by Hatshepsut (Figure 5).<sup>8</sup> The one assured instance of Amenhotep II wearing the *khat* shows a headdress resembling that of the bronze statuette, though already slightly narrower and smaller in proportion to the face.<sup>9</sup> A *shawabti* (funerary statuette) from the reign of Thutmose IV shows the narrower side flaps now accentuated by the heightened dome of the headdress.<sup>10</sup> By the time of the late Eighteenth Dynasty, the side flaps no longer rest their weight on the shoulders and sometimes fall in a long semi-elliptical shape; the headdress in the later New Kingdom and Third Intermediate Period follows this pattern (Figure 6).<sup>11</sup>

From the lower edge of the frontlet springs the

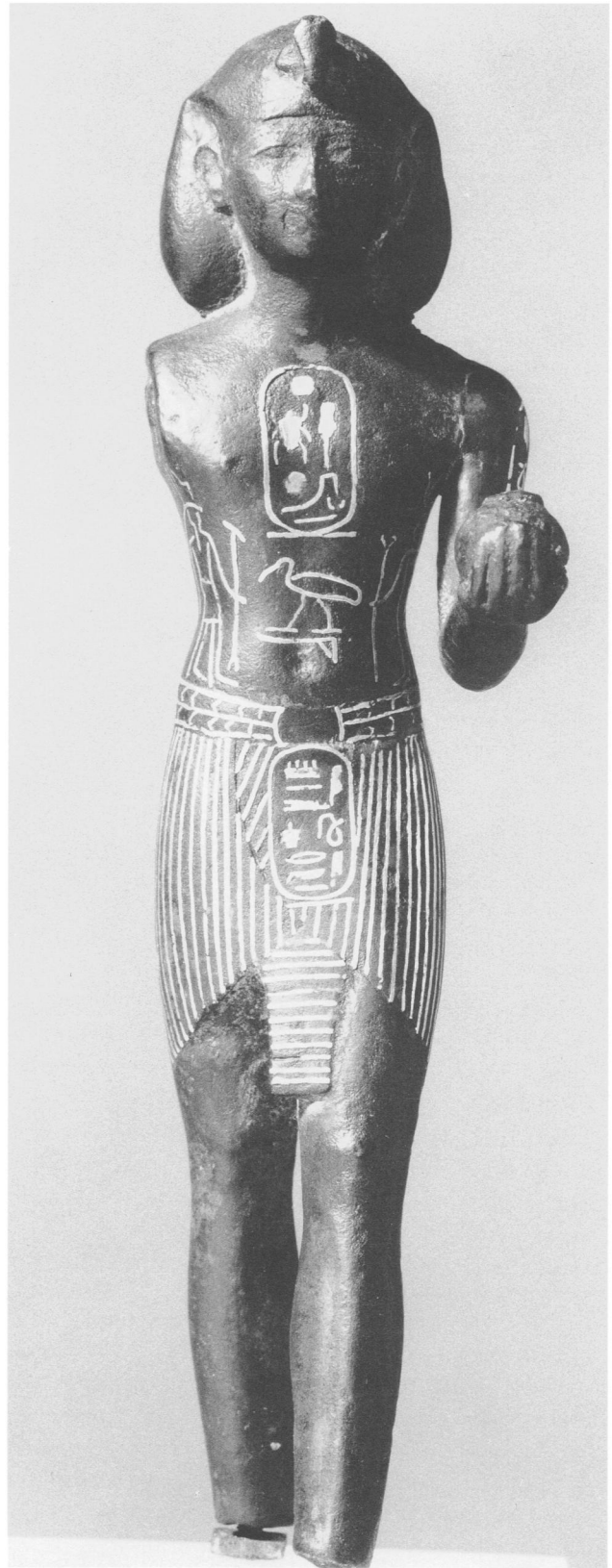


Figure 6. Statuette of Osorkon I, Dynasty 22 (ca. 924–889 B.C.) Bronze, H. 14 cm. The Brooklyn Museum of Art, 57.92 (photo: courtesy of The Brooklyn Museum of Art)



uraeus, a position that is most typical in mid-Dynasty 18, though slightly higher positions are occasionally found. During the Third Intermediate Period, by contrast, uraei appear above the upper edge of a frontlet that can be rather wide (Figure 6).<sup>12</sup> The cobra's head and hood are badly abraded. Its body is disposed in two asymmetric curves and then runs directly over the top of the king's head to the rear.

The king's face is broad at the cheeks and jaw, giving it a square or round appearance, not dissimilar to that of its nearest contemporary in bronze, the British Museum's statuette of Thutmose IV, whose jaw, however, is narrower (Figure 7). The earlobes are not pierced for earrings; such piercings are not found in royal statuary until the time of Akhenaten.<sup>13</sup> The eye sockets are quite level, although the effect of the gold lining in the absence of the eye inlays is to diminish their size. The brows follow a high arc from inner to outer edge of the eye, as is well attested for the period of Hatshepsut and Thutmose III.<sup>14</sup> By contrast, the brows of the British Museum bronze assume a straight line near the nose and curve only past the center of the eye as they move toward the outer edge of the face. In royal representations the flatter brow appears in the reign of Thutmose III, becomes very frequent with Amenhotep II,<sup>15</sup> and is the only type seen in the rather sparse representations of Thutmose IV—with the well-known exception of Cairo Egyptian Museum JE 43611, which displays the slanted eye and off-center arched brow foreshadowing that of Amenhotep III.<sup>16</sup>

The Metropolitan Museum's statuette is worn across the nose and mouth, but, while the original profile of the nose is not discernible, the contours of the mouth remain apparent. The visible features indicate well-balanced upper and lower lips rather than the slightly prominent upper lip known for Thutmose IV and visible in the British Museum bronze of that king (Figure 7).<sup>17</sup> Interestingly, the throat swells ever so slightly in the area of the Adam's apple (Figure 8), a feature occasionally found but especially strongly marked in the famous striding statue of Thutmose III wearing the Upper Egyptian crown.<sup>18</sup>

#### INSCRIPTION

The signs inscribed in the belt rectangle were not enclosed in a cartouche and are only faintly preserved.<sup>19</sup> Difficulties in resolving traces of the inscription, compounded with what turns out to be an atypical order of signs, had previously caused the signs to be conjecturally read as *mn-hprw-r*. Once the piece



Figure 7. Statuette of Thutmose IV, Dynasty 18 (ca. 1401–1391 B.C.) Bronze, H. 17 cm. The British Museum, no. 64564 (photo: courtesy of the Trustees of the British Museum)



Figure 8. Detail of head of statuette in Figure 1, proper left profile



Figure 9a. Photo of sign traces in the rectangle at the front of the belt of Figure 1 (photo: Bill Barrette)

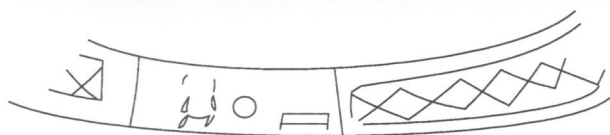


Figure 9b. Scan of Figure 9a with hieroglyphic traces drawn over. Prepared by James Allen and Barry Girsh

arrived at the Museum, however, careful study of the inscription with a binocular microscope indicated it should be reconstructed as reading from right to left *mn-r<sup>c</sup>-hpr*, a variant of *mn-hpr-r<sup>c</sup>*, the throne name of Thutmose III.<sup>20</sup>

Figure 9a shows a photograph of the rectangle at the front of the belt. Figure 9b shows the same photograph with the traces of signs connected to show the complete signs. The *mn* is quite clear, as is the roundness of the central sign, which therefore appears most like the *r<sup>c</sup>*-disk and not the *hpr*-beetle, and at the left the symmetrical disposition of four to six strokes about a space resolves into the *hpr*-beetle.

The overall layout of the inscription seems poor: the *mn* sign, at least, is below the center line of the inscription, though the *r<sup>c</sup>* sign is reasonably placed, and the *hpr* sign could be completed and extended farther upward; but the whole inscription is shifted to the right, leaving the left fifth of the rectangle apparently empty. It has been noted that inscriptions on bronze statuettes are frequently not well executed.<sup>21</sup> This fact

has not been studied for bronzes in general, but could depend on a variety of factors, including the stage at which the inscription was done: whether in the wax model, on the final casting, or even after the arms were attached to the body, thus making the area difficult to reach.

The use of the variant writing *mn-r<sup>c</sup>-hpr* is in itself interesting. The writing of Thutmose III's throne name with the *r<sup>c</sup>*-sign in the upper center is found occasionally on scarabs, and a group of these are datable to the Eighteenth Dynasty.<sup>22</sup> In the case of the statuette, however, the placement of the disk in the center might well be an example of honorific transposition to place the god's name in the center, reflecting the kneeling king's position directly opposite the god Amun-Ra.<sup>23</sup>

#### BRONZE ROYAL STATUARY

A number of recent review articles and studies have variously approached the problem of establishing a continuous history of copper-alloy and bronze statuary.<sup>24</sup>

The Museum's statuette is an object of very high quality, datable early in the New Kingdom, when the paucity of known bronze statuettes<sup>25</sup> has made it particularly difficult to explain the transition from the regular, if poorly studied, occurrence of copper-alloy statuary in the Middle Kingdom<sup>26</sup> to the well-established bronze statuary tradition of the Third Intermediate Period and later. Placed in sequence with other known or recently firmly dated royal New Kingdom examples,<sup>27</sup> the Museum's statuette can eventually help to identify other more or less contemporaneous bronzes. Moreover, because of its type and clear position early in the New Kingdom, it helps to bracket rather closely the period when important royal and temple roles for bronze statuary emerge—the late Middle Kingdom/early New Kingdom—and will aid us in refining our understanding of this development.

Kneeling figures belong to one of the few clearly interactive types found in Egyptian statuary. The royal kneeling pose expresses the respectful yet dignified role of the king, himself a god, in ensuring the continual worship of the gods. By its nature such statuary implies the presence of a juxtaposed god—whether or not the god is actually shown—and belongs quintessentially to temple contexts.

Kneeling royal offering statuary is an established though relatively rare type, beginning with Dynasty 4. Its real popularity, however, seems to begin with



Figure 10. The Amun bark as depicted on a block of the Chapelle Rouge of Hatshepsut, Karnak (photo: Dieter Arnold)

Hatshepsut and continues with fluctuations thereafter.<sup>28</sup> Large examples held either *nw* pots or a variety of other offerings for a god. They may have lined courts and processional ways, as they seem to have done at Deir el Bahri, or might even have been fixed in modular groupings with the statue of a god, such as the Eighteenth-Dynasty examples discovered in the Luxor cachette.<sup>29</sup> Also in the reigns of Hatshepsut and Thutmose III, royal kneeling statuettes, a type which seems to be first depicted in an isolated instance during the late Middle Kingdom on what may be a divine bark,<sup>30</sup> are shown as integral new elements of the bark processions of the god Amun, which are given a great new emphasis by these pharaohs (Figure 10).<sup>31</sup> The statuettes, presumably of metal or gilded wood,<sup>32</sup> hold *nw* pots toward the enshrined, shrouded image of the god; others, with outstretched hands, support the poles of the baldachin that shelters him. Thereafter, representations of such small statuettes are found regularly on the Theban barks; at Seti I's temple at Abydos they are also shown on the Osiris barks; and in the same

period they occur with other kinds of apparently portable cult emblems.<sup>33</sup> Our evidence about other New Kingdom portable barks and their appearance is limited, but they may well have incorporated similar groupings.<sup>34</sup>

Given the new interest in the type, the historically specific elaboration of bark representations that establish an entirely apt ritual context for this piece, and the apparent novelty and rarity of the small bronze specimens, it is appealing to think that the Museum's statuette might actually have belonged to a great divine bark.<sup>35</sup> Only more evidence and a better understanding of the evolution of practices and of their association with certain statuary types and materials can eventually further clarify the role of the bronze king.

Leaving aside these speculations, it remains highly interesting that the Museum's beautiful and rare statuette was made at a time of new emphasis on the king's role as intermediary and a new level of interest in the theatrics of religion. With its rich play of gold against black depths, this small bronze would have

been a strong visual presence in a cult composition rich in lustrous metallic and mineral hues.

#### A TECHNICAL OVERVIEW

The body of this figure is solid cast, as is the one surviving arm. There are three royal statuettes of comparable size and pose known from the New Kingdom: Thutmose IV in the British Museum (see Figure 7), the figure believed to be Tutankhamen in the University of Pennsylvania Museum, and one of Ramesses II in a private collection.<sup>36</sup> Each of these three figures is a hollow cast, but in the case of the Thutmose IV, the casting cavity is very small and does not conform to the contours of the sculpture.<sup>37</sup> The arms of the Metropolitan Museum's figure were attached to the body with square-section tenons extending from the shoulders (Figures 1–3); the ends of the tangs and the edges of the arms and shoulders were smeared by hammering in order to interlock the components. This mechanical joining method is frequently observed on Egyptian figural bronzes. The statuette originally was set into a base using the four tangs extending from the knees and feet (Figure 11). These tangs were bent in ancient times. In “mass-produced” bronzes of the Late Period, nearly all tangs used for this purpose are rectangular and of similar proportions; the very long, roundish tangs on the figure of Thutmose III reflect the less routine production of bronzes in the New Kingdom and Third Intermediate Period.

The eyes (and the nipples) of the figure have been highlighted with gold (Figure 4). The proper left eye socket is lined with gold sheet but only the outlines of the eyes would have appeared golden when the sockets were inlaid with stone or another material. Gold inlay survives in the proper right eyebrow, in the cosmetic lines where they extend from the eyes, and in both nipples. The gold in the proper right eye is a modern addition. No traces of inlay or of a bedding material survive in the eye sockets.

The body of the figure was analyzed using energy-dispersive X-ray spectroscopy (EDS) and found to be a low-tin bronze with a substantial amount of gold and small amounts of silver and arsenic.<sup>38</sup> A small amount of arsenic is often detected in New Kingdom bronzes, although by this time copper-arsenic alloys were seldom produced intentionally. Few securely dated figural New Kingdom bronzes are known, and most have not been analyzed; the available evidence suggests that the absence of lead may be typical of those datable to the New Kingdom. Overall, the alloy is sim-



Figure 11. Detail of statuette in Figure 1. Total extended length of front tangs ca. 3 cm, rear tangs ca. 4.5 cm

ilar to alloys of Eighteenth Dynasty and later New Kingdom “black bronzes,” such as the Tutankhamen in the University Museum,<sup>39</sup> and a shallow dish with inlaid Nilotic motifs in the Metropolitan Museum.<sup>40</sup> Typically the alloy was used to create bronzes whose matte black surfaces would contrast with the colors and sheen of inlays of other metals: gold, silver, electrum, copper, and inlaid bronze. This was first recognized by John Cooney, who identified *ḥmty-km*, known from hieroglyphic texts of the early New Kingdom, as the Egyptian term for inlaid black-patinated bronzes.<sup>41</sup>

Black bronzes contain a small but essential amount of gold, and often silver, which allows the metal to develop a black cuprite layer when it is chemically treated.<sup>42</sup> Cuprite is a copper oxide [ $\text{Cu}_2\text{O}$ ] familiar to many as the red corrosion product almost invariably present on archaeological copper-alloy artifacts. It has been proposed that the alteration of the color from red to black is caused by gold particles in the cuprite layer.<sup>43</sup> Gold does not occur naturally in copper or tin ores, and its presence in copper alloys represents an intentional addition. In nontechnical literature surfaces of black bronzes have long been mistakenly described as “nielloed.” Niello is a black, artificially produced sulfide used to inlay metal surfaces. Its earliest uncontested occurrence is known from the Roman period.<sup>44</sup>



It is possible that the technique of alloying copper with gold to produce black bronzes came into use in Egypt and other regions of the Mediterranean as early as the first half of the second millennium B.C.<sup>45</sup> Two of the copper-alloy figures from a group said to be from the Faiyum may be the earliest examples of Egyptian black bronzes. The first is a late Middle Kingdom kneeling royal figure in the Ortiz collection, often identified as Amenemhat III.<sup>46</sup> The figure, which has a black surface that was partly overlaid with gold and silver sheet, was recently analyzed and its black color established as intentional and due to the presence of gold in the alloy.<sup>47</sup> The alloy of the second piece, an inlaid black-bronze crocodile in the Staatliche Ägyptische Sammlung in Munich,<sup>48</sup> was analyzed by Josef Riederer some years ago, but gold was not among the elements routinely quantified in his studies;<sup>49</sup> it was recently reanalyzed and found to contain gold.<sup>50</sup>

There are scattered examples of possible black bronzes dated to the earlier New Kingdom. From the burial of Ahhotep, of the beginning of the Eighteenth Dynasty, there are several inlaid cupreous objects with dark surface patinations that could well have been artificially produced through the chemical treatment of an alloy containing a small amount of gold, but in these cases neither the surfaces nor the alloys have been investigated. The Metropolitan Museum's figure of Thutmose III represents the earliest securely dated New Kingdom occurrence of this process confirmed by scientific study.<sup>51</sup>

Overall the figure of Thutmose III is in good condition. It has suffered abrasion to the face and the uraeus (Figure 4), and the linear details on the belt rectangle and the belt itself are poorly preserved (Figure 9a). In modern times a blunt instrument penetrated the figure's back in several places (Figure 3). The existing arm is loose on its tenon, and a wedge has been added to hold it in its original position.

The figure has been cleaned but still retains a fair amount of its archaeological corrosion. Burial accretions can be observed on the underside between the legs. The corrosion crust is heterogeneous, containing typical archaeological copper corrosion products such as malachite  $[\text{Cu}_2(\text{CO}_3)_2]$ , atacamite  $[\text{Cu}_2(\text{OH})_3\text{Cl}]$  and cuprite, as well as less common compounds such as chalcocite  $[\text{Cu}_2\text{S}]$  and tenorite  $[\text{CuO}]$ .<sup>52</sup> The corrosion products observed on the surface include those associated with both anaerobic and aerobic conditions and with saline and nonsaline conditions. It is the presence of chalcocite that lends the figure its distinctive silvery surface. When the surface cleaned of its massive corrosion is viewed under magnification, one observes casting dendrites delineated in black and silver.

As a rule, archaeological sulfide corrosion products are not common on cupreous artifacts. In cases where copper sulfides such as chalcocite have been identified, the artifacts had been recovered from wet anaerobic environments.<sup>53</sup> Generally the chalcocite is observed directly on the surface of the metal, and carbonates, oxides, and chlorides are not present. Tenorite, which usually results from the oxidation of copper at elevated temperatures, has not frequently been reported as a massive corrosion product on archaeological copper alloys, but it has been detected on artificially patinated black bronzes on several occasions.<sup>54</sup> It is not clear if the formation of this complex assortment of corrosion products relates to the presence of the artificially induced black corrosion film on the surface of the bronze before it entered its burial environment or if it is the result of changing conditions in the environment or environments in which the figure was preserved during the more than three thousand years that have passed since the time of its manufacture.

## NOTES

1. MMA, acc. no. 1995.21; Purchase, Edith Perry Chapman Fund and Malcolm Hewitt Wiener Foundation Inc. Gift, 1995; H. 13.6 cm, excluding deformed tangs, which add ca. 3.5 cm maximum; published in *MMAB* 53/2 (Fall 1995) p. 6. I would like to thank Dorothea Arnold and James Allen of the Department of Egyptian Art and Deborah Schorsch of the Sherman Fairchild Center for Objects Conservation for very helpful discussions regarding this object and this article. For Thutmose III, see Donald B. Redford, "Thutmose III," in Wolfgang Helck and Eberhard Otto, eds., *Lexikon der Ägyptologie* (hereafter *LÄ*) 6, cols. 539–548 (Wiesbaden, 1972–86).

2. See the technical appendix by Deborah Schorsch regarding black bronzes generally and the silvery patina of this statuette in particular.

3. Stone statues rest the offering pots on their knees. The raised position with level forearms is also seen in the Thutmose IV bronze illustrated here (Figure 7). Kushite bronze kings seem to hold the pots even higher, at breast height (Paris, Louvre, E25276; Copenhagen, Ny Carlsberg Glyptotek, 605; Sotheby's, New York, sale Dec. 9, 1991, lot 116), and offering bronzes with the names of Necho II (Boston, Museum of Fine Arts, 1970.637) and Amasis (New York, MMA, acc. no. 35.9.3) hold the forearms parallel to though not touching the thighs, and therefore the pots are quite low, similar to those seen in stone statuary.

4. With respect to the width of the upper arms, the shoulder dowels required to affix the separately cast arms may be a factor. The attenuation is similar to that of wood statuary.

5. Cyril Aldred, "The Carnarvon Statue of Amun," *Journal of Egyptian Archaeology* 42 (1956) p. 7.
6. Mohammed el-Saghir, *Das Statuenversteck im Luxortempel* (Mainz, 1992) pp. 69–70.
7. Marianne Eaton-Krauss, "The *Khat* Headdress to the End of the Amarna Period," *Studien zur altägyptischen Kultur* 5 (1977) pp. 21–39.
8. In fact, by far the largest number of examples listed by Eaton-Krauss, "The *Khat*," before the Amarna Period show Hatshepsut. She lists (p. 36) one example inscribed for Thutmose III (Warsaw, 141267), a sphinx with the heavy, wide headdress thrown back over its shoulders. Another example, assigned simply to a Thutmoside pharaoh (Naples 1072), wears a long, apparently heavy, but unfortunately damaged *khat*; the statue probably represents Thutmose III to judge from the roundness of the face and the working of the throat area and Adam's apple (H. W. Müller photos in the Egyptian Department archives).
9. Cairo, Egyptian Museum, CG 42077: The resulting higher center of gravity is particularly clear in Edward B. Terrace and Henry G. Fischer, *Treasures from the Cairo Museum* (London, 1970) colorpl. v. A partial head (Edinburgh, Royal Scottish Museum 1951.346; well illustrated in Cyril Aldred, "The Statue Head of a Thutmoside Pharaoh," *Journal of Egyptian Archaeology* 39 [1963] pp. 48–49), which may well be Amenhotep II, is damaged in the area of the headdress, although it seems to have been rather full but again with a higher center of gravity.
10. Boston, Museum of Fine Arts, 03.1100; illustrated in Arne Eggebrecht, ed., *Ägyptens Aufstieg zur Weltmacht* (Mainz, 1987) p. 360.
11. In late Dynasty 18 the *khat* narrows and rises, echoing the oval contours of the face (numerous examples are cited by Eaton-Krauss, "The *Khat*"; Geoffrey Martin, *The Royal Tomb at el-'Amarna* [London, 1974] p. 39, presents a large group of Akhenaten's *shawabti*s wearing the *khat*). This shape continues in Dynasty 19 (see, for example, Tom Phillips, ed., *Africa: The Art of a Continent* [New York, 1996] p. 88, no. 1.50, the guardian figure of Ramesses I). The narrow shape is retained through the Third Intermediate Period (Osorkon I, The Brooklyn Museum, 57.92; see Figure 6 here), with occasional shorter versions (Osorkon II, Cairo, Egyptian Museum, CG 42197; well illustrated in Edna R. Russmann, *Egyptian Sculpture: Cairo and Luxor* [Austin, 1989] p. 156) or somewhat more weighted versions (the bronze statuette of Ramesses II referred to in note 27 below). A stone statuette attributed to Psamtik II in a New York private collection wears a *khat* of narrow, long conformation.
12. For a good range of examples from mid-Dynasty 18, see the articles cited in notes 14–16 regarding individual kings. For uraei in the Third Intermediate Period, see Figure 6 here or Philadelphia, University Museum, E 16199, in Bernard V. Bothmer, "Membris dispersa III: The Philadelphia-Cairo Statue of Osorkon II," *Journal of Egyptian Archaeology* 46 (1960) pl. 3.
13. See, however, the bronze head possibly representing Amenhotep III referred to in note 27 below. Earring holes are very often shown on statuary through the Third Intermediate Period, and then not thereafter; there are, however, representations of Kushite kings wearing ear ornaments (Edna R. Russmann, *The Representation of the King in the Egyptian XXVth Dynasty* [Brooklyn, 1974] pp. 25–26).
14. For example, the MMA's statues of Hatshepsut, some of which are illustrated in W. C. Hayes, *The Scepter of Egypt* II (2nd ed., New York, 1990) figs. 49–55; for Thutmose III, Cairo, Egyptian Museum, CG 42053, well visible in Biri Faye, "Tuthmoside Studies," *Mitteilungen des Deutschen Archäologischen Instituts, Kairo* 51 (1995) pl. 5c, and many other examples.
15. A brow of this type may be seen in the white limestone face of Thutmose III (Cairo, Egyptian Museum, JE 90237; well illustrated in Faye, "Tuthmoside Studies," pl. 9c and discussed p. 19) and, alongside slightly curved versions, appears regularly with Amenhotep II (see Hourig Sourouzian, "A Bust of Amenhotep II at the Kimbell Art Museum," *Journal of the American Research Center in Egypt* 28 [1991] p. 65 and passim).
16. Betsy M. Bryan, "Portrait Sculpture of Thutmose IV," *Journal of the American Research Center in Egypt* 24 (1987) pp. 3–20. It may be that the brows of Louvre E 13889 curve downward ever so slightly near the bridge of the nose.
17. *Ibid.*, p. 20.
18. Cairo, Egyptian Museum, CG 42053; the feature is visible in Russmann, *Egyptian Sculpture*, p. 90.
19. The British Museum bronze of Thutmose IV (see Figure 7 here) likewise shows name signs enclosed only by the rectangle, with no encircling cartouche. Bertrand Jaeger has shown that even in mid-Dynasty 18 scarabs are quite frequently inscribed with unenclosed royal names (*Essai de classification et datation des scarabées Menkhéperré* [Göttingen, 1982] p. 40).
20. This reading was established by James Allen.
21. E.g., Boston, Museum of Fine Arts, 1977.16; see Edna R. Russmann, "An Egyptian Royal Statuette of the Eighth Century B.C.," in W.K. Simpson and W.M. Davis, eds., *Studies in Ancient Egypt, the Aegean, and the Sudan* (Boston, 1981) p. 151, fig. 5, and n. 11. Still, the inscription on that statue is centered and the spacing appropriate.
22. See Jaeger, *Essai*, chart of writing variants, p. 29, nos. 9, 10, and 13, for variants with the disk centrally located; especially those in group 10 are datable to the 18th Dynasty and his no. 864a (see ill. 480 on p. 166), for example, is even more closely datable as a joint issue of Thutmose III and Amenhotep II.
23. Henry G. Fischer, "Hieroglyphen," in *LÄ* 3, cols. 1190–1191, discusses honorific transposition; he has not noted a case such as this, but its occurrence does not at all surprise him (personal communication). The transposition seen here fits the tendency of this time to a special emphasis on the god Amun, manifested, for example, in cryptographic elaborations (see Jaeger, *Essai*, p. 94).
24. Copper alloy is the proper term for the group of cupreous alloy statuary as a whole or for statues whose exact alloy is unknown. Bronze, an alloy of copper and tin, is used conventionally for the New Kingdom and later periods when that alloy predominates. Historical reviews are given by Christiane Ziegler, "Les arts du métal à la Troisième Période Intermédiaire," pp. 85–101, in *Tanis: L'or des pharaons*, exh. cat., Grand Palais (Paris, 1987); idem, "Jalons pour une histoire de l'art égyptien: La statuaire de métal au Musée du Louvre," *Revue du Louvre* 1996–1, pp. 29–38; Robert S. Bianchi, "Egyptian Metal Statuary of the Third Intermediate Period (Circa 1070–656 B.C.), from Its Egyptian Antecedents to Its Samian Examples," pp. 61–84, in *Small Bronze Sculpture from the Ancient World* (Malibu, 1990); Eleni Vassilika, "Egyptian Bronze Sculpture Before the Late Period," in *Chief of Seers: Egyptian Studies in Memory of Cyril Aldred* (London, forthcoming). An important listing of Middle Kingdom copper-alloy statuettes is given by James Romano, "A Statuette of a Royal Mother and Child in the Brooklyn Museum,"

*Mitteilungen des Deutschen Archäologischen Instituts, Kairo* 48 (1992) pp. 131–143. Composition studies, of course, also help to give information about the dating of metal statuary, but the matter is complicated. Vassilika's article, kindly provided in typescript, does a very good job of representing the technological complexities.

25. Only a very few examples of private or divine statuary have been identified from the Second Intermediate Period or early New Kingdom (see Ziegler, "Jalons," pp. 29–31, for discussion; also MMA, acc. no. 26.7.1413, published in Hayes, *The Scepter* II, fig. 30, is actually bronze [1991 analysis]). Small royal statuettes forming part of cult equipment, some of which (a censer, for example) may be of bronze, are represented in reliefs of Thutmose III (B. Porter and R. Moss, *Topographical Bibliography of Ancient Egyptian Hieroglyphic Texts, Reliefs, and Paintings*, II, 2nd ed. [Oxford, 1972], 123 [426] and [432]), but the statuettes shown in the private tombs of mid-Dynasty 18 are not, it seems, bronze (tomb 73, Amenhotep[?], temp. Hatshepsut, idem, I, 2nd ed. [1960], part 1, p. 143 [3]; tomb 100, Rekhmire, temp. TIII/AII, idem, I, p. 209 [7]; tomb 93, Kenamun, temp. Amenhotep II, idem, I, p. 191). Wolfgang Helck, *Material zur Wirtschaftsgeschichte des Neuen Reiches*, part 6 (Mainz, 1969) pp. 33, 40, does list bronze statue(tte)s, one denoted as royal, of the period of Hatshepsut and Thutmose III. That examples were melted down, and that many—kings and deities especially—remain unrecognized seems likely. We tend to infer from varied collateral evidence (the gathering momentum at the end of the Middle Kingdom, the frequently cited evidence of bronze-working skill, and the growing presence of sometimes elaborate bronze implements and utensils in the New Kingdom, or, again, the numbers of statuettes known starting with the Third Intermediate Period) that numerous statuettes ought to have been made; religious, social, economic, or other factors that might affect this scenario need to be considered.

26. The history of copper-alloy statuary begins with the large hammered copper statues from Hierakonpolis of Pepi I of Dynasty 6 and a smaller accompanying figure. Small cast copper-alloy statuary of male and female private persons appears from perhaps the First Intermediate Period and surely the Middle Kingdom; very few pieces are excavated, but stylistically they seem to span this interval. (Romano, "A Statuette," provides a very good list in his n. 10. I can add a few pieces and remarks: Athens 3365 is published in *The World of Egypt in the National Archaeological Museum* [Athens, 1995] p. 111, as also in Friedrich W. von Bissing, "Ägyptische Bronze- und Kupferfiguren des Mittleren Reichs," *Kaiserl. Dt. Arch. Inst., Athenische Abt. Mitteilungen* 38 [1913] figs. 1, 2, pl. x; four additional First Intermediate Period or Middle Kingdom small figurines in Berlin are inv. nos. 14054, 15080, 17958, 23703, *Ägyptisches Museum Berlin* [1967] cat. nos. 317, 319–321; Berlin 2/77 is now illustrated in *Ägyptisches Museum Berlin* [1981] p. 98; and for Ashmolean, E 2208, see John Garstang, *El Arabah* [1901] p. 7, pl. ix; in the Fitzwilliam is a man, E. 4.1926; a copper figure in a private collection on loan to the Museum of Fine Arts, Boston, was called to my attention by Peter Lacovara, see Christie's London, Dec. 9, 1992, lot 146.) Clearly datable to the later Middle Kingdom are small examples of royal statuary. An incense burner with a prostrate figure of a king Senwosret on the lid is in Cairo: Egyptian Museum, JE 35687. According to Henry G. Fischer ("Prostrate Figures of Egyptian Kings," *University Museum Bulletin* [March 1956] pp. 26–42, fig. 16) the king most resembles Senwosret III, or could possibly be a Dynasty 13 king of the same name. The piece was found in a redeposited location at Deir el-Ballas (Peter Lacovara, "The Hearst Excavations at Deir el-Ballas: The Eighteenth Dynasty Town," p. 120 n. 1, in *Studies in*

*Ancient Egypt, the Aegean, and the Sudan*). A Brooklyn statuette is attributable to a princess Sobekhotep of Dynasty 13 (BMA 43.137; Romano, "A Statuette"). A nursing woman and child (Berlin, 14078) may belong to the same period and may actually be an early bronze of a deity (see Romano, "A Statuette," pp. 138–142). The startling group of large copper alloy/bronze statues of important courtiers and royalty, including the first kneeling copper-alloy (in fact, black bronze; see the discussion in the technical overview here) statuette of a king, considerably larger than the statuette of Thutmose III, are, of course, the major examples. The largest part of the group is illustrated as nos. 33–37 in George Ortiz, *In Pursuit of the Absolute: Art of the Ancient World. The George Ortiz Collection*, rev. ed. (London, 1996). The other associated bronze/copper-alloy statues are a striding king, an official, and a crocodile in the Staatliche Sammlung Ägyptischer Kunst München, an official in the Musée du Louvre, and a queen's wig in a private collection in Geneva; see Ortiz, *In Pursuit*, n. 6 on unnumbered page preceding no. 33 for references.

27. Besides this piece: a sphinx of Menkheperia in the Louvre (E 10897) may belong to this king (Ziegler, "Jalons," pp. 31–32 and n. 28, refers to the stylistic ambiguity of this piece and announces technical studies that may help to clarify its position); kneeling Thutmose IV (Figure 7), British Museum 64564 (see Bryan, "Portrait Sculpture," p. 20, for references); head possibly of Amenhotep III, Fitzwilliam E.G.A. 4504.1943 (Eleni Vassilika, *Egyptian Art* [Cambridge, 1995] p. 54); kneeling "Tutankhamun," The University Museum, Philadelphia, E14295 (Bernard Fishman and Stewart J. Fleming, "A Bronze Figure of Tutankhamun: Technical Studies," *Archaeometry* 22/1 [1980] pp. 81–86; for a brief updated consideration of this piece, see Marsha Hill, catalogue entry in *Searching for Ancient Egypt: Art, Architecture, and Artifacts from the University of Pennsylvania Museum*, forthcoming); kneeling Ramesses II in a private collection in New York (not the same as the piece on the art market referred to by Ziegler, "Jalons," p. 29); torso of Ramesses V, Fitzwilliam 213.1954 (Vassilika, "Egyptian Bronze Sculpture," p. 6). The upper part of a sometimes cited Ramesses IV (as in H. Garland and C. O. Bannister, *Ancient Egyptian Metallurgy* [London, 1927] figs. 2, 16; also the same piece labeled as Ramesses VI was noted by Nicholas Reeves in New York, Parke-Bernet, April 15, 1942, lot 251) is actually Osorkon II (Jean Yoyotte, *Kémi* 21 [1971] pp. 47–48). A variously cited Ramesses IX/X/XI from the Michailidis Collection may not be correct (see Ziegler, "Jalons," comments on p. 29 and n. 16). I am not including bronze *shawabtis*, which seem to me to form a separate category.

28. While not completely exhaustive or up-to-date, Hartwig Altenmüller, "Königsplastik," *LÄ* 3, cols. 568–580, provides a useful overview. After very rare examples in the Old Kingdom and First Intermediate Period, kneeling statues holding *nw* pots are known for most of the Dynasty 12 kings, for instance. But Hatshepsut probably had at least eight colossal examples at Deir el Bahri, which could have stood in the peristyle court outside the sanctuary. Moreover, she begins the proliferation of types of offerings by creating at least twelve smaller examples holding a single round libation vessel with a *djed* symbol (Department of Egyptian Art archives: Herbert E. Winlock, Egyptian Expedition Theban Excavation Notebook 8: Temple Sculpture, pp. 160, 205). Interestingly, kneeling private statuary proffering emblems or other items has its origins also in the early 18th Dynasty, as pointed out by Edna R. Russmann, "The Statue of Amenemope-em-hat," *MMJ* 8 (1973) p. 38 and n. 16.

29. See the example of Horemhab, M. el-Saghir, *Das Statuenversteck*, pp. 35–40.

30. The king wears the *khat* and seems to support a baldachin(?) pole on a curved deck (W. M. F. Petrie et al., *The Labyrinth, Gerzeh and Mazguneh* [London, 1912] p. 32 and pl. 29 upper right), noted in Marianne Eaton-Krauss, “Statuendarstellung,” *LÄ* 5, col. 1263 and n. 19).

31. Egyptian gods had traveled on important journeys by river bark since very early, and portable barks for land travel were a metaphorical extension from rather early on (see Kenneth Kitchen, “Barke,” *LÄ* 1, cols. 619–625). The portable bark and therefore processional aspects of the Amun cult at Karnak seem to be attested from the time of Senwosret I by the existence of a bark station of that king bearing perhaps a ruined representation of the bark it sheltered (Claude Traunecker, “Rapport préliminaire sur la chapelle de Sésostris I<sup>er</sup> découverte dans le IX<sup>e</sup> pylône,” in *Karnak VII* [Paris, 1982] pp. 121–126). However, a survey of the development of the Amun bark in representations (pp. 77–85 and plates of Claude Traunecker et al., *La Chapelle d'Achôris à Karnak II* [Paris, 1981]; now supplemented by a detailed study by Christina Karlhausen, “L'Évolution de la barque processionnelle d'Amon à la 18<sup>e</sup> Dynastie,” *Revue d'Égyptologie* 46 [1995] pp. 129–137, which contains important insights) shows that at the beginning of the New Kingdom in the bark station of Amenhotep I, the Amun bark is depicted as extremely simple and without the complement of royal figurines except for the striding sphinx standard, but with Hatshepsut and Thutmose III a change occurs. These pharaohs, who built temples and refurbished cults throughout the country, began a new era of Theban cult elaboration. They emphasized the processional route from Karnak to Deir el Bahri with bark stations between and bark shrines within the temples (excavations of the Thutmose III temple site have yielded many fragments of relief depicting barks, see Hubert J. Górski, “La Barque d'Amon dans la décoration du temple de Thoutmosis III à Deir el-Bahari,” *Mitteilungen des Deutschen Archäologischen Instituts, Kairo* 46 [1990] pp. 99–112; and the Polish Mission, reported in *Egyptian Archaeology* 7 [1995] p. 12, has determined that the temple incorporated a bark shrine). And in depictions from the time of Hatshepsut the bridge of the bark begins to be peopled, with kneeling kings holding *nw* pots and sphinxes with libation vessels in the first grouping introduced (Traunecker, *La Chapelle*, p. 77, has misunderstood as standing the royal figurine whose lower part is blocked by a sphinx; its proportions make this impossible; see Karlhausen, *ibid.*, p. 121, for a possible earlier example). It is quite difficult to judge from published photos, and the degree of correlation between actuality and representation is problematic in any case, but it seems that, while usually the *nemes* is shown, in at least two instances these earliest small kneeling offering kings may have worn the *khat* headdress: see Górski, “La Barque,” fig. 1, where the king's headdress was apparently understood by restorers as monochrome like the *khat* and painted yellow, unless paint is simply missing as in fig. 2, and in the same article the Clandeboye Hall block, pl. 29d (photo actually switched with 29c), where the tail of the headdress is the tail of the *khat* and not the *nemes*. Pictorial evidence regarding the barks of the Abydene gods is available from the time of Seti I, but, so far, not before (Amice M. Calverley and Myrtle Broome, *The Temple of King Sethos I at Abydos* [London/Chicago, 1933–58]).

32. Stone and faience, the former heavy and both brittle, seem dubious candidates. Wood would be suitable, was probably used, and has not survived. There is a tradition of rich metallic and col-

oristic decoration on barks; see, for example, the description of the Osiris bark in the Ikhnofret stela (Berlin, Ägyptisches Museum, 1204). Because bronze royal figurines could be associated with what is thought to have been the remains of a ritual bark of Amun from Dynasty 25 at Kawa (F. Laming Macadam, *The Temples of Kawa II* [London, 1955] pp. 243–244), and because bronze striding sphinxes on standards—a type rather specifically associated with barks—are dated to Dynasty 19 (Brooklyn Museum of Art, 61.20; Richard Fazzini, *Images for Eternity* [Brooklyn, 1975] p. 92) and known from Dynasty 25 (e.g., Louvre E 3916 of Taharqa), it is reasonable to assume that some of the bark statuary of Dynasty 18 might be of bronze. There is no representation of the bark with color before the time of Haremhab's refurbishment of Thutmose III's Deir el Bahri temple (see Górski, “La Barque,” figs. 1, 2), and in those of Seti I at Abydos yellow and white are the colors of the statuary (Calverley and Broome, *The Temple*; in fact, both groupings on the bark [e.g., I, pl. 7] and about the Osiris emblem [I, pl. 11] are shown); gold and silver, and possibly bronze, but not black bronze, seem to be implied.

33. H. E. Winlock, *Bas-Reliefs from the Temple of Rameses I at Abydos* (New York, 1921) pls. II, III; Calverley and Broome, *The Temple I*, pl. 11, for example.

34. See note 30 and general references in note 31; also see Christina Karlhausen, “Une Barque d'Ahmès-Néfertari à Louxor?” *Studien zur altägyptischen Kultur* 23 (1996) pp. 217–225 and n. 3.

35. The suggestivity of these coincidental factors is enhanced by the fact that ideas of fairly specific, if perhaps rather labored, translation between relief, statuary and actual ritual seem to be abroad in the 18th and early 19th Dynasties, even if their degree is difficult to gauge. The phenomenon could, of course, go back further and we simply have no evidence; it could also be related to the building of large stone temples and general elaboration of state cults in the New Kingdom. Hourig Sourouzian, writing chiefly in regard to large stone or wood cult statuary during this period, has carefully laid out the question of correlations between actual statuary and relief depictions of rituals, enumerating all the factors that bring the suspicion of correlations to mind and, likewise, those that make it so difficult to feel one's way toward any satisfying answer (“Statues et représentations de statues royales sous Séthi I,” *Mitteilungen des Deutschen Archäologischen Instituts, Kairo* 49 [1993] pp. 239–257). The same question can be posed for bronze royal statuary, in particular with regard to the kneeling type.

36. For museological and bibliographic references for these figures, see note 25. My thanks go to James H. Frantz, Richard E. Stone, Dorothea Arnold, Marsha Hill, Lawrence Becker, and Mark T. Wypyski for their generous contributions to this study.

37. I am grateful to Michael Cowell of the Department of Scientific Research, The British Museum, for showing me the radiographs of Thutmose IV. High-quality, large, hollow-cast bronzes, such as those in the famed group said to be from the Faiyum, were already produced in Egypt in the late 12th Dynasty.

38. Elemental analysis was carried out on a sample removed from one of the tangs using a Kevex Delta IV energy-dispersive X-ray spectrometer coupled to a modified Amray 1100 scanning electron microscope. The data were quantified using MAGIC IV ZAF corrections.

wt %	Cu	Sn	As	Au	Ag	Fe
	88.5	4.3	0.5	6.1	0.4	0.2

39. Kneeling figure of Tutankhamen (U.M. E 14295)


wt %	Cu	Sn	As	Au	Ag	Fe
	88.7	4.6	1.10	4.7	0.75	1.57

The figure was analyzed using proton-activated X-ray fluorescence (PIXE). Trace amounts of lead, antimony, zinc, and mercury were also detected (Fishman and Fleming, "A Bronze Figure of Tutankhamen," p. 82). At the time of that publication the relationship between the gold content of a copper alloy and its artificial black patination had not yet been recognized.

40. Shallow dish with Nilotic motifs (MMA, acc. no. 1989.281.99)

wt %	Cu	Sn	As	Au	Ag	Fe
	86.1	6.9	0.8	4.1	0.9	0.3

Unpublished EDS analysis of a polished section carried out in the Sherman Fairchild Center for Objects Conservation in 1992. The dish was formerly in the Norbert Schimmel collection and is illustrated in Jürgen Settgast, *Von Troja bis Amarna* (Mainz, 1978) cat. no. 249.

41. John D. Cooney, "On the Meaning of , "Zeitschrift für Ägyptische Sprache und Altertumskunde 93 (1966) pp. 43–48.

42. Our understanding of ancient black bronzes is based in part on technical studies of copper alloys, such as *shakudo*, that have been used in Japan for at least 600 years to create artificially patinated metal works of art. *Shakudo* typically contains 1–5 percent gold and small amounts of silver. According to Gowland, a 19th-century observer, the black color develops when the metal is boiled in a solution of blue vitriol (copper sulfate) and verdigris (copper acetate). Prior to this treatment the objects are immersed in a boiling lye solution, polished with charcoal, and rinsed in a saline plum-vinegar bath; cited in Michael R. Notis, "The Japanese Alloy *Shakudo*: Its History and its Patination," in *The Beginning of the Use of Metals and Alloys*, Robert Maddin, ed. (Cambridge, 1988) pp. 316–327.

43. Ryu Murakami, S. Niyama, and M. Kitada, "Characterization of the Black Surface Layer on a Copper Alloy Coloured by Traditional Japanese Surface Treatment," in *The Conservation of Far Eastern Art*, John S. Mills, Perry Smith, and Kazuo Yamasaki, eds. (London, 1988) pp. 133–136. Notis, "The Japanese Alloy *Shakudo*."

44. Susan La Niece, "Niello: An Historical and Technical Survey," *The Antiquaries Journal* 63 (1983) pp. 280–297, esp. 280.

45. There are several inlaid copper-alloy objects with black surfaces from royal tomb 2 in Byblos that also have not received scientific examination. Pierre Montet, *Byblos et L'Égypte: quatre campagnes de fouilles à Gebeil, 1921, 1922, 1923, 1924*, 2 vols. (Paris, 1928–29) I, pp. 172, 174–177, 180, II, pls. 98–100, 102. Tomb 2 contained a chest with the name of Amenemhat IV as well as a stone jar inscribed with a name used by seven different kings of the 12th and 13th Dynasties. The dating of the tomb remains a source of dispute; Christine Lilyquist, "Granulation and Glass: Chronological and Stylistic Investigations at Selected Sites, ca. 2500–1400 B.C.E., *BASOR* 290–291 (1993) pp. 29–94, esp. 41–44.

46. See note 24 above.

47. Alessandra Giumlia-Mair, "Das Krokodil und Amenemhat III. aus el-Faiyum," *Antike Welt* 27 (1996) pp. 313–321, esp. 315; the tin content, erroneously printed as 9.00 percent, is actually 3.00 percent. My thanks to Alessandra Giumlia-Mair for sharing her results before the publication of her article.

48. Dietrich Wildung, "Berichte der Staatlichen Kunst-

sammlungen, Neuerwerbung, Staatliche Sammlung Ägyptischer Kunst," *Münchener Jahrbuch der bildenden Kunst*, 3rd ser., 30 (1979) pp. 199–206, esp. 202–204.

49. See, e.g., Josef Riederer, "Die naturwissenschaftliche Untersuchung der Bronzen der Staatlichen Sammlung Ägyptischer Kunst in München," *Berliner Beiträge zur Archäometrie* 7 (1982): 5–34, p. 11. The crocodile has been referred to by Wildung, "Neuerwerbung," as "Bleibronze," which, following Riederer's terminology, is an alloy containing more than 20 percent lead. In fact, the unpublished analysis indicates that the figure contains a modest amount of tin (3.08 percent), a significant amount of arsenic (1.59 percent), and only traces of lead (0.29 percent) and silver (0.22 percent). My thanks to Josef Riederer of the Rathgen-Forschungslabor in Berlin for sharing this information.

50. Giumlia-Mair, "Das Krokodil." The Middle Kingdom attribution of this crocodile has been questioned on both stylistic and technical grounds. See Hans W. Müller, "Eine ungewöhnliche Metallfigur eines blinden ägyptischen Priesters," *Bayerische Akademie der Wissenschaften, Philosophisch-Historische Klasse Sitzungsberichte* 5 (1989): 5–33, pp. 27–31. One of Müller's "technical" arguments is based on misinformation, that is, that "niello," by which he means black bronze, was first produced in Egypt only in the ninth to eighth centuries B.C. The earlier, inaccurate, published designation of the crocodile as a leaded-copper alloy would also have strongly suggested a later date, while the correct data are not inconsistent with an attribution to the Middle Kingdom.

51. Mycenaean bronze daggers with inlays and overlays of precious metal that are dated as roughly contemporaneous with the beginning of the New Kingdom have also long been described as "nielloed," but a recent scientific investigation of one such dagger indicates that it was made from an artificially patinated copper alloy containing a small amount of gold; E. Photos, R. E. Jones, and Th. Papadopoulos, "The Black Inlay Decoration on a Mycenaean Bronze Dagger," *Archaeometry* 36 (1994) pp. 267–275. Many authors have addressed the issue of black bronzes originating from cultural contexts all over the world. A synthesis of the international literature appears in Alessandra R. Giumlia-Mair and Paul T. Craddock, "Corinthium aes Das—Das schwarze Gold der Alchimisten," *Antike Welt* 24, Sondernummer (1993) pp. 2–62.

52. X-ray diffraction examination was carried out in situ using a Phillips 1710 open architecture unit and using conventional Debye-Scherrer cameras on corrosion samples removed from the surface of the figure. My thanks to Paul Craddock and Susan La Niece of the Department of Scientific Research, The British Museum, for sharing the results of their examination of the statuette and its corrosion. The results of their examination appear in Paul T. Craddock and Susan La Niece, "The Black Bronzes of Egypt," in *International Conference on Ancient Egyptian Mining and Metallurgy and Conservation of Metallic Artifacts* (forthcoming).

53. See Steven J. Duncan and Helen Ganiaris, "Some Sulphide Corrosion Products on Copper Alloys and Lead Alloys from London Waterfront Sites," in *Recent Advances in the Conservation and Analysis of Artifacts*, James Black, ed. (London, 1987) pp. 109–118; W. Andrew Oddy and Nigel D. Meeks, "Unusual Phenomena in the Corrosion of Ancient Bronzes," in *Science and Technology in the Service of Conservation*, Norman S. Bromelle and Garry Thomson, eds. (London, 1982) pp. 119–124. Sulfide corrosion, identified as covellite, in the form of small black spots, has been identified as a post-retrieval phenomenon occurring on objects of varied provenance



preserved in sulfur-containing environments; Nils Heljm-Hansen, "Cleaning and Stabilization of Sulphide-Corroded Bronzes," *Studies in Conservation* 29 (1984) pp. 17–20.

54. Tenorite has been found in the patinas of three other New Kingdom "black bronze" objects examined in The Metropolitan Museum of Art: an unpublished New Kingdom figure of a dog (MMA, acc. no. 47.58.1), a shallow bowl with Nilotic inlays (MMA, acc. no. 1989.281.99) mentioned earlier, and a second inlaid bowl

(MMA, acc. no. 1989.281.100), also formerly in the Norbert Schimmel collection; the latter bowl is illustrated in Settgast, *Von Troja bis Amarna*, cat. no. 250. Massive tenorite has been detected on the surface of an ancient Egyptian bronze cat head believed to have been reheated in modern times; Deborah Schorsch, "Technical Examinations of Ancient Egyptian Theriomorphic Hollow Cast Bronzes—Some Case Studies," in *Conservation of Ancient Egyptian Materials*, Sarah C. Watkins and Carol E. Brown, eds. (London, 1988) pp. 41–50, esp. 49.