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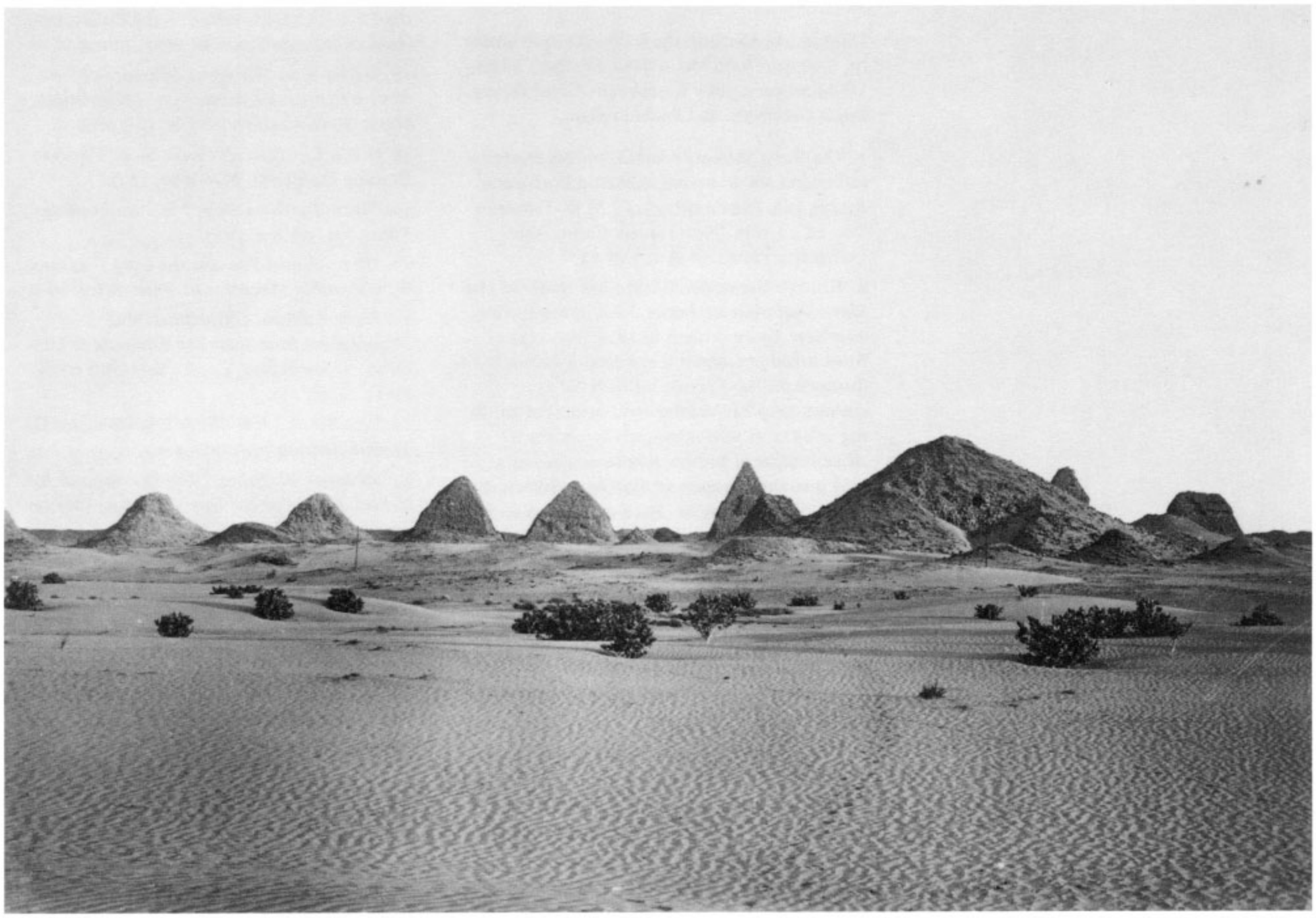

Fig. 1. Pyramids at Nuri, Sudan, before excavation; Aspelta's is the steeply sloped one, just left of the largest pyramid.

Susanne Gänsicke

King Aspelta's Vessel Hoard from Nuri in the Sudan

Introduction

A group of exquisite vessels, carved from translucent white stone, is included in the Museum of Fine Arts's first permanent gallery of ancient Nubian art, which opened in May 1992. All originate from the same archaeological find, the tomb of King Aspelta, who ruled about 600–580 B.C. over the kingdom of Kush (also called Nubia), located along the banks of the Nile in what is today the northern Sudan. The vessels are believed to have contained perfumes or ointments. Five bear the king's name, and three have his name and additional inscriptions. Several are so finely carved as to have almost eggshell-thin sides. One is decorated with a most unusual metal mount, fabricated from gilded silver, which has a curtain of swinging, braided, gold chains hanging from its rim, each suspending a jewel of colored stone. While all of Aspelta's vessels display ingenious craftsmanship and pose important questions regarding the sources of their materials and places of manufacture, this last one is the most puzzling. The rim with hanging chains, for example, is a type of decoration previously known only outside the Nile Valley on select Greek or Greek-influenced objects. A technical examination, carried out as part of the conservation work necessary to prepare the vessels for display, supplied many new insights into the techniques of their manufacture and clues to their possible origin.

In 1916, the Harvard University–Museum of Fine Arts expedition, under the direction of George A. Reisner, moved its operations up the Nile to the site of ancient Napata, beside the modern-day town of Karima, Sudan, just below the Fourth Cataract, and more than six hundred miles upstream from Luxor.[1] Napata, an important stop on the overland trade route between central Africa and Egypt, had become prominent during the New Kingdom as the southernmost outpost of Egyptian imperial control, after the pharaohs had conquered Kush in the late sixteenth century B.C. Napata's principal landmark was a small, buttelike mountain known today as Gebel Barkal. The Egyptians identified the mountain as a residence of their state god Amun and established a sanctuary to the deity beneath the cliffs. Later, after the withdrawal of the Egyptians from this region in about 1100 B.C., Napata—and Gebel Barkal—became the center of a Nubian kingdom encompassing all of Nubia, from perhaps Khartoum in the south to Aswan in the north. Eventually, in the mid-eighth century, its monarchs established themselves as masters of all Egypt and were counted as its Twenty-fifth Dynasty. The Nubian kings, ethnically and linguistically different from the Egyptians, nevertheless presented

Susanne Gänsicke is *Assistant Conservator, Department of Objects Conservation and Scientific Research*, Museum of Fine Arts, Boston.

themselves in the north as true pharaohs in the Egyptian tradition and by Greco-Roman times had attained a reputation for great piety and devotion to the Egyptian gods. Their rule, however, was to last only six decades. In 664 B.C., after repeated raids into Egypt, Assyrian armies were able to put the combined Egyptian-Kushite forces to rout, finally driving the kings back into the Sudan and putting an end to Kushite rule in the north. Establishing their court once again at Napata, the descendants of the last Kushite ruler of Egypt continued to pose as true pharaohs for generations, presiding over their own Nubian kingdom.

Virtually nothing was known of the ancestors or successors of the Twenty-fifth Dynasty rulers until Reisner began his work at Napata. There, between 1916 and 1920, he excavated the chief cult sanctuary of Kush at Gebel Barkal. At nearby El-Kurru, ten miles downstream, he found the plundered pyramid tombs of four of the Kushite kings who had ruled Egypt, as well as the tombs of their many wives and a sequence of unknown predecessors probably dating back to the mid-ninth century B.C. At the site of Nuri (fig. 1), six miles upstream from Gebel Barkal, he found much larger pyramid tombs, including that of Taharqa (about 690–664 B.C.), the most illustrious of the Kushite pharaohs, and those of nineteen of his successors to the late fourth century B.C. Although the burial sites were badly plundered, they clearly had been thoroughly Egyptian in character. The tombs were underground chambers cut in the bedrock, deep beneath the solid sandstone masonry pyramids; they were accessible by stairways leading from the ground which had been filled in after the burials.

One of the best preserved of these pyramids, and one of the least plundered, belonged to King Aspelta. He was Taharqa's fifth successor and perhaps his great-grandson. Apart from his burial ensemble, he is known from a colossal statue (fig. 2) found by Reisner at Gebel Barkal in 1916 and now in Boston; a sphinx now in the Sudan National Museum, Khartoum; and from several inscribed stelae.[2] Aspelta seems to have been the last of his line to aspire to reconquer Egypt, but his plans were evidently discovered by the ruler of the succeeding Twenty-sixth Dynasty in Egypt. Psamtik II invaded Kush in 591 B.C., inflicting a decisive defeat on the Kushite army near modern-day Dongola in the Sudan and advancing upstream to ravage all the towns as far as Napata.[3] This disaster evidently drove the Kushite court southward to Meroë, about eighty miles northeast of Khartoum, where thereafter the history of the Nubian kingdom becomes sketchy.

Despite his evident reverses, Aspelta received a sumptuous burial. His pyramid was as finely built as any at Nuri, and his three interconnecting tomb chambers had been elaborately carved and decorated with texts from the Egyptian Book of the Dead. In the burial chamber, Reisner found a mammoth, twelve-ton, granite sarcophagus, carved

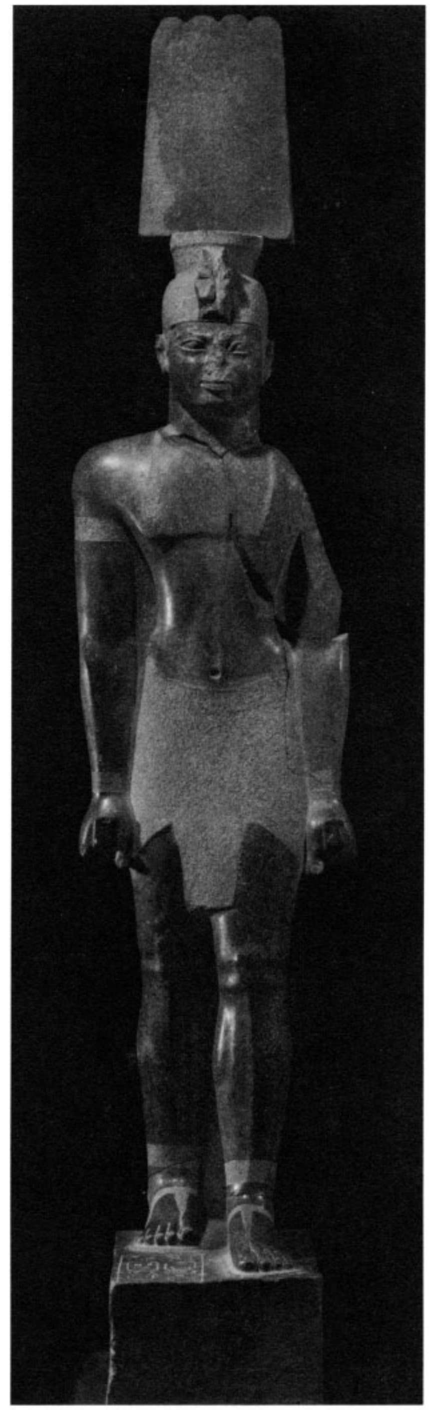

Fig. 2. Colossal statue of Aspelta, king of Kush (ca. 600–580 B.C.), from Gebel Barkal, Sudan. Granite, H. 3.32 m (10 ft. 11 in.). Museum of Fine Arts, Boston. 23.730.

Fig. 3. A cluster of stone alabastra as found in situ in the first chamber of the tomb of Aspelta at Nuri. They were thought by the excavator to have been entirely wrapped in gold foil when buried. The bejeweled alabastron is that in the upper right corner.

inside and out, which was ultimately brought back to the Museum (23.729). He found numerous cut-stone inlays, fragments of gold foil, and inlay eyes that had evidently adorned two nested, wooden, anthropoid coffins, which had contained the king's mummy. Scattered around the sarcophagus were 330 faience shawabtis, or servant figures, which ancient tomb robbers had dispersed while plundering the tomb. The ceiling in the first room must have collapsed in antiquity, burying a number of objects under rubble and preventing complete theft. Among the objects found in the second chamber were the remains of a wooden box containing six long pairs of tweezers, three of silver and three of gold, a multistranded collar of gold and amethyst beads, a large solid gold ewer, a wide gold lid with chain from a lost vessel, and a silver milk vessel inscribed for King Senkamenisken (about 640–620 B.C.), who is assumed to have been Aspelta's father.[4] In the entry chamber were twenty-three magnificent stone jars in two clusters (figs. 3 and 4), fifteen decorated gold or gilt silver cylinders of uncertain use, and a gold band, possibly part of a royal horse harness.[5] The profusion of gold foil fragments found in the soil around all these objects suggested to Reisner that every object in the burial had once been wrapped in the precious metal.[6]

When the objects were divided, half were designated for the Khartoum Museum while the other half were assigned to Boston. Boston's share of Aspelta's treasure may now be seen together with a scale model of the king's tomb in the Museum's new gallery of Nubian art. They and many objects from the royal tombs of Kush continue to be studied and conserved at the Museum.[7]

King Aspelta's Alabastra

Twenty-three stone vessels were found in Aspelta's tomb. All but four are of a type called, from the Greek, alabastron (pl. alabastra), after the material, known as "Egyptian alabaster," from which they were often made (fig. 5).[8] Such vases are characteristically tall and narrow, having rounded bottoms, short vertical necks, flaring rims, and two lug handles high on the sides.[9] There are also two miniature vessels, without lugs and having pointed bottoms, both of which are incised with bands of inscriptions and figures of deities. One of them still has a small piece of gold foil adhering to the rim, with which it had probably been wrapped at burial (see fig. 4, foreground).[10]

The rounded bottoms of these vessels did not allow them to stand by themselves; they probably required separate stands. A nearly contemporary wall relief in temple B 700 at Gebel Barkal actually depicts a group of similar vessels arranged on the tops of strutted wooden tables as part of an offering, where they are supported by individual, cushionlike objects.[11] Although no traces of any such stands or tables

Fig. 4. Selection of Aspelta's alabastra after conservation. Made from Egyptian alabaster; Museum of Fine Arts, Boston. From left to right, 20.1070, 20.1067, 20.1077, 20.1073, 20.1072, 20.1079, 20.1074. In the foreground, four cylinder sheaths, gold or gilt silver, also Museum of Fine Arts, Boston. From left to right, 20.340, 21.339, 21.11372, 21.11735.

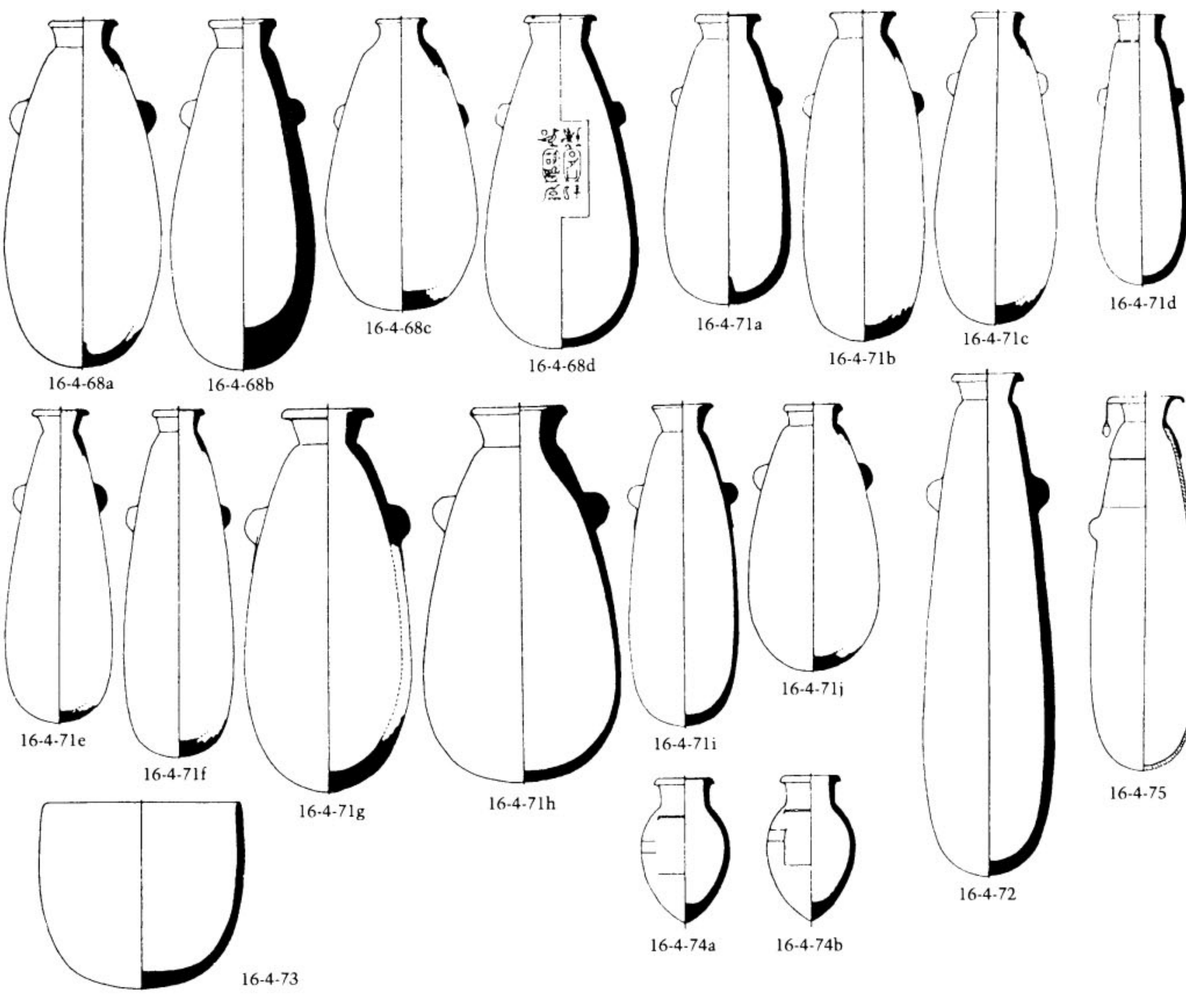

Fig. 5. Nineteen of Aspelta's vessels made from Egyptian alabaster; the objects are identified by field numbers: 16-4-68a-c, Khartoum 1564; 16-4-68d, MFA 20.1071; 16-4-71a, 20.1081; 16-4-71b, Khtm. 1564; 16-4-71c, MFA 20.1078; 16-4-71d, Khtm. 1564; 16-4-71e, MFA 20.1079; 16-4-71f, Khtm. 1564; 16-4-71g, MFA 20.1077; 16-4-71h, MFA 20.1073; 16-4-71i, MFA 21.3090; 16-4-71j, MFA 20.1080; 16-4-72, Khtm. 1564; 16-4-73, MFA 20.1072; 16-4-74a, MFA 20.1067; 16-4-74b, Khtm. 1386a; 16-4-75, MFA 20.1070. (Drawings by Suzanne Chapman in Dows Dunham, *Royal Cemeteries of Kush II: Nuri* [Boston: Museum of Fine Arts, 1955], figs. 53 and 54.)

were discovered with Aspelta's group, the fact that they were found in two clusters may suggest they had been stored in wooden, compartmented boxes or chests that did not survive the burial.[12]

The word "alabaster" began to be applied to the Italian variety of gypsum (calcium sulfate) during the eighteenth century, which has led to some confusion of terminology.[13] Egyptian alabaster, in fact, is a variety of limestone (calcium carbonate), a stone that has been referred to variously as calcite, if classified as a mineral, or travertine, when described as a rock. It is a fine-grained, crystalline stone, either pure or off-white in color, and is characterized by bands of different coloration and opacity, ranging from white to amber and from translucent to dense-opaque. Numerous Egyptian alabaster quarries with ancient workings have been identified in the desert on the eastern side of the Nile, where the material occurs as secondary calcareous sinter deposits in subsurface caverns and veins. Most prominent are those of the Mokattam, Salamat, and Minia limestone formations in Middle Egypt.[14] Accordingly, this area of the Fifteenth Egyptian nome (ancient provincial district) was called the "alabastron region" in Ptolemaic times.[15] Since no such deposits are known south of Asyut, the natural occurrence of this stone would seem to be impossible in the northern Sudan, where the main outcrops within two hundred miles of the river are comprised of sandstone, basalt, and igneous rocks, with no known limestone sediments.[16] This stone, therefore, when found in Nubian contexts, must have been imported from Egypt. Given its known uses in Nubia for luxury objects, it must have been a highly valued material, in the same category with other exotic stones and precious metals.[17]

Egyptian alabaster was found abundantly in the Kushite royal tombs both as alabastra and other objects. Employing Egyptian burial customs, the rulers copied the pharaohs and regularly used canopic jars made from the material. Taharqa included several hundred alabaster shawabtis in his total of more than a thousand. For generations, royal coffins were wooden and anthropoid in form and had eyes inlaid in Egyptian alabaster and obsidian. Some tombs at El-Kurru even had select elements made from blocks of the stone.[18] Beads, amulets, and eye inlays of Egyptian alabaster were present in Nubian tombs of all periods.

Whether the stone was brought from Egypt to Nubia in raw form to be carved there or whether the products were made in Egypt and brought to Nubia in finished form is not always clear. One would expect that the lighter weight of finished products would have made them easier to transport. A few huge alabastra, several hundred pounds each in weight, were found at El-Kurru, dating to the period of the early Twenty-fifth Dynasty.[19] Had they been brought south in block form, their weight would have been two to three times greater.

Fig. 6. Pair of alabastra from Aspelta's hoard which were carved from the same block of stone, as indicated by veining. Made from Egyptian alabaster; lower H. 24.8 cm (9 3/4 in.), W. 8.9 cm (3 1/2 in.); upper H. 24.8 cm (9 3/4 in.), W. 10.9 cm (4 1/4 in.). Both Museum of Fine Arts, Boston. Lower 20.1074, upper 20.1077. (Photograph: Susanne Gänsicke.)

Two of Aspelta's alabastra possess an identical pattern of veining (fig. 6), which reveals that they were cut from the same block of stone. They obviously were produced in the same workshop, probably in Egypt, and would have been sent together and remained as a pair during burial.

The vessel shape of the alabastron apparently originated in Egypt about the eighth century B.C.[20] It became extremely popular, and its production and use quickly expanded all over the Mediterranean world.[21] The shape was also quickly replicated in a variety of other types of materials: stone, pottery, faience, precious metal, and even glass.[22]

To date, no alabastron manufactures or indications of such activities have been found in Nubia, but the remnants of one such factory were discovered in the Nile Delta at the early Greek Egyptian settlement at Naukratis,[23] where thousands of core drills and broken vases were used to form the pavement of a Greek temple of the fifth century B.C.

In Egypt, luxury stone vessels, including alabastra, were traditionally carved so that the exterior was cut and polished first and then the interior was drilled out.[24] In some cases, the top (shoulder, neck, and lip) or bottom was carved separately and joined to the vessel after it was hollowed out, a technique that can also be observed on Egyptian stone vessels almost two thousand years earlier. This process allowed the construction of flasks with extremely narrow openings, which in turn helped to protect their valuable contents, usually various types of aromatic unguents.

An alabastron of Aspelta that was excavated not at Nuri but at Meroë, as part of a treasure the king apparently dedicated to a deceased family member there, is inscribed: "Take unto yourself the sweat of Re, so that your odor may become sweet thereby and your flesh be made firm through that which comes forth from Re forever, O King of Upper and Lower Egypt, Son of Re, Mery-ka-re, Aspelta."[25] This inscription is the only example that clearly suggests that these vessels were used to hold aromatic unguents ("the sweat of Re [the sun]"), and doubtless they served this function for the king both in his daily life and in his life after death. If some or all of these vessels held perfumes, it is likely that they entered Nubia in trade as luxury objects that also functioned as containers. Numerous classical writers have alluded to the use of alabastra as containers for perfumed unguents; Herodotus even cites alabaster perfume containers among the gifts sent by Cambyses to the king of the Ethiopians (i.e., Kushites) after his conquest of Egypt, in 525 B.C.[26] The great beauty of the alabastra would also have assured them a long life for other purposes, well after their original contents were used up. As the text of one of the above-mentioned vessels reveals by its reference to the local Nubian god Amun of Gebel Barkal (see note 9), it was almost certainly inscribed locally even if it may have been imported from Egypt. The same may also be true of the other inscribed vases.

A survey of the Egyptian alabaster vessels excavated in the royal cemeteries of Kush from the eighth to the second centuries B.C. reveals that significantly different quantities were in use at different times. It is reasonable to assume that the occurrence of the stone corresponds largely to the relative closeness of political and mercantile ties between Kush and Egypt during that time. All vases cited in the object registers of these excavations have been compiled in a graph (fig. 7) that shows this distribution in the different cemeteries throughout this period. At all three of the major pyramid fields—El-Kurru, Nuri, and Meroë—a well-defined peak (large accumulation of vessels) occurs in the first half of the seventh century B.C., corresponding to the period of Kushite domination of Egypt, when the rulers would have had easy access to Egyptian resources. Another peak at Nuri, some eighty years later, is caused primarily by the accidental survival of Aspelta's hoard and reveals clearly that, even three generations after the expulsion of the Kushites from Egypt, such stone containers were still widely used and available to Kushite royalty. Whether this means that the Kushites were still obtaining them directly from Egypt in such quantity or whether they were merely reusing those that had been previously transported is not entirely clear. Other vessels may have been heirlooms, suggested by the fact that a silver milk container, also found in Aspelta's tomb, was inscribed for Senkamenisken. Some of the stone vases may also have been old when buried, as is implied by the presence of a deep, straight-sided bowl that appears to be the bottom of an alabastron, cut down after its top was broken.[27] Never-

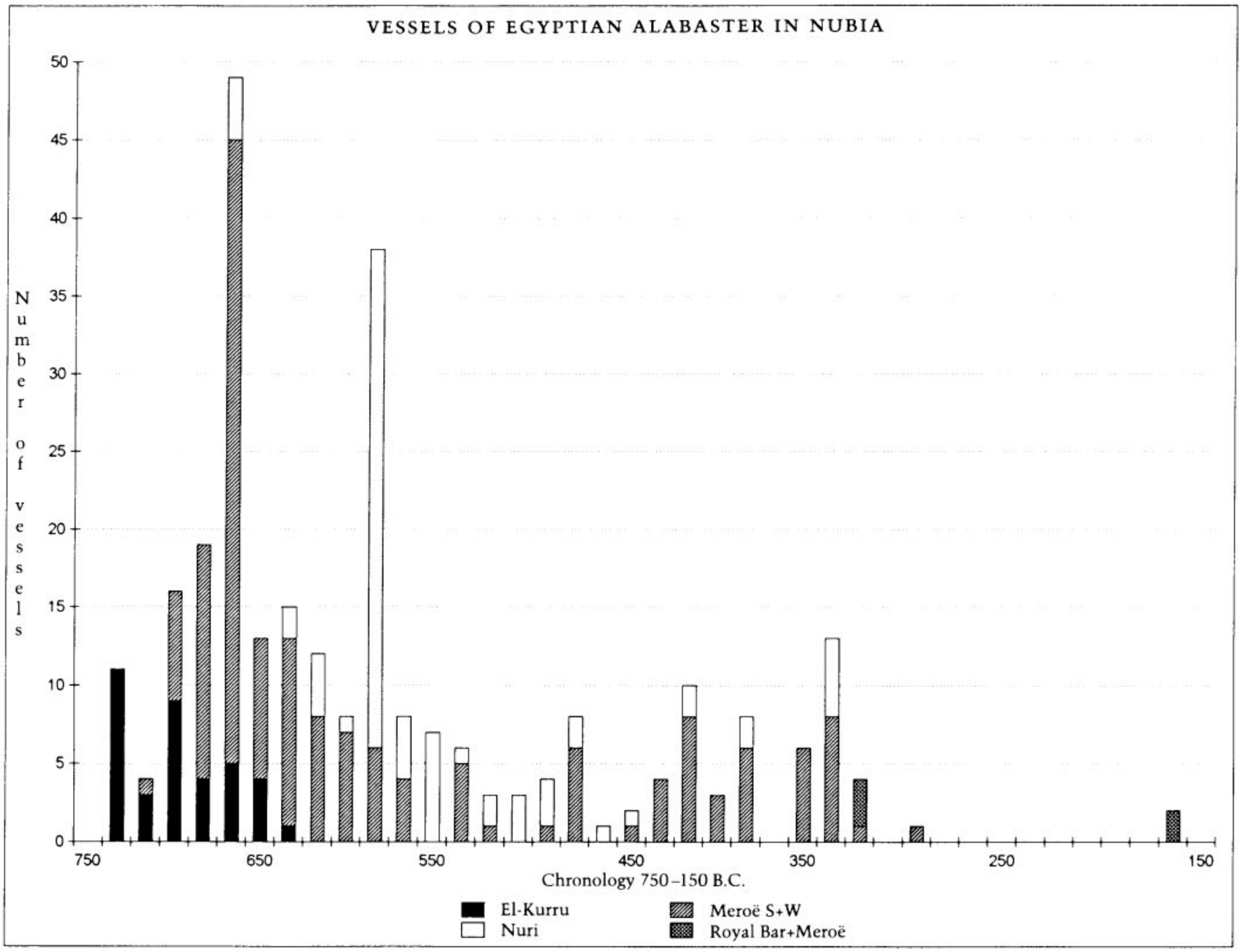

Fig. 7. Graph illustrating the number of Egyptian alabaster vessels excavated in the royal cemeteries of Kush: El-Kurru, Nuri, Barkal and Meroë North, and Meroë South and West (ca. 750–150 B.C.). Data derived from Dows Dunham, *Royal Cemeteries of Kush: I, II, IV, V* (Boston: Museum of Fine Arts, 1950, 1955, 1957, 1963). (Graphics: Susanne Gänsicke.)

theless, because well into the fifth and fourth centuries B.C. both the royal and private cemeteries at Nuri and Meroë continue to show small but regular occurrences of Egyptian alabaster, it is reasonable to assume that alabastra and objects of Egyptian alabaster were still readily obtainable. A sharp decline of Egyptian alabaster occurs after about 300 B.C., which is most surprising, for it is well known that during the ensuing so-called Meroitic Period, strong contacts again existed between Kush and Egypt.

Fig. 8. Aspelta's bejeweled alabastron before treatment in 1931. Egyptian alabaster, gilded silver, Egyptian blue, feldspar, cornelian, magnetite; H. 25.2 cm (9 7/8 in.), D. 7.2 cm (2 7/8 in.). Museum of Fine Arts, Boston. 20.1070.

Aspelta's Bejeweled Alabastron

While alabastra were common in the early sixth century, one of Aspelta's vessels is unique (figs. 8 and 9). It bears on its surface delicately incised twin cartouches with Aspelta's royal names flanked on both sides by a pair of protective, winged goddesses. Its upper shoulder, neck, and flaring lip have been replaced by a precious metal mount that reproduces the usual stone profile.[28] Either the vessel was originally deliberately carved without its shoulder, neck, and lip, or the usual stone upper part became damaged or lost, if carved separately, which might have required its complete replacement in metal. Several other alabastra with cutoff necks and rims have been excavated in Nubia, suggesting they might once have had similar metal embellishments.[29]

The metal shoulder of Aspelta's alabastron is enveloped by a rigid collar of cloisonné work (fig. 10). Cloisonné is a form of applied surface decoration that uses thin metal strips to create small, shallow compartments that can be filled either with cut-stone inlays, with enamel, or with some other kind of colored paste. The collar consists of five horizontal registers, or bands, four of which bear Egyptian floral motifs, while the fifth, and lowest, bears drop-shaped motifs. The style and design precisely duplicate the so-called broad collar, a type of jewelry worn by the Egyptians throughout pharaonic history.[30]

On the alabastron, it is evident that the idea of a human collar has been transferred to the "neck" of the vessel. This was no new device; pottery jars of the New Kingdom are frequently painted with alternating necklacelike swags of floral motifs on their shoulders, and on faience vessels from the Late Period, splendidly modeled broad collars can be found.[31] Similarly, several cosmetic jars in Egypt may be cited that combine precious metal tops or rims with elegant stones.[32] That the collar of the Aspelta alabastron is of ornate cloisonné metal, however, is something new. For this collar, the artisan created the individual floral motifs by bending small ribbons of gilded silver sheet to the proper form and then soldering them onto very thin backplates, cut to fit the shape of the motifs. These were then arranged and soldered into the parallel registers of the collar, and small hemispheres of gilded silver were inserted between each pair of flowers (fig. 11). The

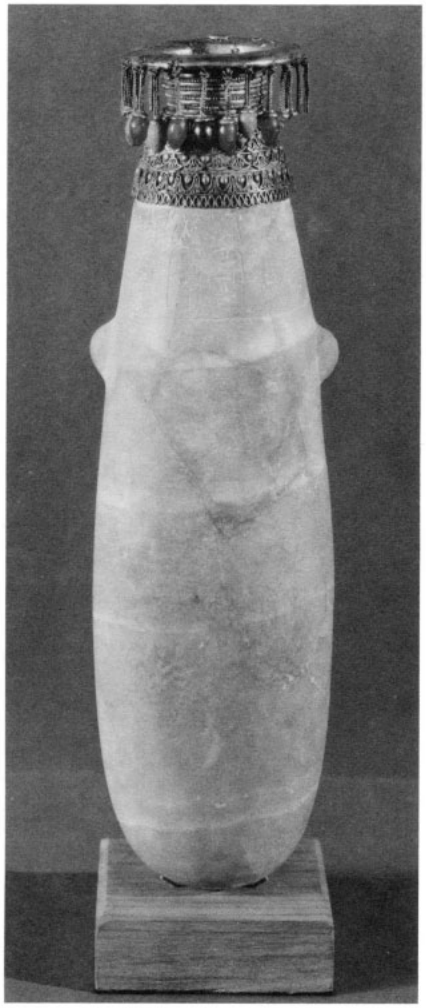

Fig. 9. The alabastron after treatment. MFA 20.1070.

Fig. 10. The metal mount of the alabastron. MFA 20.1070. (Photograph: Susanne Gänsicke.)

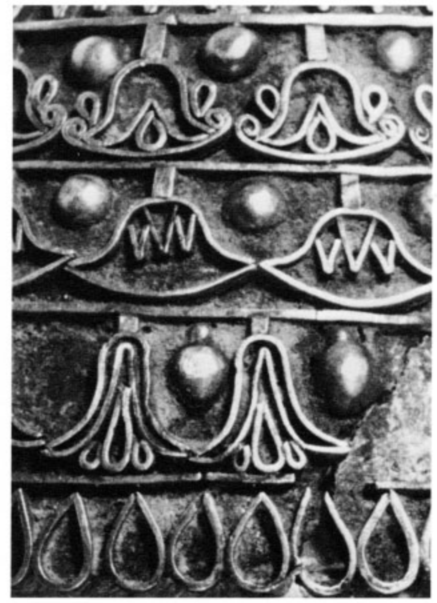

Fig. 11. Detail of the gilded cloisonné collar from Aspelta's alabastron. MFA 20.1070. (Photograph: Susanne Gänsicke.)

fabrication of cloisons in such a manner is atypical, since in ordinary cloisonné work, the ribbons would be placed directly onto the substrate or foundation metal.[33]

The cells of all five registers, or bands, of this collar are filled with a blue, granular compound that was sampled for analyses (see Appendix for analytical procedure and data).[34] It was identified as a calcium-copper-silicate frit, a material well known as "Egyptian blue," which was developed in the third millennium B.C. as the first-known synthetic pigment, its use as a color spreading all over the Ancient Near East and Mediterranean world.[35] Additionally, traces of an organic binder, possibly an animal glue, could be identified in the sample. It is possible that all cells of the collar were filled with this blue paste, thus creating a monochrome blue network of gold-outlined flowers. If true, such a use of cloisonné would be extremely unusual, as traditional Egyptian aesthetics preferred a profusion of multiple colors, and the purpose of cloisons was to separate differently colored areas. It is more likely that this blue ground was merely an adhesive for minute, colored stone inlays, all of which have been lost.

In many respects, the collar is comparable to certain Egyptian pieces of the Late Period, both in technique and iconography. Each of the known parallels is slightly different, however, in method of manufacture. This could indicate both that ancient Nile Valley craftsmen knew how

Fig. 12. Miniature collar inlaid with stones. Egyptian Late Period; gold, stone inlays; L. 10.2 cm (4 in.). The Metropolitan Museum of Art, New York, The Harry Brisbane Dick Fund, 49.121.1.

Fig. 13. Fragment of an Egyptian Late Period inlaid collar. Substrate silver, cloisons gold, inlaid with cornelian, lapis lazuli, turquoise, and white stone; L. 14 cm (5 1/2 in.), W. 7 cm (2 3/4 in.). Musée du Louvre, Paris, E 25379.

Fig. 14. Cylinder sheath from Pyramid 10 at Nuri, Sudan, dating to the late sixth century B.C.; note similarity of ribbed neck with metal mount of alabastron. Gilded silver, colored cement in the cloisons; H. 12 cm (4 3/4 in.), W. 3 cm (1 1/8 in.). Museum of Fine Arts, Boston. 20.275.

to accomplish the same effect through various means and that assorted techniques were current simultaneously in different areas.

Among the best parallels for the alabastron's metalwork are two inflexible miniature broad collars, similar in size and style, which may have been designed as ornaments for cult statues. One (fig. 12) is now in the Metropolitan Museum of Art, New York, and the other, a virtual duplicate, is in the Cairo Museum.[36] The latter was found at Tukh El Karamus in the eastern Delta; thus, the first is presumed to have come from the same place. The Metropolitan's necklace was fabricated from gold, and the flower cloisons, with inlays of cut stone, were soldered onto strips of metal that form the horizontal registers. These, in turn, were set onto the thicker metal substrate. The alabastron collar differs in that the small floral elements have been soldered onto their own form-fitted backplates, as already noted, which in turn were set onto the substrate.

Another parallel is a fragmentary collar (fig. 13) of the Ptolemaic Period that was made with a silver backplate covered with gold foil.[37] The floral elements are formed by golden ribbons and are inlaid entirely with cut stones. Corroded fragments of another similar object exist in Cairo.[38]

In the Sudan, cut-stone or glass inlays of this same type were used at the same time, as demonstrated by a hollow, cylindrical ornament (fig. 14), one of the so-called cylinder sheaths (see below for brief discussion) excavated from a royal tomb at Nuri of the late sixth century B.C., postdating Aspelta's (see fig. 4) by perhaps fifty years.[39] Here, the inlays, all of which have been lost, have left imprints in the multicolored cement that still remains in the cloisons. Another example of the local use of cut-stone and glass inlays may also be seen in a gilded silver amulet from El-Kurru of a ram-headed lion seated atop a column. Predating Aspelta by more than a century, this amulet has inlays cut from red and turquoise-blue colored glass and lapis that are held by red-and-blue-tinted cement in gilt silver cloisons.[40] Two bronze staves from El-Kurru that take the form of rods terminating in bent hands holding hollow cylinders have braceletlike features with bronze cloisons inlaid with glass, set into red cement on top of blue cement.[41] Such objects suggest that the blue paste on the alabastron's collar could actually have been the adhesive for similar inlays, now lost.

Above the cloisonné collar, the cylindrical neck of the vessel is decorated with a band composed of ten superimposed gilded silver half-round wires, alternately plain and beaded. It is precisely this same form of decoration that makes its appearance on the cylinder sheaths, which are found only in the royal tombs from Nuri.[42] These objects, whose function has never been determined, are hollow cylinders of gold or gilded silver that are open at one end. Their exterior is decorated with punched designs of divinities and raised friezes of rams' heads and uraei (serpents). Since these designs present religious iconography peculiar to the Kushite variant of the Egyptian religion, they were no doubt made locally. Because they and the alabastron's collar are similarly made, we may also conclude that, even if the vessel itself was imported from Egypt, its metal embellishment, while inspired by Egyptian models, was manufactured and added at the court of Kush.

The most unusual feature of this elaborate metal top is its curtain of swinging chains attached to the lip, each suspending a jewel of colored stone. Whereas the other metal parts of the top are of gilded silver, the chains are all of gold. Altogether, there were twenty-two chains. Seventeen still survive, of which ten retain their jewels. The chains are suspended from the edge of the rim, which itself has been formed by the join of an exterior and interior gilded sheet, the first of which bears the decoration and the latter of which was designed to fit over the vessel's interior stone surface (fig. 15). The chains were fastened to the flaring lip by means of tiny loops. Into the only partially drilled jewel terminals, the chains were secured by means of some sort of adhesive, while small golden disks covered the joins.

The surviving jewels are made from three types of stone: four were of cornelian, five of the jewels were of feldspar, and one of magnetite.[43] It is not known whether in ancient times magnetite was distinguished from hematite, a similar-looking iron oxide that was used in moderate amounts in Egypt and that in Nubia was employed mainly for inlays in coffins or as pupils in inlaid eyes and was occasionally used for beads and amulets.[44] If the single magnetite bead had a special significance, or if it was placed originally above the inscription for a specific purpose, we do not know. The Egyptians attributed magical power and significance to the different gemstones and used them for special magical purposes. Almost certainly, they shared such beliefs with their southern neighbors.

The hanging chains (fig. 16) are of a type known as the "loop-in-loop," which was commonly employed throughout antiquity. Its use in Egyptian jewelry is traceable in all periods, from the Old Kingdom.[45] Aspelta's use of such chains as an adornment for his alabastron, however, seems innovative.

The different metals on the neck and collar of the alabastron were analyzed in order to identify their alloy composition and to investigate the techniques used during their manufacture (see fig. 15, for sample location; see Appendix for analytical results and detailed discussion). The findings revealed that the substrate of these parts is made of a silver alloy that contains some copper and a moderate amount of gold. This implies that the silver was likely to have been a naturally occurring silver alloy. Silver seems to have been comparatively scarce in Egypt, owing to the lack of any substantial sources of it in the Nile Valley. Most of it was imported, having been derived through smelting

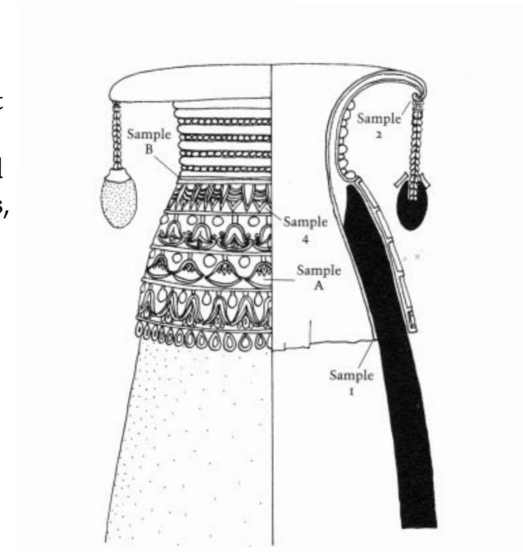

Fig. 15. Drawing of the metal mount on the Aspelta alabastron. MFA 20.1070. The location where the metal samples were taken is marked. (Drawing: Susanne Gänsicke.)

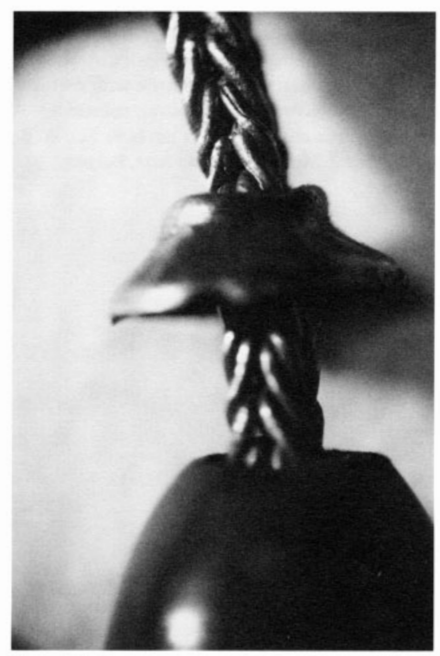

Fig. 16. Photomicrograph of the double loop-in-loop chain of the Aspelta alabastron. MFA 20.1070. The seam of the twisted wire is clearly visible. (Photograph: Susanne Gänsicke.)

and refining processes from argentiferous galena, a silver-containing lead ore.[46] It has been suggested, however, that aurian silver was obtained from a deposit within the traditional Nubian gold mines along the Wadi Allaqi, about 215 miles due east of the Second Cataract, and a similar origin could, therefore, be assumed for the silver used on Aspelta's alabastron.[47]

The gilding on the alabastron was probably made from unrefined native gold, judging from its rather high silver content. More than one composition of gold is in evidence, which supports the notion that the metal was used unrefined in small bits and pieces, as available. Gold occurred in the eastern desert of Egypt, but the main sources were always quartz veins and alluvial deposits in Nubia.

Varying in thickness, but averaging about 0.02 millimeters (less than 1/1000 inch), the gold leaf would have been adhered to the substrate, either with an adhesive or by hammering, and a strong bond created by subsequent heating.[48] This gilding technique is known as diffusion gilding, which was used in antiquity previous to the invention of mercury gilding.[49] The ancient goldsmith probably prepared a group of gilded silver elements made from different metal samples that were subsequently assembled to form the ornament, rather than making a single silver object at once, which he afterward covered with gold foil.

Even though it is known that silver became more readily available to the Egyptians around the time of the New Kingdom, very few gilded silver objects are known from Egypt, and the technique is not thought to have been widely used. The occurrence of large quantities of gilded silver in the royal cemeteries of Kush, therefore, is unexpected and extremely interesting, particularly since Nubia traditionally had been the main source of gold for the Egyptians.[50] The heavy use of silver in Nubia during and after the Napatan Period could suggest that the famous gold mines of Nubia were already largely exhausted by about 600 B.C. or had been cut off from the Kushites. It could also suggest that gilded silver had merely been used as an economical substitute for gold, at least for objects of lesser importance or for funerary use. But gold must have remained relatively available, as is suggested by the great thickness of the gold foil on some of the silver objects.

Gold leaf was also used lavishly in the royal burials—particularly as a wrapping for the deposited objects—and even large solid gold objects were found occasionally in the tombs. A solid gold ewer, three gold cylinder sheaths, three gold tweezers of large size, and a large lid with thick loop-in-loop chain from a plundered vessel, all found in Aspelta's tomb, reveal that solid gold objects were not uncommon and may have been buried in abundance. This, as well as the assertion that numerous gold objects were said to have been dedicated to the temples at Kawa by Taharqa, implies that the gold mines of Nubia were still producing gold at least in the early Napatan Period.[51] Probably, too, they were also producing respectable amounts of aurian silver. The large amounts of gilded silver in Kush might be evidence of an attempt to conserve gold or might indicate the celebration of the proud mastery of the newly developed, if rather time-consuming and not very practical, technique of gilding. There is at least the possibility that gilded silver evoked a familiar mythological notion, in which silver was identified with the bones of the gods and gold with their skin.[52] Applying this notion to the alabastron, we find a silver substrate or core covered with gold, the incorruptibility of which made it a symbol for eternity.

Conclusion

The presence in Napatan royal tombs of exquisitely crafted perfume vessels, made from a stone found in Egypt but not in the Sudan, seems to suggest first, that some sort of a regular trade between Egypt and Nubia continued long after the Kushite kings had ceased to rule Egypt, and second, that in respect to this particular commodity, the trade probably consisted largely of finished vessels with their contents moving southward rather than merely the raw, unworked stone doing so. The metal mount on the single alabastron in Aspelta's hoard, while reflecting Egyptian tastes and basic techniques, resembles most closely the construction and materials of the Nuri cylinder sheaths, a peculiarly Nubian type. This fact, like the silver gilding technique, suggests that the collar was made of locally mined metal in Nubia. The vessel, therefore, most likely came from Egypt, while its metal embellishment appears to have been added later, in Nubia, as probably also were the inscriptions of the several accompanying vessels, which mention uniquely Nubian deities.[53]

The feature of the ornamental chains adds yet another dimension to the alabastron. In this detail, the only known parallels are to several vessels from the Greek sphere. A partially gilt, Hellenistic silver alabastron (fig. 17) is decorated with a chased and punched design of strap necklaces with flower buds on stems that hang on each side between the lug handles.[54] A second silver alabastron of the same type, formerly in the Metropolitan Museum of Art, shows a punched design around the shoulders of the vessel, covering the same surface as the gilded collar of Aspelta's alabastron.[55] Objects of striking similarity derive from a chieftain's tumulus grave, which is dated by two gold coins of King Paerisades to the second century B.C. and found at Siverskaia, in the Caucasus near the Black Sea coast. Three glass vessels discovered there are adorned with gold-mounted rims and hanging chains.[56] One skyphos (fig. 18), its gold-covered rims and handles decorated with garnets, granulation, and filigree work, has golden loop-in-loop chains suspended from rim and handles. Round cornelian beads, covered with a small golden disk just as on the beads of Aspelta's vessel, are completely drilled through and leave golden balls to form terminals for the

Fig. 17. Hellenistic silver alabastron decorated with a chased strap necklace, about third century B.C. Silver, partially gilded; H. 13.5 cm (5 3/8 in.). Museum of Fine Arts, Boston; gift in memory of Ashton Sanburn. 1974.138.

Fig. 18. Skyphos from a burial at Siverskaia, Caucasus, in southern Russia, second century B.C. Cast glass, gold-mounted, with garnet inserts and golden chains with cornelian pendants. Krasnodarsky kray, Severskaya stanitsa, V.I. Sizovs excavations 1881, The State Historical Museum, Moscow, Inv. N 9890.

chains. Short, hanging, loop-in-loop chains are also exceedingly common ornaments or pendants on Hellenistic jewelry.

The alabastron shape enjoyed wide popularity soon after it was developed in Egypt. It was readily copied both by the Greeks in the north and the Kushites in the south and was adapted to their individual tastes. The same may also be said about the use of chains as a pendant ornament. Since Aspelta's vessel was produced four centuries before the chieftain was buried with his, it cannot be determined whether we see here a uniquely Nubian invention that inspired imitations farther north and in the Mediterranean world or whether it was merely a Nubian copy of a fashionable international-style object that had perhaps been inspired by an Egyptian or Greek original. Contact between the Greek world and Nubia already existed in the seventh century B.C.[57] Not only were there Greek settlements in the Delta at that time, but the army of Psamtik II that invaded Nubia in 591 B.C. brought Greek soldiers with it. The destructive effect of the latter contact, however, was surely counteracted by more positive influences. Obviously, Kush maintained regular communication with Egypt throughout the Napatan Period (seventh to third centuries B.C.) and was not at all isolated from the rest of the ancient world. The exchange of goods would have been accompanied by an exchange of ideas, which were brought not only by foreigners to the southern land but also by Nubian travelers to Egypt and beyond. If Aspelta's alabastron, found in the remote Sudan, surprises us for its incorporation of what would seem to be avant-garde Greco-Egyptian features, we should hardly be surprised to find that a large series of Greek pottery alabastra, made on the Greek mainland, is decorated with figures of Nubian warriors, such as an example (figs. 19 and 20) in the Museum.[58] It is, therefore, interesting to contemplate the Greeks and Kushites—separated by a vast distance—each observing the other and the other's crafts, finding pleasure in their respective exoticism.

Fig. 19. Attic alabastron depicting a Nubian, fifth century B.C. Ceramic; H. 14.2 cm (5 1/2 in.), W. 5.4 cm (2 1/8 in.). Museum of Fine Arts, Boston; H. L. Pierce Fund. 98.927.

Fig. 20. Detail of the painting on the Attic alabastron. MFA 98.927.

Appendix: Technical Examination of Aspelta's Alabastron

RICHARD NEWMAN, *Research Scientist, Department of Objects Conservation and Scientific Research,* Museum of Fine Arts, Boston.

Metal components

Several samples (each less than one millimeter in size, or less than 4/100 inch) were taken with a scalpel, mounted in epoxy resin, and polished for analysis (fig. 15 shows sample locations). The cross sections were examined by reflected light microscopy and in an electron beam microprobe to determine, when possible, the composition of both gilding and silver substrate.[59] The microprobe results are shown in table 1; the following are comments on the individual samples.

Sample A Strip attached to backing sheet, second decorative band from bottom. The substrate silver contains about 5% gold and a little less than 2% copper. The gilding was carried out with silver-rich gold, perhaps close to point 7 of the sample in composition (about 68% gold, 28% silver, 3% copper).

Sample B Behind soldered band of wire, immediately above fourth decorative band from the bottom (two fragments, B1 and B2, were separately prepared as cross sections).

Results are inconclusive, since the samples consisted primarily of silver corrosion products (silver chloride).

Sample 1 Lower edge of inner surface. This sample contains only gilding, whose composition (at the outer surface) is about 90% gold, 10% silver, with a small amount of copper (0.3%).

Sample 2 Upper edge of the rim at the top. This sample is of the same piece of metal as sample 1, although from a widely separated location. As expected, the outer surface of the gilding has a composition virtually identical to that of sample 1: 88% gold, 11% silver, 0.7% copper. Substrate composition cannot be determined from this sample.

Sample 3 "Wire" from detached strand of one of the horizontal bands around the neck. The outer surface of the gilding layer has a composition of about 88% gold, 11% silver, 0.8% copper. The substrate contains more copper than this (about 1.8%), but the apparent gold level of nearly 10% is probably high due to diffusion from the gilding layer.

Sample 4 Strip attached to the backing sheet, fourth decorative band from the bottom. The substrate of this metal strip, which delineates one of the cloisons of a decorative band, is made from silver that contains a little more than 4% gold and close to 2% copper. The gilding, which is thin in the sample, contains about 75% gold, but the applied metal may have been more gold-rich than this.

TABLE 1

Results of microprobe analyses of metal cross sections

	Silver	*Gold*	*Copper*	*Total*
(A) substrate (1)	93.91	5.07	1.79	100.8
(A) substrate (2)	94.59	5.03	1.92	101.5
(A) substrate (3)	93.25	4.94	1.76	100.0
(A) inclusion in substrate (4)	47.95	41.59	9.86	99.4
(A) gilding, middle of layer (5)	38.15	57.71	3.75	99.6
(A) gilding, middle of layer (6)	38.19	58.68	4.29	101.2
(A) gilding, near top of layer (7)	28.33	67.75	3.10	99.2
(B1) small isolated metallic area (1)	72.82	22.19	6.18	101.2
(B1) small isolated metallic area (2)	74.19	21.31	6.19	101.7
(B2) isolated area of metal (1)	74.23	19.53	4.75	98.5
(B2) isolated area of metal (2)	72.75	22.01	5.02	99.8
(1) top of gilding layer (1)	9.07	86.00	0.43	95.5
(1) top of gilding layer (2)	9.44	87.25	0.31	97.0
(1) middle of gilding layer (3)	11.32	85.08	0.38	96.8
(2) substrate (1)	70.47	24.79	1.11	96.4
(2) top of gilding layer (2)	10.77	85.52	0.65	96.9
(2) substrate (3)	51.80	42.97	1.99	96.8
(2) top of gilding layer (4)	11.15	83.55	0.80	95.5
(2) middle of gilding layer (5)	23.84	71.08	1.50	96.4
(2) gilding layer, between points 4 and 5 (6)	12.65	82.87	0.83	96.4
(3) top of gilding layer (1)	12.84	77.35	0.79	91.0
(3) top of gilding layer (2)	10.68	81.96	0.78	93.4
(3) middle of gilding layer (3)	16.77	78.15	1.04	96.0
(3) substrate (4)	89.26	9.96	1.79	101.0
(4) substrate (1)	93.45	4.53	1.99	100.0
(4) substrate (2)	94.60	4.15	1.92	100.7
(4) substrate (3)	93.77	4.19	1.95	99.9
(4) thin gilding layer (4)	24.65	70.60	1.26	96.5
(4) thin gilding layer (5)	20.39	74.93	1.06	96.4

TABLE 2

Results of amino acid analysis of blue paste (mole percentages)

Amino acid	*Blue paste*	*Reference Proteins*			
		Rabbit skin glue	*Egg yolk*	*Egg white*	*Casein*
Aspartic acid	7	5	9	9	5
Glutamic acid	8	7	13	14	20
Hydroxyproline	2	11	0	0	0
Serine	6	4	9	7	5
Glycine	34	34	3	4	2
Histadine	0	1	3	2	3
Argenine	5	5	7	6	3
Threonine	3	2	6	4	3
Alanine	9	11	5	6	3
Proline	4	11	4	4	10
Tyrosine	0	0	4	4	5
Valine	4	2	6	7	6
Methionine	5	1	3	4	8
Isoleucine	0	1	6	6	5
Leucine	4	2	9	8	8
Phenylalanine	3	1	5	6	5
Lysine	6	3	7	6	8

Summary While the samples do not represent all components that make up the collar, they do reveal that the gilding on the main part of the collar (samples 1 and 2) is similar in composition to that of one wire (sample 3): silver-rich (about 10%) gold with a low copper content. The gilding in another area (sample A) was carried out using gold with a much higher silver content (28%). The substrate composition could be determined only from two samples (samples A and 4), both of which are strips soldered to the backing with similar composition (about 4% gold and 2% copper).

Blue paste

Samples of the blue material were analyzed by qualitative X-ray fluorescence in the microprobe and by Fourier transform infrared microspectrometry,[60] both of which proved that it consists of Egyptian blue. The Egyptian blue could have been applied in the cloisons as a paint, that is, as a mixture of blue pigment and binder. If so, an organic binder must have been used, since no plaster was detected during the analyses. Alternately, the Egyptian blue could have been applied as a frit and then fired.[61] Examination of a fragment in an electron microscope gave no indication that the crystals of pigment were even partially fused together, as would have been expected had they been fired. Two separate analyses were made for organic binders. Gas chromatography/mass spectrometry was utilized to detect sugars,[62] which would indicate the presence of plant gum, a common binder in ancient Egyptian paints. Very small amounts of arabinose and galactose, both of which occur in many plant gums, were detected. However, the levels are very low for the size of the sample that was analyzed, and it seems very unlikely that these are due to a binder in the blue paste. High-performance liquid chromatography was used to detect amino acids,[63] which would indicate the presence of a protein-containing binder such as animal glue, also common in ancient Egyptian times. Table 2 shows the results; for the sake of comparison, typical amino acid profiles for common protein-containing binders are also included. The sample most closely matches animal glue (note in particular the high glycine content), but the hydroxyproline content is much lower than expected for animal glue. Overall, the amino acid content of the sample was quite low, considering the size of the sample that was analyzed. All that can be concluded is that the blue paste appears to contain some animal glue and possibly also an additional organic material that contains amino acids.

The conclusion is that the blue paste was probably applied as a "paint," that is, as a mixture of pigment (Egyptian blue) and an organic binder or binders.

Notes

I would like to thank Arthur Beale for supporting and facilitating my research, Timothy Kendall for his advice on the historical aspects of this paper, Richard Newman for the technical examination, and all of them for their editing of this text.

1. The archaeological expeditions to the Sudan have been described by George A. Reisner, "Excavations at Napata, the Capital of Ethiopia," *Museum of Fine Arts Bulletin* 15, no. 89 (1917): 25–34; and Dows Dunham, *The Egyptian Department and Its Excavations* (Boston: Museum of Fine Arts, 1958). See also Dows Dunham, *Royal Cemeteries of Kush I: El Kurru* (Boston: Museum of Fine Arts, 1950), 7–10.

2. Dows Dunham, *The Barkal Temples* (Boston: Museum of Fine Arts, 1970), 23, pls. XXI–XXII; Jean Vercoutter, "Le sphinx d'Aspelta de Defeia (Khartoum Museum no. 11777)," in *Bibliothèque d'études 32: Mélanges Mariette* (Cairo: Institut français d'archéologie orientale), 97–104; E. A.Wallis Budge, *Egyptian Religion, vol. 2, Annals of Nubian Kings with a Sketch of the History of the Kingdom of Napata (Books on Egypt and Chaldaea, 33)* (London: Kegan Paul, 1912), lxxxix–cix, 89–116; Mary B. Reisner, "Inscribed Monuments from Gebel Barkal, Part 4: The Stela of Prince Khaliut," *Zeitschrift für Ägyptische Sprache und Altertumskunde* 70 (1934): 35–46.

3. See Timothy Kendall, "The Napatan Palace at Gebel Barkal: A First Look at B 1200," in W. Vivian Davies, ed., *Egypt and Africa: Nubia from Prehistory to Islam* (London: British Museum Press, 1991), 308 and notes.

4. Timothy Kendall, *Kush: Lost Kingdom of the Nile* (Brockton: Brockton Art Museum/Fuller Memorial 1982), 39–41.

5. Dows Dunham, *Royal Cemeteries of Kush, II: Nuri*, 78–102, esp. 84–85. The gold band is inscribed "Aspelta's great horse."

6. George A. Reisner, *Harvard University–Museum of Fine Arts Expedition Field Diaries* (original manuscript in the Egyptian Department Offices, Museum of Fine Arts, Boston), April 18, 1916.

7. For an overview of the treatment of the MFA Nubian collection, see Margaret A. Leveque, "An Historical Approach to the Conservation of Archaeological Materials from the Sudan with Special Reference to the Museum of Fine Arts, Boston," in Charles Bonnet, ed., *Études Nubiennes, Conférence de Genève 1990* (Geneva: University of Geneva, 1990), 193–199.

8. Dunham, *Royal Cemeteries II: Nuri*, 79–80; figs. 53, 54; pl. LXXX. For the term "Egyptian alabaster," see note 12, below.

9. Aspelta's alabastra vary in size and shape, ranging from very tall (32.8 cm; 12 7/8 in.), with a four-to-one height-to-width ratio, to more squat (24.4 cm; 9 1/2 in.) and bulbous, with a nearly two-to-one height-to-width ratio.

10. MFA 20.1067 (hereafter, all accession numbers not otherwise credited refer to the MFA); this vessel is carved with figures in sunk silhouette of the Nile god Hapi repeated twice, knotting the plants of Upper and Lower Egypt beneath the king's cartouches, which are also capped with the hieroglyph *pt* ("heaven"). The text reads: "Utterance of Hapi: 'I have come and I have animated your heart with the love of Re so that your soul might come into being in the presence of the people and the gods, like your father Amun.'" The other one (16-4-74b), now in Khartoum, displays dual squatting figures of the god Amun, in both human- and ram-headed form, facing the royal cartouches, again surmounted by the hieroglyph *pt*. The inscription reads: "Utterance of Amun-Re, Lord of the Thrones of the Two Lands, who resides in the Pure Mountain [Gebel Barkal]: 'I give to you the true voice [resurrection] of R^{C} [the sun god] and your rejuvenation so that it will open for you a good year and life forever." Both texts are of a religious nature but do not reveal the purpose of the vessels or their contents. The references to "rejuvenation" and to the "soul" (*ba*) suggest that the vessels had a primarily funerary purpose. Both are H. 9.6 cm (3 3/4 in.) and W. 6 cm (2 3/8 in.); see Dunham, *Royal Cemeteries II: Nuri*, 80, fig. 54, pl. LXXIX j. One of the taller alabastra, 20.1071, is also circumscribed with a line of text above the king's cartouches: "Live the King of Upper and Lower Egypt, the chosen of Re, the image of Atum, who comes forth from his limbs," and "Live the Son of Re, born of Hathor of Heliopolis, that she may give the love of Re so that the people and gods rejoice at the sight of him." In this case the text would seem to be equally uninformative, unless the noun *mrt* R^{C} ("love of Re"), which appears in two of these texts, was the actual name of the vessel's contents that caused "the people and gods to rejoice at the sight of him." It is not inconceivable that it was some sort of cosmetic. Special thanks to Joyce Haynes and Peter Der Manuelian for providing translations of these texts.

11. Francis Ll. Griffith, "Scenes from a Destroyed Temple at Napata," *Journal of Egyptian Archaeology* 15 (1929): pl. 5.

12. The use of such boxes in Greece is described by D. A. Amyx, "The Attic Stelai," *Hesperia* 27 (1958): 164–217.

13. For discussions on the nomenclature of Egyptian alabaster, see James Harrell, "Misuse of the Term 'Alabaster' in Egyptology," *Göttinger Miszellen* 119 (1990): 37–41; and Dietrich Klemm and Rosemarie Klemm, "Calcit-Alabaster oder Travertin?" *Göttinger Miszellen* 122 (1991): 57–70.

14. James Harrell, "An Inventory of Ancient Egyptian Quarries," *Newsletter of the American Research Center in Egypt* 146 (1989): 1–7; and James Harrell and V. Max Brown, "Topographical and Petrological Survey of Ancient Egyptian Quarries" (manuscript, Department of Geology, The University of Toledo, Ohio, December 1993); Thierry De Putter and Christina Karlshausen, *Les pierres utilisées dans la sculpture et l'architecture de l'Egypte pharaonique* (Brussels: Connaissance de l'Egypte ancienne, 1992).

15. Klemm and Klemm, "Calcit-Alabaster," 61, mention the Ptolemaic name "*alabastrites*" for the Fifteenth nome.

16. James Harrell, telephone conversation with author, January 31, 1994.

17. See Kendall, *Kush: Lost Kingdom*, 29 and 38, for a list of such materials buried in Nubian royal tombs, especially as foundation deposits.

18. Dunham, *Royal Cemeteries II: Nuri*, pls. LXXXII and LXXXIII, 10; and Dunham, *Royal Cemeteries I: El-Kurru*, 30.

19. Dunham, *Royal Cemeteries I: El-Kurru*, pls. XXXVIII A and XXXIX A. On the other hand, some of the later Napatan canopic jars are so un-Egyptian in style that one can only conclude that they were made locally out of raw or reused stone. See Dunham, *Royal Cemeteries II: Nuri*, pls. LXXXII–LXXXIII.

20. Janine D. Bourriau, "Salbgefäße," in *Lexikon der Ägyptologie*, Band V/3, Wolfgang Helck and Wolfhart Westendorf, eds. (Wiesbaden: Otto Harrassowitz, 1983), col. 362–366; and Barbara A. Greene, *Ancient Egyptian Stone Vessels* (Ann Arbor, Mich.: Dissertation Information Service, 1991).

21. The use of alabastra in the Greek world is discussed by Amyx, "The Attic Stelai," 213; see also John Herrmann, Jr., *In the Shadow of the Acropolis* (Brockton: Brockton Art Museum/ Fuller Memorial, 1984), 23.

22. Alabastra of various materials are discussed by Dietrich von Bothmer, "Echoes from Egypt," *Artibus Aegypti* (Brussels: Musée royaux d'art et d'histoire, 1983), 15–23. One alabastron from El-Kurru, 21.2787, is a black-and-white speckled, porphyritic igneous rock, possibly basalt (Dunham, *Royal Cemeteries I: El-Kurru*, pl. XXXVIII E).

23. W. M. F. Petrie, *Naukratis, Part I, 1884–5* (London: Trübner & Co., 1886), 15.

24. Alfred Lucas and J. R. Harris, *Ancient Egyptian Materials and Industries*, 4th ed., reprinted (London: Histories & Mysteries of Man Ltd., 1989), 423–425. Thomas R. Hester and

Robert F. Heizer, "Making Stone Vases: Ethnoarchaeological Studies at an Alabaster Workshop in Upper Egypt," *Monographic Journals of the Near East, Occasional Papers on the Near East*, vol. 1, issue 2 (November 1981). The use of different types of stones and a chronology of vessel types can be found in Greene, *Stone Vessels*, 388–389.

25. Kendall, *Kush: Lost Kingdom*, 41; Dows Dunham, *The Royal Cemeteries of Kush V: The West and South Cemeteries at Meroë* (Boston: Museum of Fine Arts, 1963), 374, fig. 202.

26. Herodotus, III, 20. 1. For another example, see Pliny, *Natural History*, XIII, 19: *unguenta optime servantur in alabastris* ("unguents keep best in alabaster boxes"). See also Amyx, "The Attic Stelai," 213, note 103. No traces of former contents of Kushite alabastra can be identified visually, and to date, no analyses have been carried out on possible organic residues inside Aspelta's vessels.

27. 20.1072: Dunham, *Royal Cemeteries II: Nuri*, 80, fig. 54, pl. LXXX. I wish to thank Timothy Kendall for this observation. At least thirteen other bowls, which appear to be the sawn-off bases of alabastra, have been found in Nuri (Dunham, *Royal Cemeteries II: Nuri*, pls. LXXX and LXXXI).

28. Dunham, *Royal Cemeteries II: Nuri*, 80, described the object (20.1070) as: "Veined alabaster vase, inscribed, broken shoulder and rim added in gold with enamel filled cloisonné decoration on shoulder and ca. 30 gold braided wire chains suspended from the rim, each terminating in a drop pendant of carnelian, turquoise or steatite. The metal top was found separated and crushed and has been restored in the laboratories of the MFA" (fig. 53, pl. LXXX A.1, pl. LXXIX L. restored). See also Steffen Wenig, *Africa in Antiquity: The Arts of Ancient Nubia and the Sudan, II* (Brooklyn: Brooklyn Museum, 1978), no. 112; and Kendall, *Kush: Lost Kingdom*, 40. The vessel was broken into numerous pieces and mended. There were several losses, including one of the lug handles, which have been reconstructed. In early photographs, the rim and the neck appear as one entity, and the collar is still attached to the upper elements of the vessel. Although, before reconstruction, it was deformed and flattened with minor losses of the base plate along the break, it appeared to be almost uncorroded. The gold surface above the silver rim and neck substrate was partially pushed up by silver corrosion products formed in limited areas, and the gold surface was partially obscured by them. The vessel was restored several decades ago, but unfortunately no documentation of this early work exists. I examined it closely in 1992 and 1994.

29. Dunham, *Royal Cemeteries II: Nuri*, 110, 233, 251.

30. Such necklaces consisted of multiple strands of beads, individual amulets, or floral elements with drop-shaped pendants in the lowest level and were normally balanced by a counterpoise hung from the back. They were worn by both male and female private, royal, or divine figures, and even by the dead. They appear in art in all periods: in relief, in sculpture in the round, and in the minor arts. Many original broad collars have survived in tombs, and magical power was believed to be inherent in them. See Alix Wilkinson, *Ancient Egyptian Jewellery* (London: Methuen & Co. Ltd., 1971), 30–31.

31. For New Kingdom vessels, see Edward Brovarski, Susan K. Doll, Rita E. Freed, *Egypt's Golden Age* (Boston: Museum of Fine Arts, 1982), 88–100. A splendid Late Period faience New Year's flask with broad collar, for example, is in the collection of the Brooklyn Museum (acc. no. 37.337E); see Elizabeth Riefstahl, *Ancient Egyptian Glass and Glazes* (Brooklyn: The Brooklyn Museum, 1968), 62, no. 60.

32. An example of a gold-rimmed cosmetic jar can be found in Jürgen Settgast, *Ägyptisches Museum Berlin* (Mainz: Zabern, 1989), 6 (acc. no. 1/77); of a kohl pot, in Brovarski et al., *Golden Age*, 219, cat. no. 265, blue glass, London, British Museum 24391.

33. True cloisonné is a technique of surface decoration that uses vitreous materials, such as powdered glass, melted into the cells by the application of heat to create cloisons filled with differently colored enamels. Most of the Egyptian cloisonné predates enameling, when inlays cut from stone or glass were used to create the colorful effect. These inlays were held in place by an adhesive cement that allowed each inlay to be leveled, forming an even, smooth surface with the metal ribbons dividing the cells. This technique can first be detected in the Old Kingdom (about 2630–2250 B.C.) and reached levels of high excellence on jewels created during the Middle Kingdom (about 2061–1784 B.C.). The use of colored cement and cut-glass inlays pressed into their cloisons in a semimolten state is dicussed by Peter Lacovara, "An Ancient Egyptian Royal Pectoral," *Journal of the Museum of Fine Arts, Boston* 2 (1990): 18–29; and Richard Newman, "Technical Examination of an Ancient Egyptian Royal Pectoral," *Journal of the Museum of Fine Arts, Boston* 2 (1990): 30–37. Christine Liliquist, "The Boston/Lafayette Jewel and Other Glass-Inlaid Ornaments," *Varia Aegyptiaca* 9, nos. 1–2 (1993): 33–44, adds a recent discussion about the use of glass inlays. The use of enamel on the vulture pectoral from the treasure of Tutankhamun, Cairo, Egyptian Museum, Carter Cat. No. 256, PPP, has been suggested by Cyril Aldred, *Jewels of the Pharaohs* (London: Thames and Hudson, 1971), fig. 103, 221, but was disputed by Emily Teeter, "Enamelling in Ancient Egypt," *American Journal of Archaeology* 85 (1981): 319 (no technical examination was carried out). The practice of enameling in the Nile Valley is believed to have begun in Late Period Egypt (ca. 525–343 B.C.) and is definitely known in the Meroitic Sudan; although it does seem to have been known much earlier in antiquity, as suggested by a Mycenaean object from the fourteenth century B.C. The use of enamel in the ancient world is summarized by Jack Ogden, *Jewellery of the Ancient World* (New York: Rizzoli, 1982), 133–134. For the use of enamel in Egypt, see Carol Andrews, *Ancient Egyptian Jewelry* (New York: Abrams, 1991), 82–83; in Meroë, see Robert S. Bianchi, "The Gold of Meroe," *Minerva* 4, no. 6 (1993): 20; and Karl-Heinz Priese, *Das Gold von Meroe* (Mainz: Zabern, 1992).

34. This material has been referred to erroneously both as enamel (Dunham, *Royal Cemeteries II: Nuri*, 80) and as fused-glass inlays (Wenig, *Africa II*, 193).

35. See Lucas and Harris, *Materials*, 340–343; and M. S. Tite, M. Bimson, and M. R. Cowell, "Technological Examination of Egyptian Blue," in Joseph B. Lambert, ed., *Archaeological Chemistry III* (Washington: American Chemical Society, 1984), 215–242. It is a sintered compound produced by grinding sand (silica), limestone (calcium carbonate), copper compounds (for example malachite), and natron and heating them together.

36. Émile Vernier, *Catalogue général des antiquités égyptiennes du musée du Caire, bijoux et orfèvreries I, II* (Cairo: L'institut français d'archéologie orientale, 1927), miniature pectoral 53.669: 480–481, pl. XCIX. This object is attributed to Tukh el Karamus and is inlaid with lapis and amazonite. No further technical information is presently available on the Cairo collar.

37. The fragmentary broad collar (14 x 7 cm; 5 1/2 x 2 3/4 in.) was acquired by the Louvre (25379) in 1952 from an antiquarian in Cairo; see also Jean Leclant, ed., *Ägypten-Spätzeit und Hellenismus* (München: Verlag C. H. Beck, 1981), fig. 179. It is inlaid with cornelian, lapis lazuli, turquoise, and a white stone. To date, no laboratory examination has occurred.

38. For the fragments of the Cairo pectoral, see Vernier, *Catalogue*, 53.194–7: 393–394, pl. LXXXVIII. The inlays are amazonite, cornelian, lapis. Another formerly inlaid gold object from

Nuri is a cloisonné flail, from pyramid Nu. 13 (17-3-649).

39. 20.275; see Dunham, *Royal Cemeteries II: Nuri*, 155, pl. CX.

40. 24.972; see Dunham, *Royal Cemeteries I: El-Kurru*, 94, 97, pl. LXI; Wenig, *Africa*, frontispiece, no. 94.

41. 20.3110, 3111; see Dunham, *Royal Cemeteries I: El-Kurru*, 31, 34, fig. 11e.

42. In Pyramids Nu.2, 3, 8, 9, 10, 15, 16, 26, 27; see Dunham, *Royal Cemeteries II: Nuri*, 43, pls. XCIII–CXIII; Wenig, *Africa*, II, 194; Kendall, *Kush: Lost Kingdom*, 40–41.

43. Cornelian, a translucent red chalcedony (silicone dioxide) colored by small amounts of iron oxide, was highly prized in Egypt, being favored widely for inlays, rings, and hair ornaments. This stone was found in the eastern desert in Egypt as well as in the Nubian deserts in the form of small pebbles, and even today the surface of some ancient sites is still strewn plentifully with its chips (Andrews, *Jewelry*, 41; Lucas and Harris, *Materials*, 391). Feldspar is also known as microcline, amazon stone, or amazonite (potassium-aluminum-silicate), which is opaque and pale green in color, often showing veins, inclusions, and color variations. It is thought to have derived from mines in the eastern desert in Egypt near Gebel Migif, but a source north of the Tibesti range in Chad has also been suggested. In Egypt it was used as early as in predynastic times for beads and later also for inlays and amulets (Andrews, *Jewelry*, 41–42; Lucas and Harris, *Materials*, 393). Both cornelian and feldspar occur regularly in Kushite jewelry.

44. Magnetite, an iron oxide of metallic appearance, was rarely used in Egypt (Lucas and Harris, *Materials*, 395). The hematite objects from the royal cemeteries of Kush have not been studied to date, and a thorough examination might reveal that at least some of them were, in fact, magnetite.

45. W. M. F. Petrie, *The Arts and Crafts of Ancient Egypt* (Edinburgh: T. N. Foulis, 1910), 86, fig. 94. A group of such chains is known from the Middle Kingdom tomb of the princess Khnumet (Wilkinson, *Jewellery*, fig. XIV, 66), Cairo, Egyptian Museum CG 52.975–8; two magnificent, long loop-in-loop chains, suspending fly amulets and a scarab, belong to the treasure of Queen Ahhotpe from Western Thebes, of the early Eighteenth Dynasty (Vernier, *Catalogue*, 219–212, pl. L for Cairo, Egyptian Museum CG 52.670 and pl. LI for Cairo, Egyptian Museum CG 52.671). The most stunning—and abundant—use of these chains on an item of jewelry occurs on a golden collar of the Twenty-first Dynasty king Psusennees, from Tanis, where fourteen loop-in-loop chains, suspended from the clasp, continue to divide until they terminate in no less than fifty-six, each studded with a golden flower pendant (Wilkinson, *Jewellery*, 173–174, pl. LXIII; Cairo, Egyptian Museum JE 85752). A unique pair of Ramesside earrings, each with seven uraei suspended by loop-in-loop chains from a large round plaque, comes perhaps closest to the alabastron in its use of such decoration (Vernier, *Catalogue*, 113–116, pl. XXVII, for Cairo, Egyptian Museum CG 52.323, 52.324). The use of hanging elements, both chains and strands of beaded tassels terminating in decorative pendants, is a familiar feature of the Egyptian aesthetic; see, for example, Tutankhamun's earrings (Wilkinson, *Jewellery*, 124–125, pl. XLV, for Cairo, Egyptian Museum Carter Cat. 269, A2; and pl. XLVI, A, for Cairo, Egyptian Museum Carter Cat. A3). Loop-in-loop chains must also have been used in Kush, for the large gold cap for a lost vessel, also found in Aspelta's tomb, has a long strand of loop-in-loop chain attached to it, 20.334 (Dunham, *Royal Cemeteries II: Nuri*, 81, fig. 55, pl. LXXXIX B).

Making such delicate chains as these required large amounts of wire. Ancient wire was characteristically twisted from thin, flat strips of metal that were turned into spirals and continually rolled until round wires were created. The twisting process results in either S- or Z-seams along the wires, depending on the direction in which the twisting was carried out. The wires on Aspelta's vessels appear to have an S-seam (see fig. 16). A formal study of this aspect of ancient wires has yet to be carried out.

A summary of current knowledge of ancient wire is provided by Jack Ogden, "Classical Gold Wire: Some Aspects of Its Manufacture and Use," *Jewellery Studies* 5 (1991): 95–105. To construct the chains, the craftsman wound the wire around a core to form spirals; it was then cut into small open loops that, in turn, were soldered shut. These loops were bent in the middle into an 8-shape and linked together. To create the double loop-in-loop chain on the alabastron, the maker would have transversed each loop with two other loops. The construction of chains is illustrated in Ogden, *Jewellery*, 58.

46. Z. Stos-Fertner and N. H. Gale, "Chemical and Lead Isoptope Analysis of the Ancient Egyptian Gold, Silver and Lead," *Archaeo-Physica* 10 (1979): 299–314. The main sources for ancient silver lie in Asia Minor and Syria. The exploitation of the famous Laurion silver mines in Greece started only in the fifth century B.C. All of these sources supplied silver that was extracted from lead ores, which is characterized by traces of lead and a very low gold content, a composition that cannot be identified on our samples. Few analytical studies have yet been carried out on Egyptian silver objects and even fewer on Nubian silver objects. Thus, comparable data are sparse.

47. Nine of twelve Nubian silver objects examined in the Ashmolean Museum have a very high gold content (6–25%). Eleven of these come from Sanam (opposite Gebel Barkal) and are Napatan; see Z. Stos-Fertner and N. H. Gale, "Ancient Egyptian Silver," *Journal of Egyptian Archaeology* 67 (1981): 103–115. The silver alloy of the cylinder sheath, 20.275, does not show traces of lead, but has a lower gold content, of approximately 2%.

48. Analysis of points in a line from the top of the gilding into the substrate in these cross sections indicated that the gilding was held in place by a diffusion process. The heating process creates a compositional gradient zone between gilding and substrate, and the presence of such a gradient is a clear indication that heating has occurred.

49. W. Andrew Oddy, Susan la Niece, J. E. Curtis, Nigel D. Meeks, "Diffusion-Bonding as a Method of Gilding in Antiquity," *MASCA* 1, no. 8 (1981): 239–241; and W. Andrew Oddy, T. G. Padley, Nigel D. Meeks, "Some Unusual Techniques of Gilding in Antiquity," *Archaeo-Physica* 10 (1971): 230–242. Gilding techniques on organic substrates and the alloy composition of gold leaf have been discussed by Pamela Hatchfield and Richard Newman, "Ancient Egyptian Gilding Methods," in *Gilded Wood, Conservation and History*, Deborah Bigelow et al., eds. (Madison, Conn.: Sound View Press, 1991), 27–47.

50. Jean Vercoutter, "The Gold of Kush," *Kush* 7 (1959): 120–153, discusses the Nubian gold mines. Richard Newman and I are currently undertaking a comprehensive study of the Nubian gilded silver in the MFA, including more than forty objects or object groups such as jewelry and amulets, cylinder sheaths, horse's harnesses, and mummy trappings.

51. Ibid., 137.

52. Andrews, *Jewelry*, on gold, 52, and on silver, 56. A textual reference from Egyptian mythology in which the bones of Re are described as being silver is given in Erik Hornung, *Der ägyptische Mythos von der Himmelskuh*, OBO 46 (1982): 37, line 5.

53. This was pointed out to me by Timothy Kendall; see also note 9.

54. 1974.138. The object has been published by Andrew Oliver, Jr., *Silver for the Gods: 800 Years of Greek and Roman Silver* (Toledo: Toledo Museum of Art, 1977), 70, fig. 34; and by Claire Blackwell, "Alabastron," *BMFA Bulletin* 73, no. 369 (1975): 16–17. Punched strap necklaces, though less ornate, can also be observed on a differently shaped perfume vessel (amphoriskos), 250–200 B.C., from Bolsena,

Italy, now in the Metropoltian Museum of Art, New York, 03.24.5, in Oliver, *Silver*, 56, fig. 23.

55. Dietrich von Bothmer, *A Greek and Roman Treasury* (New York: The Metropolitan Museum of Art, 1984), 35. Interestingly, the lug handles on this object and the silver alabastron at the MFA are in the shape of ducks' heads; Bothmer discusses the use of zoomorphic handles in his article. The MMA object has recently been returned to Turkey.

56. The objects are in the collection of the State Historical Museum, Moscow. The second one shows loop-in-loop chains suspended from the rim only with oval cornelian and round, gold beads at the terminals. The gold mount of the third skyphos is slightly less ornate and does not use stones. The circumstances of their discovery are described by Germain Bapst, "Les fouilles de Siverskaia," *Gazette Archéologique* 12 (1887): 116–123, pl. 16. See also Sabri and Günter C. Vieten, eds., *Historische Schätze aus der Sowjetunion* (Recklinghausen: Aurel Bongers, 1967), 87, 120, kat. 202, abb. 40; N. V. Anfimov, *The Kuban's Ancient Gold* (Krasnodar: Krasnodar Book Publisher, 1987), 186–193; and K. F. Smirnov, *Severskaya Stanitsa Barrow* (Moscow, 1953).

57. Bronzes created in Egypt during the Twenty-fifth dynasty, excavated at Samos, are further proof of contact between Nubia and Greece; see Robert S. Bianchi, "Egyptian Metal Statuary of the Third Intermediate Period (Circa 1070–656 B.C.) from Its Egyptian Antecedents to Its Samian Examples," in *Small Bronze Sculpture from the Ancient World*, Marion True and Jerry Podany, eds. (Malibu, Calif.: J. Paul Getty Museum, 1990), 61–84. I know of only one other example, by description only, of an alabastron fitted with metal that comes from an Attic tomb of a woman dated to the fifth century B.C.: "An alabastron was found, fitted with a silver mouth, and, near it, a delicate, small silver spoon made from the same material (silver) used to remove the alabastron's content," in A. Bruekner and E. Pernice, "Ein attischer Friedhof," *Mitteilungen des Kaiserlich Deutschen Archaeologischen Instituts, Athenische Abteilung* 18 (1893): 169.

58. The genre of Greek pottery vases with images of "Ethiopians" appears to have been quite common and is discussed in Jean Vercoutter et al., *The Image of the Black in Western Art I, From the Pharaohs to the Fall of the Roman Empire* (Cambridge, Mass.: Harvard University Press, 1976), 148–150; see also Frank M. Snowden, Jr., *Blacks in Antiquity: Ethiopians in the Graeco-Roman Experience* (Cambridge, Mass.: Belknap Press of Harvard University, 1970), 46, fig. 16, and 223, fig. 81. I wish to thank Timothy Kendall for bringing these objects to my attention.

59. Samples were coated with carbon and examined in a Cameca MBX microprobe equipped with a Tracor Northern 5502 energy-dispersive X-ray fluorescence (EDS) system and Tracor Northern 1310 stage automation and wavelength-dispersive X-ray fluorescence (WDS) system (Department of Earth and Planetary Sciences, Harvard University). Quantitative analyses were carried out by WDS using a 25 µm by 25 µm rastered beam. Pure metal standards were used, and matrix corrections were carried out by a fundamental parameters (ZAF) program.

60. Samples were pressed in diamond anvil cell and analyzed in a Nicolet 510P FT-IR spectrometer with an attached NicPlan infrared microscope. Comparative analyses of known samples of Egyptian blue were also carried out.

61. A recent discussion of the composition and appearance of frits that contain Egyptian blue is M. S. Tite, "Characterization of Early Vitreous Materials," *Archaeometry* 29 (1987): 21–34.

62. A sample was hydrolyzed in 2N trifluoroacetic acid and dried under vacuum. The dried sample was heated at 75° C for 1.5 hours with 30µl of hydroxylamine hydrochloride (about 8mg/ml in pyridine), let cool, and 10µl of trimethylsilylimidazole added. After standing for about thirty minutes, a sample was analyzed. Analysis was carried out in a Hewlett Packard 5890 gas chromatograph with an HP 5971 A mass-selective detector. Eight monosaccharides found in plant gums and other carbohydrate-containing binders were derivatized and analyzed under the same conditions for comparision.

63. A sample was prepared for analysis and analyzed following the Waters Chromatography "Pico-Tag" method. Hydrolysis is carried out under vacuum in hydrochloric acid vapor, and amino acids derivatized with phenylisothiocyanate. Details of the method have been recently described by Susana M. Halpine, "Amino Acid Analysis of Proteinaceous Media from Cosimo Tura's 'The Annunciation with Saint Francis and Saint Louis of Toulouse,'" *Studies in Conservation* 37 (1992): 22–37. Analysis was carried out on a Waters HPLC system consisting of two 510 pumps, an oven heater, manual injector, and 991M photodiode array detector. Waters Pico-Tag eluents and column were used. In order to quantify the results, samples of Pierce Chemical Co. Amino Acid Standard H and a solution of hydroxyproline were derivatized and analyzed along with the sample.