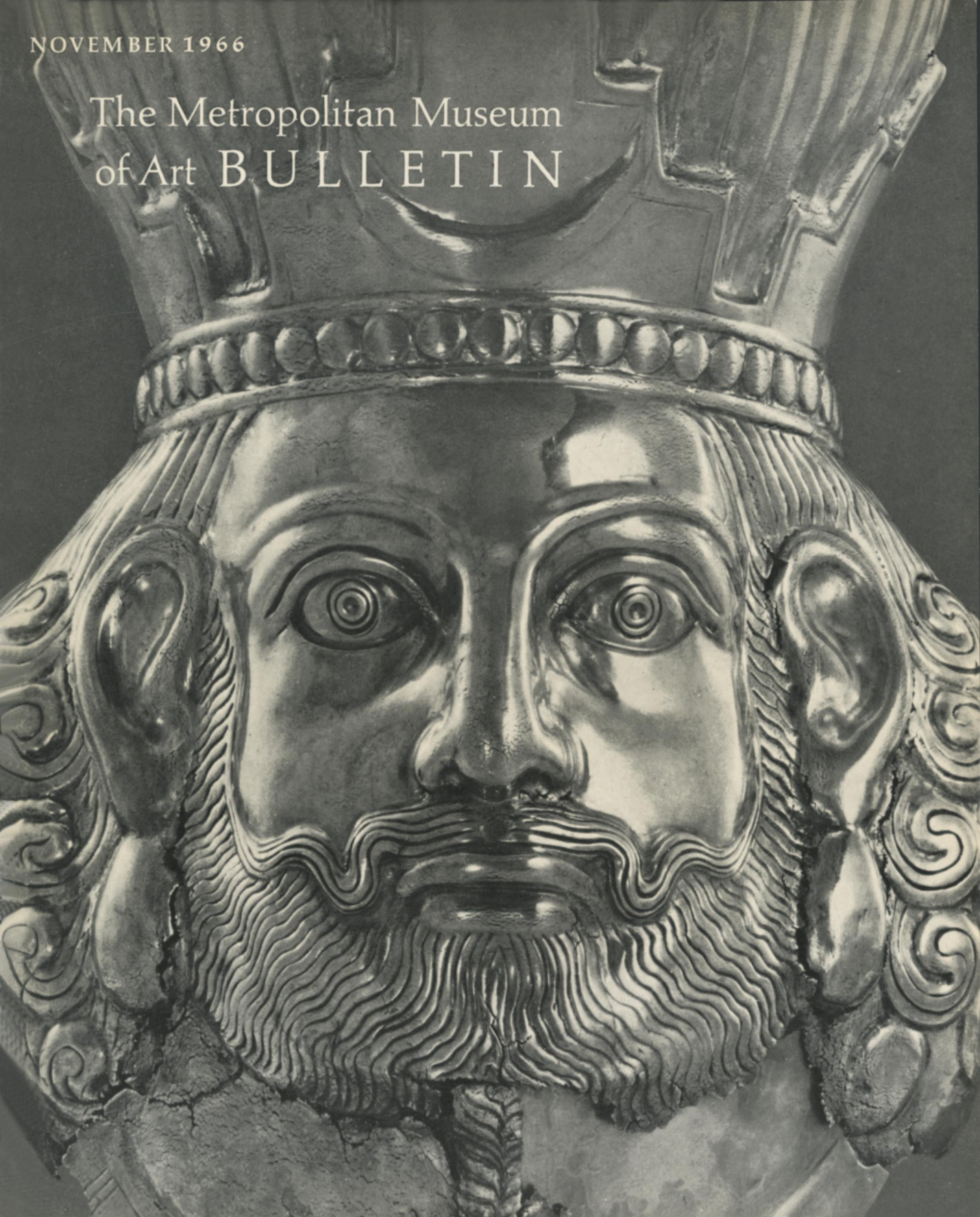


NOVEMBER 1966

The Metropolitan Museum
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The Hasanlu mound from the southeast, in 1962. Burned Building II, not completely excavated, is in the right foreground; BB I is to its west, in the center of the photograph; BB III is in the background. The perimeter of the Period IV fortifications may be clearly seen in the foreground. Photograph: Vaughn Crawford

Hasanlu 1964

OSCAR WHITE MUSCARELLA

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The modern village of Hasanlu is situated in the Solduz Valley of northwest Iran, one of the richest agricultural regions of that country. Many mounds, each marking the position of a sequence of ancient cities, attest to its richness and popularity in ancient times as well. What is known of the ancient history of this valley comes from the annals of Assyrian and Urartian kings of the ninth century B.C. Assyria, to the west, and Urartu, to the northwest, were keenly interested in this area for both political and economic reasons, and military incursions were made there. The major peoples in northwest Iran during the ninth century were the Parsuans, the Madai, and the Manneans. The Parsuans and the Madai can be recognized as the well-known Persians and Medes, and the Manneans as the Minni mentioned in the Old Testament. But what is not certain from these annals is the exact geographical and cultural relationship of these people.

Because little was known of the early history of the Medes and Persians, and practically nothing about the Mannaeans, archaeologists were interested in excavating a city in this area. Moreover, it was considered equally important to excavate a city in a region that often experienced trading, migrations, and invasions, in order to learn something about the various influences at work in early Iranian history. The Solduz Valley seemed the best place to look. In 1957 the University Museum of the University of Pennsylvania chose the mound at Hasanlu for excavation because of its large size and because pottery fragments littering the surface indicated that remains of the early first millennium B.C. were to be expected there. The Metropolitan Museum joined forces with the University Museum in 1959, and work continued until 1964, thus continuing a Museum tradition of archaeological research in Iran that had lapsed for some time.

Excavations previous to 1964 had revealed the existence in the Hasanlu mound of several occupation levels belonging to different historical epochs. The uppermost level, Period I, visible even before excavation, consists of a large late Islamic fort dating perhaps to the fourteenth century A.D. Below this level is a very large building, which because of a paucity of identifiable material found within is still of undetermined date and attribution; tentatively it is dated to the late fifth and fourth centuries B.C. It is called by the excavators the "Mystery Period." Below this building are the thin remains of two levels, overlapping each other. The upper (Period III A) is Achaemenid Persian

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*Silver-gilt head of a Sasanian
king. See the article on page 137*

in date, about 600 to 400 B.C.; the lower (Period III B) extends back into the seventh century. All of these levels consist only of rubble walls and a few material remains because the settlements were abandoned by the inhabitants, who took practically all their property with them. Why they left is not known, but the threat of invading armies was always present – even down to modern times. If the inhabitants were fleeing an enemy, it is clear they had advance warning of danger. Not so lucky were the people who lived in the settlement below, Period IV. Perhaps they had no warning of invaders, or perhaps, knowing that an enemy was advancing, they nevertheless decided to remain and protect their city. Excavation has shown the tragedy of their decision, for there is evidence that their city was completely destroyed by a violent fire.

Anyone who has experienced the almost daily strong winds that cross the Solduz Valley can reconstruct the last moments. That the destruction came in late summer or early fall is evident from the charred remains of harvested crops. Enemy soldiers set fire to the city, and within minutes the flames spread, whipped by the winds. Before many people could escape and apparently before much plundering could occur, the buildings collapsed, killing those caught within and sealing the treasures of the city under tons of debris. There is no evidence that anyone attempted to “excavate” the smoldering ruins, and so the contents remained untouched until archaeologists in the twentieth century began to dig.

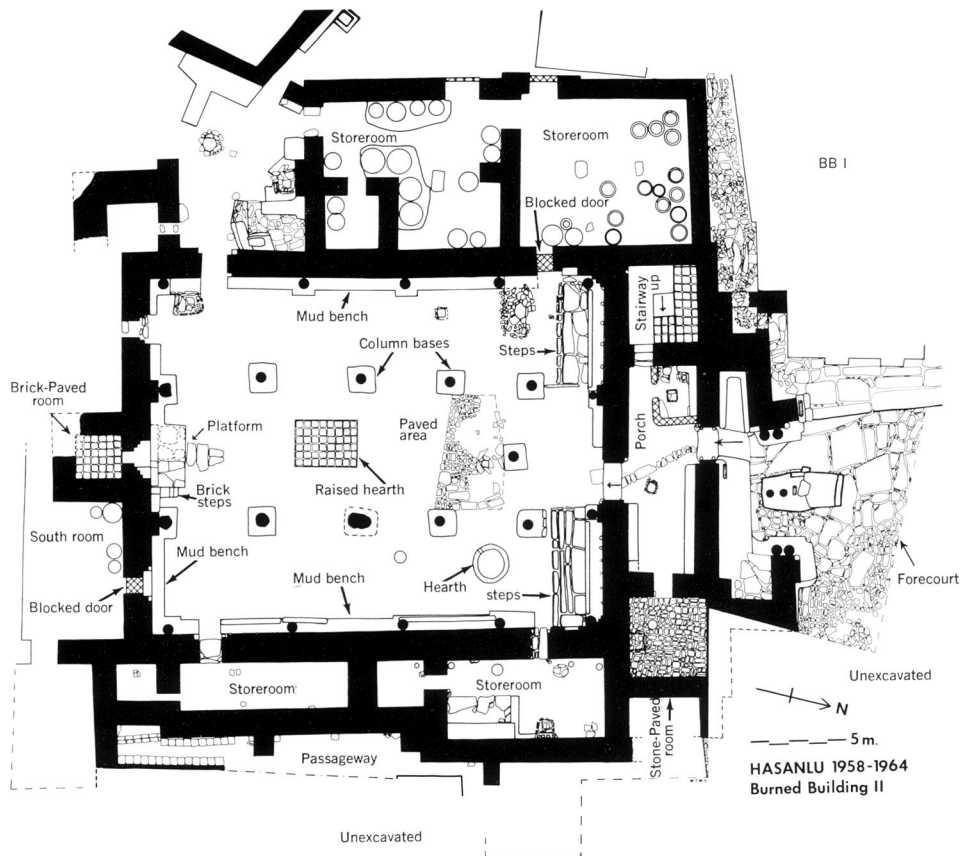
Within the burnt debris of the buildings are both the ordinary and the luxury possessions of the people, tossed in all directions by the collapse of the walls and roofs. Furthermore, in every area of the citadel are scores of skeletons, many wearing jewelry or carrying weapons, others clutching children, and still others holding valuables in their hands: to date 146 have been found. From carbon 14 analysis it became clear that this city was destroyed in the late ninth century B.C. – just the time of the Assyrian and Urartian records concerned with this area – and so it received much attention from the excavators. To be sure, the levels below this period have also been excavated and recorded. Although the material recovered in Period V is scanty, it is possible to state that the cultures of the two periods are somewhat similar and that there is evidence of some continuity. It is also possible to speculate that the earlier people were, at least in part, ancestors of those who lived in the Period IV city, and that they arrived as newcomers into northwest Iran about 1200 B.C.

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1. Burned Building II, 1X century B.C.

Previous work on the Period IV level resulted in the partial clearing of a fortification wall, three meters thick, around the perimeter of the city (Frontispiece). This wall had a stone foundation and a mud brick superstructure. Within the walls, one large building and the greater part of two others, all of such monumental size and plan that they must have been official buildings, were excavated. The principal goals of the 1964 season were to map the city walls completely, to finish the excavation of one of the buildings, Building II, and to acquire from the cemetery skeletons for an analysis of the physical characteristics of the inhabitants and other grave material.

The city fortification walls were almost completely cleared. There were originally twelve or thirteen large towers at ten-meter intervals, and the spaces between the towers were occupied by two small piers, evenly spaced. The

plan is reminiscent of some of the later Urartian fortresses; perhaps the Urartians were influenced by the type at Hasanlu.

The excavation of the so-called Burned Building II (BB II, Figure 1), which was begun in 1959, was completed in 1964. An entry porch with a small room at each end, one of which contained a stairway, opened into a great pillared hall. This type of porch is a typical North Syrian unit, called in their language a *bît hilani*. Knowledge of it may have come directly from North Syria or through Assyrian intermediaries, since Assyrian kings, at least by the eighth century, borrowed it also. The nonalignment of the porch door and the door to the pillared hall may also be an architectural idea borrowed from North Syria.

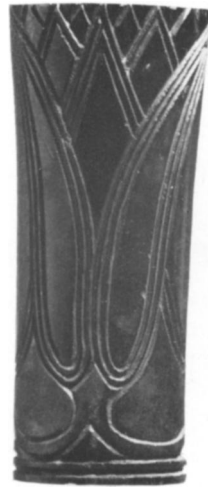
A mud bench ran around three walls of the great hall. At the north end were stone steps leading to platforms or high benches on both

sides of the entrance. At the south end some features occur that reinforce the suggestion that this building may have served as a major religious or political structure. Here was found a stone-lined mud platform, with mud brick steps leading up to it. Directly in front of this platform on the floor was a mass of burned furniture fragments, suggesting that an elaborate chair or throne was originally on the platform. Resting against the platform was a saucer-shaped iron lamp held by a long iron tripod.

2. *Fragments of an Assyrian relief, first half of the 1X century B.C. Ivory, height about 9 inches. Rogers Fund, 65.163.2a,b, 3a,b,c, 4a,b*



Behind the platform was a small brick-paved room, which was partly destroyed. That



3. *Handle incised with lotus flowers, 1X century B.C. Bone, height 2¾ inches. Rogers Fund, 65.163.30*

it had a second storey is proved by material found high up in the fill, but there was no stairway to be seen. Perhaps this room communicated with the larger room to the east, but the destruction of the immediate area makes it impossible to say. This large room was both a kitchen and a storeroom, to judge from the many funnels and large jars found there. It originally communicated by a doorway with the great pillared hall, but this door was blocked when the platform and the bench adjacent to it were constructed. The storey above the kitchen must surely have been the quarters of an important person, for the objects found in the debris were quite rich.

In addition to the typical wood pillars on mud bases and the storage rooms to the east and west of the pillared hall, features found in Burned Buildings I and III, this building also had a raised hearth apparently in alignment with the south platform and the entrance door. Many heads of red deer, complete with great antlers, were found on the floor, perhaps having fallen off the walls. All the above-mentioned features – the platforms, the brick-paved room, the raised hearth, and the deer heads – suggest that BB II was more important than the other two structures excavated. And the objects found there reinforce this conclusion.

The objects recovered in 1964 were found in the south end of the pillared hall, in the east storerooms, and in the second-storey de-

bris of the brick-paved room and large south room. They were of terracotta (sometimes glazed), bronze, gold, ivory, wood, and Egyptian blue, a glass-like substance. There were also many thousands of beads made of shell, stone, Egyptian blue, and amber.

The first examples of writing found at Hasanlu came from the south room. Unfortunately the writing was not in the form of documents, that is, on tablets, but consisted of brief cuneiform inscriptions on objects made of stone: a large shallow bowl, a fragment of a goblet, and fragments of three mace heads. No archive room was found, so scholars must be content with the few sentences preserved. Research still in progress may yield information about the ancient inhabitants, perhaps a name of a king or god. The name of the state in which the city was situated, or even the name of the city itself, might be forthcoming. It is also possible that these objects were imported and therefore will tell nothing about this city, but something about the city from which they came.

The rarest of the objects found, and the most valuable artistically, were the many ivory fragments, of various styles and techniques. Some were imported from the west, Syria and Assyria, while others were probably carved at Hasanlu, although they clearly reflect motifs and ideas from the west. Some are carved in the round, some in bas-relief, and others have simple incisions on a flat background. The collection of ivories received by the Museum after the division of finds includes examples from each category.

A well-carved relief plaque (Figure 2), although preserved only in fragments, shows a recognizable scene: an attendant or priest (he is not wearing a royal headdress, nor is he crowned or winged like a deity) carries a lamb or goat in his left hand and a staff in his right. Ivory staffs of the same type have been found at Nimrud in Assyria, and the pose and the style of the plaque are purely Assyrian. It seems certain that the piece was imported from some Assyrian city. Since the plaque is quite worn, it is evident that it was extensively used before its destruction; it may possibly be from the time of Assurnasirpal II (883-859 B.C.) or Shalmaneser III (850-824 B.C.). Some other pieces in the Museum's collection appear also to be imports from Assyria, because of their style and the fact that exactly the same types of objects occur in Assyria. One piece, of bone, is a cylindrical handle decorated with lotus flowers (Figure 3); another is an ivory fragment of a recumbent calf, similar to many others found at Nimrud; there are also fragments of ivory plaques with concave sides and with representations of an ostrich enclosed within a decorated circle (Figure 4).

A North Syrian city, or an Assyrian workshop staffed by North Syrian craftsmen, is the source of some fragments of pyxides—cosmetic containers—with reliefs of recumbent sphinxes (Figure 6). The wings of the sphinxes originally held an inlay, and the whole creature was covered with gold foil, traces of which still remain. Pyxides of the same type, perhaps made in the same work-

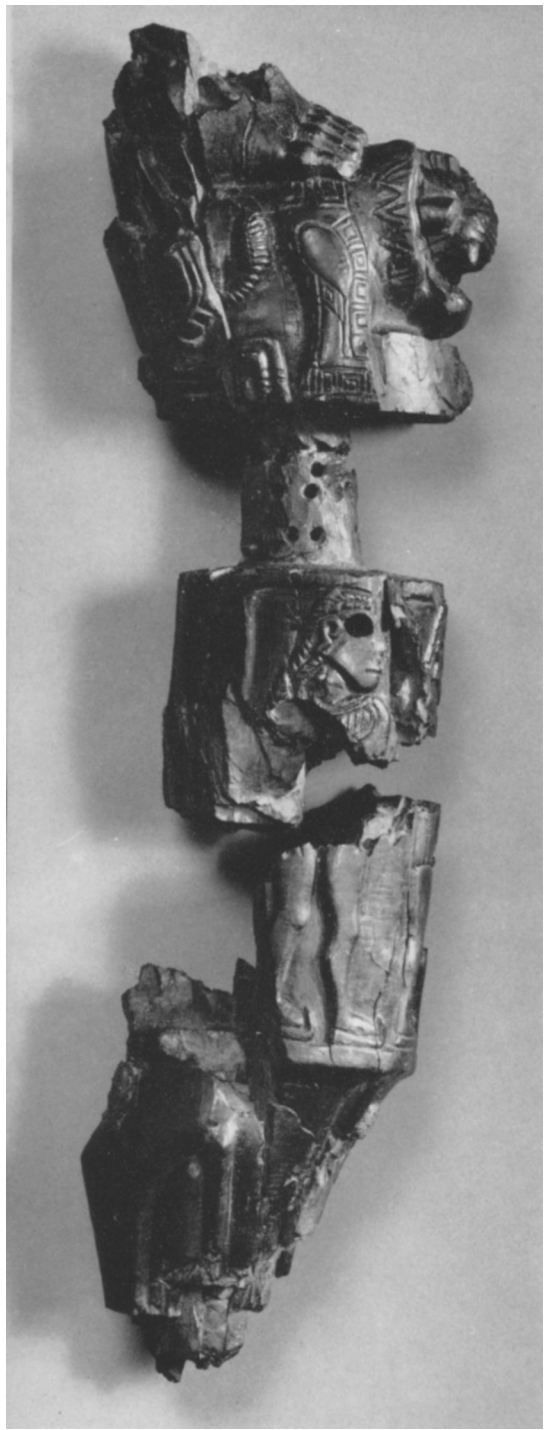


4. Fragment of a plaque, Assyrian style, IX century B.C. Ivory, height 2 inches. Rogers Fund, 65.163.33



5. Ornament, Zincirli, North Syria, IX-VIII century B.C. Silver with gold overlay, height 3 inches. *Ausgrabungen in Sindschirli*, v, pl. 46,k

6. Fragments of two pyxides of Syrian style, IX century B.C. Ivory, heights $1\frac{7}{16}$ inches, $1\frac{5}{8}$ inches. Rogers Fund, 65.163.5.81



7. Pedestal for a deity, 1X century B.C. Ivory, height 10 inches. Rogers Fund, 65.163.1a,b,c

shop, were found years ago at Nimrud. The style of the sphinxes' heads is very close to that of heads represented on some metal objects from Zincirli in North Syria (Figure 5). The flamelike pattern on the rear legs is also typically found on animals represented in art in several North Syrian cities.

Many of the ivories appear to be the products of local craftsmen, since stylistic details are seen to be similar to those of other objects considered to be locally made, and because no immediate parallels are forthcoming from foreign centers. One of them is without parallel anywhere. It is a pedestal consisting of a sculptured cylinder supporting a magnificently made lion upon which stands a deity, of which only the feet remain (Figure 7). Several parts of the pedestal are missing, but one can still see how monumental the object must once have been. The open-mouthed lion, with its triangular ruff design, its muzzle, small ears, and gable-like head, reflects influence from North Syria. Yet there are differences, which show an independent inspiration: the geometric outline of the front legs, the position of the tail, and the foreshortening of the body. Animals on ivories from Gordion in Anatolia, and Ziwiyeh in Iran, presumably later in date, have outlined legs, but the manner of outline is not the same as on the pedestal lion.

The cylindrical lower part of the pedestal was made from two pieces of ivory held together by a bronze nail. A tang on the upper part fitted into a socket in the base of the lion. The tang, originally masked by some material which is now lost, was held in place in the socket by a bronze nail that also pierced the lion; its head may be seen between the lion's feet.

Two men walk toward the right, where they confront a third man. The men wear kilts and sandals with curved-up tips. The man in the center has a beard, unlike his companions, and he apparently drinks from a cup or goblet. He is no doubt the principal figure, for not only is he larger than the others, but he is directly below the lion's head. Moreover, although all three men have the same facial type, a large sloping nose, round or slightly

oval eyes, ears shaped like question marks, and long hair, the central figure has a different hair style, and he alone wears a fillet. Either this figure or the one he faces carries a mace with its head down. The men on either side both have a narrow object or piece of clothing hanging down and resting along one thigh. Perhaps this was a scene of introduction, the center man being introduced to the man at the right. Examples of men carrying a mace with the head pointed down are known from other works of art and may suggest a peaceful gesture.

Since the lower part of the pedestal is missing, it is not possible to tell whether it was attached to some other object or was self-standing. Machteld Mellink has suggested that the bottom resembles a bull's leg. The motif of a deity on an animal was known all over the Near East, and it is not surprising to find it at Hasanlu, but what specific significance the whole object had and how it was employed is not clear.

Men with the same physiognomy are to be seen on other works of art from Hasanlu, for example on a silver beaker found in 1958 (Figure 10). The men on the beaker also wear kilts, although of a different style.



8. *Head of a man, 1X century B.C. Ivory, height 1 1/8 inches. Rogers Fund, 65.163.16*
9. *Head of a man, 1X century B.C. Ivory, height 1 inch. Rogers Fund, 65.163.15*
10. *Drawing of a silver beaker from Hasanlu, 1X century B.C., Archaeological Museum, Tehran. Drawn by Grace Freed Muscarella from photographs. The University Museum, Philadelphia*





11. Fragments of a chariot battle scene, reconstructed, IX century B.C. Ivory, height of chariot $1\frac{1}{16}$ inches. Rogers Fund, 65.163.19, 21. Note the hand holding a spear in front of the horses' heads



12. Horseman with a spear riding over an enemy, IX century B.C. Ivory, height $1\frac{3}{4}$ inches. Rogers Fund, 65.163.9

RIGHT:

13. Relief of a chariot battle scene from The Long Wall of Sculpture at Carchemish, North Syria, IX century B.C. Stone. Archaeological Museum, Ankara



14. Fragments of a battle scene, reconstructed, IX century B.C. Ivory, heights $1\frac{1}{16}$ inches, $\frac{7}{8}$ inch. Rogers Fund, 65.163.8, 18

Two heads in relief (Figures 8 and 9) also show a close stylistic resemblance to the heads on the pedestal and the silver beaker, as well as to each other and to other heads on Hasanlu ivories.

Another locally made ivory that reflects outside influences, in particular from North Syria, is a flat plaque with a chariot battle scene (Figure 11). The chariot with six-spoked wheels and a nude enemy under the horses occurs in the art of both North Syria and Assyria in the ninth century, but whereas in Assyria the horses are represented galloping, in North Syria they usually have all four feet on the ground (Figure 13).



A fragment of a horseman wielding a spear and riding over a prostrate nude enemy wearing sandals (Figure 12) is from the same room and is clearly related to this chariot scene. Moreover, the linear decoration on the horse, which represents hair, is similar to decoration on some of the animals on the silver beaker mentioned above and a famous gold bowl also found at Hasanlu in 1958. This decoration may also be seen on some of the animals represented on gold vessels from Marlik, in the southwest Caspian region, and on some of the stone reliefs of animals from Tell Halaf in North Syria, but there in a more cursory manner. This type of decoration, then, is clearly at home in Iran.

Another piece from the same room may have been part of the same scene. A man with a strange hat, which might be a feathered headdress, fights off two enemy soldiers (Figure 14). The man carries a round shield and wields a socketed spear, which he thrusts against an enemy's bare foot. His clothing has the same decoration as the horseman's. The headdress is reminiscent of types represented on some Luristan pins and of the much later headdresses worn by Persian guards at Persepolis in southern Iran. Moreover, its history goes back to the late third millennium B.C., for it may be seen on a warrior represented on a rock relief near Sar-i-Pul in western Iran.

A fragment of a woman tearing her hair in despair, next to a tower into which a spear or arrow is stuck (Figure 16), may also have been part of the same scene, as it was found in the same room. Siege scenes are fairly common in Assyrian reliefs. A woman next to a tower and in a pose similar to ours may be seen on a relief fragment from the palace of Assurnasirpal II at Nimrud (Figure 17). A fragment of bowmen (Figure 15) may also be part of a siege scene, although it could not be the same one, since the piece was found in a different room. It may be that the Hasanlu siege scenes represent Hasanlu soldiers attacking another city in Iran; the artist who carved the ivory was no doubt inspired by western reliefs.

A small but impressive fragment shows two open-mouthed lions *en face*, their front paws touching (Figure 18). Such scenes are to be found in Mitannian art in Mesopotamia and Iran during the second half of the second millennium B.C. Sometimes, however, in these scenes the lions' paws stop short of touching, as on a Mitannian seal (Figure 19). The resemblance is unmistakable.

Two other plaque fragments represent winged lions or lion-griffins. The better-preserved piece (Figure 21) shows a seated lion, one of whose paws is held up. Its wings end in a straight line, and it has long ears and a scorpion's tail, the sting of which is missing. It seems that a second lion-griffin touched its nose and paw. The second fragment (Figure 20) shows exactly the same type of lion-griffin, but it does not touch noses with another crea-



15. *Two bowmen, 1X century B.C. Ivory, height $\frac{1}{16}$ inch. Rogers Fund, 65.163.25*



16. *Woman next to a tower, 1X century B.C. Ivory, height $1\frac{3}{16}$ inches. Rogers Fund, 65.163.24*

17. *Detail of a relief from Nimrud, period of King Assurnasirpal II (883-859 B.C.). Stone. British Museum*



18. *Two confronting lions, IX century B.C. Ivory, height 1 5/8 inches. Rogers Fund, 65.163.11*



19. *Impression of a Mitannian seal from Tepe Giyan, Iran, XV-XIV centuries B.C. Rogers Fund, 56.81.14*



RIGHT:

20. *Lion-griffin, IX century B.C. Ivory, height 1 3/16 inch. Rogers Fund, 65.163.22*

ture. Their similarity indicates that they came from the same workshop, quite possibly in Iran, although they may have been imported from the west.

Representations in art of human heads are always especially exciting finds because one is always interested in seeing what an ancient people looked like and how they depicted their own physical characteristics. Two heads in the round (Figures 22 and 24) have some features similar to heads found at Nimrud, of North Syrian style: oval eyes with inlay for the iris, inlaid eyebrows, and narrow, slightly protruding mouths. But the two pieces have long jaws and hollow cheeks, which are more at home in Iranian art than in the west. For instance, a terracotta statue from Chekka-Sabz in Luristan in the Museum's collection (Figure 23) and some representations of men on several Luristan bronzes have hollow cheeks, albeit more stylized. Several other objects from northwest Iran have representations of



21. *Lion-griffin, IX century B.C. Ivory, height 1 5/16 inches. Rogers Fund, 65.163.10*



heads with a narrow protruding mouth. This manner of depicting the mouth was thus common to both Iran and Mesopotamia. The smaller of the two ivory heads (Figure 22) is magnificently sculpted by a master craftsman and is one of the finest pieces from the Hasanlu group.

Very few areas in the ancient Near East outside of Egypt have yielded carved or sculpted wood. One thinks primarily of the wooden objects from the island of Samos or from the tombs at Gordion in Turkey. A few pieces of carved wood were found in past cam-



22. Head, IX century B.C. Ivory, height $1\frac{5}{8}$ inches. Rogers Fund, 65.163.6



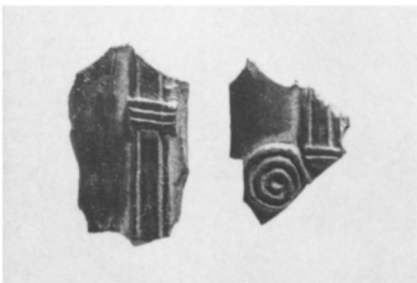
23. Statue from Chekka-Sabz, Luristan, early 1 millennium B.C. Terracotta, height $2\frac{3}{4}$ inches. Rogers Fund, 43.89.3



24. Head, IX century B.C. Ivory, height $2\frac{3}{4}$ inches. Rogers Fund, 65.163.7

25. *Lion's head, IX century B.C.*
Wood, height $1\frac{5}{16}$ inch. Rogers
Fund, 65.163.42

26. *Horse's head, IX century B.C.*
Wood, height 1 inch. Rogers
Fund, 65.163.43



27. *Fragments of a stylized tree, IX century B.C.* Wood, heights 1 inch, $1\frac{3}{16}$ inch. Rogers Fund, 65.163.45a,b

28. *Goblet with nipple base, IX century B.C.* Glazed terracotta, height $4\frac{7}{16}$ inches. Rogers Fund, 65.163.65



paings at Hasanlu, and more were recovered in 1964 from BB II. All the wood had burned to charcoal in the fire, insuring its survival.

The most beautiful piece is a complete head of a man wearing a tall hat and with a thin face and hollow jaws, now in Tehran. The hollow jaws are reminiscent of the ivory heads discussed above, but the head is without parallel in style and material. Several other small and tantalizing fragments in sculpted wood are in the Museum's collection. A lion's foot – wearing what appear to be thongs – stands on a base. A masterfully carved head of a lion in the round with what seem to be the feet of another lion on its head (Figure 25) is similar to the head of the lion on the pedestal (Figure 7). A horse's head in relief (Figure 26) is comparable to the carving in Figure 11, and fragments of a stylized tree (Figure 27) have an exact counterpart in ivory from Hasanlu.



29. *Cup, IX century B.C.* Glazed terracotta, height $2\frac{3}{8}$ inches. Rogers Fund, 65.163.67

30. *Goblet with nipple base, IX century B.C.* Egyptian blue, height $4\frac{13}{16}$ inches. Rogers Fund, 65.163.36. (Photographed upside down, before cleaning)

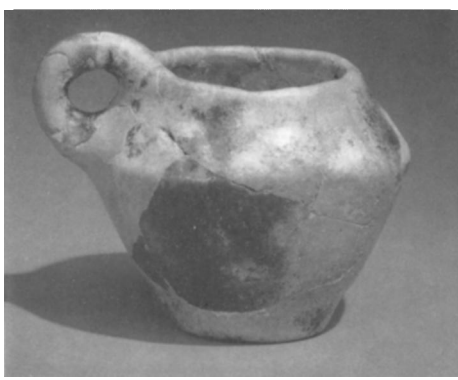
Evidently a tradition of wood carving existed side by side with ivory carving at Hasanlu, and it may be assumed that the same artisans worked with both materials.

Objects of other materials found in BB II are equally impressive in both quality and quantity. And here too some of the objects seem to have been imported, others locally made. In ceramics there were both glazed and plain specimens. Of the former there are Period IV spouted jugs, in some cases resting on a tripod stand, a combination often found in graves. From the earlier Period V there is a fine pedestal-base goblet, a shape very characteristic of its time. The peoples of both Periods IV and V commonly employed gray ware, attesting to some cultural continuity between the two periods.

A goblet with a nipple base (Figure 28), which must have had a separate supporting

31. *Cosmetic stand, IX century B.C.* Egyptian blue, height $3\frac{5}{16}$ inches. Rogers Fund, 65.163.38

32. *Mace head, IX century B.C.* Limestone with gold inlay, height $2\frac{13}{16}$ inches. Rogers Fund, 65.163.48



stand, a cup (Figure 29), and a fragment of a bull's head are examples of glazed material. The nipple-base vessel, covered with blue-green glaze, is very reminiscent of vessels from Assur, Nuzi, Tell Billa, and Tell al Rimah, all in Mesopotamia and dating to the second half of the second millennium B.C. Similarly shaped vessels from the early first millennium are also known at Tell Billa, Nimrud, and Assur in Mesopotamia, and also from Tell Fakhariyah in North Syria. It is evident that the vessel was a popular one known across the Near East over a long period of time. The glazed bull head must have been part of a wall plaque similar to another, and finer, example of a lion's head, found in BB II and now in Tehran.

One of the finest objects found is an Egyptian-blue goblet, also with a nipple base and decorated in relief with guilloches—a very common motif in the Near East during the first millennium B.C.—a rosette, and what may be a mountain or a stone pattern (Figure 30). The original blue color of the goblet has, unfortunately, been removed by fire. This goblet may be an import, perhaps from Assyria, but we cannot be certain. The same uncertainty exists for several other objects of Egyptian blue. A small stand divided into three compartments (Figure 31) may once have held ladies' cosmetics. The function of another object, an exact duplicate of which is in Philadelphia, remains a mystery: it has a "handle" decorated with a guilloche pattern, and a small rectangular opening above the handle (Figure 33). Both pieces were found together in the second-storey fill of the large south room, and they may have been parts of furniture, or used to hold an object.

The artisans of Hasanlu used all kinds of raw materials, and stone objects were fairly common. Tripod bowls, molds, tools, and beads for jewelry were part of the repertory of the stone industry. Quite a few stone mace heads were found, some no doubt used in battle and others apparently as symbols of authority. One of these (Figure 32) was inlaid with small gold rings; it surely belonged to an important person and could not have been an ordinary weapon of war. Another type of stone



33. *Object of unknown function, IX century B.C. Egyptian blue, height 6 1/8 inches. Rogers Fund, 65.163.37*

34. *Mace head, 1X century B.C.*
Stone, height 3 $\frac{3}{16}$ inches. Rogers
Fund, 65.163.47

mace head found has a long hollow socket with a rosette-shaped head (Figure 34). The stone is highly polished. A very similar mace head, in bronze, was found at Tepe Hissar (Period II) in eastern Iran, and another, in stone, was found at Tepe Giyan to the south, so the type is surely Iranian.

A goblet carved from a jasper conglomerate is also finely made. Its high polish makes each stone in the conglomerate seem to be an inlay (Figure 35). A bronze peg was found in the base, indicating that the bottom, now missing, may have been of a different material.

35. *Vessel, 1X century B.C. Jasper*
conglomerate, height 5 $\frac{3}{4}$ inches.
Rogers Fund, 65.163.51



As may be expected, metal was very commonly used by ancient artisans, although not many metal pieces have found their way to New York. A small crude hollow bird's head of electrum that was part of a necklace or bracelet, and two electrum pendants with a cluster of granulations at one end (Figure 36) were found. One of the two pendants was attached to an amorphous piece of ivory and apparently ornamented some ivory object, perhaps the ears of a female statuette, shattered by the collapse of the walls.

While excavation on the city mound was in progress, another team excavated graves in the north cemetery. Well over a hundred and fifty graves belonging to Periods II to V have been discovered and recorded to date. The dead were usually buried in unlined pits with some pottery and personal ornaments, rings, straight pins, occasionally a belt. Fibulas (safety pins) were never found in Period IV graves, although they did occur in later ones, of Period III (Figure 37) and II (Figure 38). The belief that fibulas were not generally used in Iran before the late eighth century B.C. is thus reinforced. The burial pattern and grave material of Periods IV and V have yielded information that substantiates the opinion that there was some continuity of culture at Hasanlu between about 1200 and 800 B.C.

The architecture, graves, and material products of the people of Hasanlu, taken together,

reveal much about the culture in this area in the ninth century, and yet there is much still concealed. The merchants and artists of Hasanlu traveled great distances and brought back fine objects, no doubt in exchange for fine locally made products, and produce. Foreign merchants and artisans, from both east and west, may have visited Hasanlu regularly. The occurrence of similar motifs and objects in Syria by the Mediterranean Sea and at Hasanlu near the Caspian Sea documents a vigorous exchange of material and ideas across the whole ancient Near East in the early first millennium, and indeed there are indications that this *koine*, this sharing of culture, had already begun in the second millennium.

An examination of the monumental buildings, fortification walls, and great wealth recovered shows that Hasanlu was a major city in the early first millennium, and that it was ruthlessly destroyed. Both the Urartians and the Assyrians invaded this area several times in the ninth century, so it seems plausible to suggest that one of these states was the enemy who burned the city. Whether the city was Mannaeen or Parsuan is still a debatable issue and need not be discussed here. If, however, subsequent research proves that Hasanlu lay

in Parsua and not, as most scholars now think, in Mannai, then the people of Period IV may possibly have been the ancestors of the Achaemenid Persians, or at least related to them. The ancient name itself of the city still eludes archaeologists, but whatever it was called – and we still hope to learn it – Hasanlu Tepe has become a landmark in Iranian archaeology.

NOTE

The objects in Figures 3, 6, 7, 15, 22, 24, and 30-36 were found in the large south room; Figures 8, 20, 21, 26, and 27 in the brick-paved room; Figures 28 and 29 in the southeast area of the great pillared hall; and Figures 2, 4, 9, 11, 12, 14, 16, 18, and 25 in the eastern storerooms.

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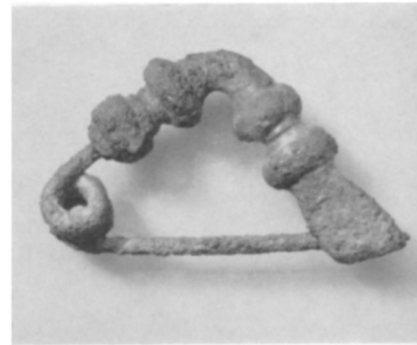
36. *Pendants with ivory fragment, IX century B.C. Electrum, height 7/8 inch. Rogers Fund, 65.163.62a,b*



37. *Fibula from a burial, Period III, VII-V centuries B.C. Bronze, height 1/2 inch. Rogers Fund, 65.163.56*



38. *Fibula from a cist tomb, Period II, V-IV centuries B.C. Bronze, height 1 inch. Rogers Fund, 65.163.55*



Portrait of a King

PRUDENCE OLIVER HARPER

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One of the most popular subjects in the major arts of the Near East in the Sasanian period was the king. On immense rock reliefs, on silver vessels, and in a multitude of other media dating from the third to the seventh century A.D. there are representations of the royal person. He is shown overcoming his enemies, hunting or banqueting, enthroned, or being invested with kingship by Zoroastrian divinities. In this wealth of royal Sasanian art, however, the Museum's newly acquired head of a king (Figures 1, 6, and 18) is without parallel or peer. It is extraordinary that it was not destroyed, either in antiquity or more recently by those who accidentally came upon it. Even in Sasanian times it must have been an object of rarity. Ancient records mention the quantity of silver vessels that existed in this period, and a large number of plates, bowls, and ewers have survived and are in museums throughout the world. There is no such evidence, ancient or modern, of nearly life-size sculptures in precious metals.

For four hundred years the kings of the Sasanian dynasty controlled an empire that extended at times beyond Iran and Mesopotamia to present-day Afghanistan in the east, and to Armenia, Syria, Yemen, and even Egypt in the west. Vast trade routes led from China to the Mediterranean and served to create a closely interconnected world as much as did war and conquest. Such contacts with foreign powers had an impact on Sasanian art. Although the stylistic development of this art cannot always be completely followed, nor the sources of varied influences easily traced, general trends are apparent. Earlier in the period the art of the Greco-Roman world introduced a naturalism sometimes bordering on realism; later, in the fifth, sixth, and seventh centuries, the arts of India, Afghanistan, and Central Asia are reflected increasingly in certain stylizations of form and detail.

1. *Head of a king. Sasanian, about IV century A.D. Silver-gilt, height 15 $\frac{9}{16}$ inches. Fletcher Fund, 65.126*





2. *Obverse of a silver coin of Shapur II (309-379). American Numismatic Society*



3. *Obverse of a silver coin of Yazdgard I (399-420). American Numismatic Society*



4. *Drawing of the head of Shapur III in Figure 5, by E. Herzfeld. *Archaeologische Mitteilungen aus Iran*, 1X (1938), p. 113*

5. *Rock relief of Shapur III (383-388) and Shapur II at Taq-i-Bustan, Iran. Photograph: Herzfeld Archives, Freer Gallery of Art, Washington, D.C.*



alistically modeled surfaces of the cheeks and mouth. The king wears, in standard Sasanian fashion, rather simple ovoid earrings and a beaded necklace, both gilded. His eyes, staring forward, are arresting, and the graceful curve of the nose reveals that to some degree the artist attempted an actual portrait of his king, rather than simply an idealized image. The sculpture is, however, not so distinctive nor our knowledge of the features of Sasanian rulers so accurate that this king can be recognized simply by his physical appearance.

The names of the Sasanian kings are known, and, for the most part, the dates of their reigns. In addition, their coins provide a record of their crowns, which included symbols of the different Zoroastrian divinities: crenellations, rays, wings, crescents, or plant forms. These crowns changed frequently, from reign to reign and often within a single reign as well. Thus kings depicted in works of art can often be identified by their crowns, if comparison is made with the coins. There are, however, representations of crowns in Sasanian art that do not occur on any of the coins, possibly be-

cause such crowns were worn for a specific occasion or had a limited significance. It is evident too that new elements appeared first in these works of art, to be adopted and reproduced only later for the official images on the coins.

The crown on the Museum's head is one of those not recorded on any extant Sasanian coin, so it alone cannot provide a certain identification of the king. It is, however, extremely similar to a crown on one Sasanian coin. The four crenellations and the beaded band are exactly like those of the crown on a coin of Shapur II (309-379) (Figure 2). The only difference is the small crescent within the front crenellation on the silver head.

No crescent appears on any Sasanian crown shown on a coin until the time of Yazdgard I (399-420), a grandson of Shapur II. In this crown (Figure 3) the crescent is a major element. It replaces the forehead crenellation and rests directly on the beaded band, and only one crenellation is visible. Yazdgard's crown is thus quite unlike those of Shapur II or the Museum's silver king.

In spite of the evidence of the coins, a later work, the tenth-century *Annals of Hamza al-Isfahani*, says that the crowns of both Shapur II and his son Shapur III (383-388) included a crescent. The account, taken from a book of kings probably compiled late in the Sasanian period, says that the Bahrams I, II, and III, who ruled from 273 to 293, as well as the Shapurs II and III, wore golden crowns with two crenellations and a golden crescent. These descriptions in their original form were probably written two or three hundred years after the death of the kings mentioned, and they are undoubtedly not entirely accurate. Ernst Herzfeld has noted that none of the crowns on the coins of these five kings exactly matches the description.

There is, however, evidence that, at least in the detail of the crescent on the crown of one of these kings, Hamza's description may not be wrong. In a rock relief at Taq-i-Bustan near Kermanshah, in western Iran, two male figures are shown standing side by side (Figure 5). The accompanying inscriptions identify them as Shapur III and Shapur II. The polit-

6. Profile view of the silver head



7. *Head of a figure on a silver bowl. 111 century. Hermitage Museum, Leningrad. Drawing by E. Herzfeld in The Metropolitan Museum of Art*



8. *Head of Shapur II on a silver-gilt plate. IV century. Freer Gallery of Art, Washington, D. C.*



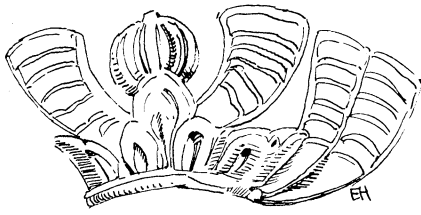
9. *Top view of the silver head*



ical purpose of the relief was probably to emphasize the continuity in the line of succession from father to son. In fact, the line was broken for a few years, from 379 to 383, when Ardeshir II, whose relation to the Shapurs is uncertain, held the throne. The head of Shapur III, on the left, is badly worn, so it is impossible to distinguish all the elements in his crown, but a crescent is clearly visible (Figure 4).

The crowns of Shapur III on his coins contain no crescent. Here then is an illustration of the existence of an important iconographical feature on a royal headdress some time before it appears on the coins. Its occurrence at this time may be the result of influence from a neighboring kingdom, the Kushan. This tribe came from northwestern China and ruled over an extensive area, including present-day Afghanistan and part of India, from the first to the third century. The coins of the Kushans as well as those of the Kidara Kushans, another branch of the same tribe, show that the crescent was in almost continuous use as an element of the royal headdress. The Sasanians came into contact with the Kushans in the third century, and Sasanian princes ruled over them in the fourth. It is possible therefore that familiarity with the Kushan custom led the Sasanian king in the fourth century to include the crescent as part of his crown.

The presence of the crescent on the crown, however, is not the only way in which the



10. Crown on a Kushano-Sasanian coin. IV century (?). Drawing by E. Herzfeld, *Memoirs of the Archaeological Survey of India*, no. 38, p. 24, fig. 13



11. Obverse of a silver coin of Kidara. IV century (?). British Museum



12. Obverse of a gold Kushano-Sasanian coin. IV century (?). British Museum

silver king's headdress differs from those on the coins of Shapur II. In Sasanian art the large ball that customarily rises from the king's head represents his hair, which is usually covered by a thin silk cloth. The curving wind-blown ripples on this cloth give it some texture, and it is often decorated with dots, perhaps symbolic, perhaps at times intended to represent pearls (Figures 2 and 3). Much rarer in Sasanian art is the type of globe rising above the silver king's head.

This globe has strong vertical striations. The view from above (Figure 9) shows that these join, producing forty-eight long, narrow, petal-like forms. At the top are four additional rippled concentric circles, whose design appears to represent the ends of inner layers of "petals." The two successive inner circles have, furthermore, forty-eight scallops, the same number as the outside ring.

This kind of globe, although it is not seen on any coin, is not unknown in Sasanian art. It occurs on one third-century rock relief at Naqsh-e Rostam, where it forms part of a standard and rises from the king's shoulders as well as from his crown. A third-century silver bowl shows a figure wearing a horned headdress surmounted by the striated globe (Figure 7), and a fourth-century plate showing Shapur II again includes this form within the king's crown (Figure 8). On a cameo of the third or early fourth century in the Bibliothèque Nationale, a Sasanian royal figure on horseback fighting with another equestrian,

apparently Roman, also has the striated globe surmounting his head and shoulders. The globe rising from the silver head is almost identical to these. The only difference is that they are gathered in at the base, whereas the striations on the Museum's head run down into the crenellations of the crown.

An area in which this type of globe does occur on coins is in the Kushan lands to the east of Iran, in the period of Sasanian supremacy (Figure 10). There, as well as on coins of the Kidara Kushans (Figure 11), probably of the fourth century, is the same striated ball, often with a punched or raised circle at the apex of the globe, which may be a way of depicting the circular design shown in Figure 9. Because this striated globe never occurs on Sasanian coins, its occurrence in Sasanian art has been attributed to Kushan influence. Yet, as the chronology demonstrates, the influence could equally well have been the other way.

Scholars have discussed the meaning of the striated globe, but without coming to any convincing conclusions. Clearly it is not the hair itself, and it is not the common wind-blown cloth covering of the hair ball to be seen on Sasanian coins. There is no resemblance to any lunar or solar symbol. It seems closer to a vegetal form but is definitely not the lotus flower that also appears on Kushano-Sasanian coins (Figure 12). The dotted design on the Freer plate's striated globe suggests that the material of which the Museum's globe

was actually made may have been silk, but the meaning of the form into which it has been stitched or folded is not apparent. Surely it is not simply decoration. In spite of the additional view, down from above, provided by the Museum's example in the round, it remains an unexplained feature.

A definite identification of the silver king, therefore, cannot be made through a study of his headdress. The separate details can be found in the arts of the Sasanian empire in the fourth century, but no parallel for the complete form. To determine more precisely the date of the head it is necessary to consider its style. Here we are hindered by either the paucity or the poor condition of comparable material. The stucco or stone sculptures that exist are often badly worn, and the great rock reliefs themselves are not published in such detail that minor elements – types of eyes or beards or personal ornaments – can always be closely examined. The royal heads on Sasanian coins and vessels are on such a small scale that their style or the method of executing various details is hardly comparable to this almost life-

size sculpture.

One feature that is apparent to some degree on the rock reliefs is the treatment of the hair. Many third-century reliefs (Figure 13), and certain silver vessels of this period (Figure 14) show the curls at the ends of the locks as whorls formed by three or four lines radiating from a single point. The curls on our silver head, however, are spirals rather than whorls. Such spiral curls appear in the third century, for example on the relief of Shapur I at Naqsh-i-Rajab (Figure 16). But here each deeply modeled curl is divided by a great number of fine lines. By the fourth century, on the reliefs of Ardashir II (Figure 15) and Shapur III at Taq-i-Bustan, a development has taken place: the curl is flattened and not so deeply modeled, and only a pair of lines divides its surface. These are the reliefs that are closest stylistically to the Museum's silver head.

A minor difference between the silver head and most of the kings on rock reliefs and coins is the direction in which the curls turn. On the reliefs and coins the line of the hair coming down from the crown usually reverses

13. *Head of Anahit on a rock relief of Narseh (293-302) at Naqsh-i-Rustam. Photograph: Herzfeld Archives, Freer Gallery of Art, Washington, D.C.*



14. *Head of a figure on a silver bowl. III century. Cincinnati Art Museum, Gift of Mr. and Mrs. Warner L. Atkins*

itself upward and finally curls in toward, rather than out from, the face. A rock relief, of Bahram II at Sar Meshed (Figure 17), however, illustrates the less common form visible on the silver head. There is a parallel too for the division of the curls at the back of the head, where those curling to the right meet those curling to the left. This occurs on a stone statue in the round of Shapur I near Bishapur.

The remaining detail of importance is the beautifully and intricately braided and bowed beard. Braiding or bowing appears in Sasanian art more commonly on the tails of horses than on the beards of kings. Beards gathered in by a ring or tied with a ribbon, however, are common in royal portrayals on coins from the time of Shapur I through Yazdgard II (438-457), but after Yazdgard II this custom is discontinued. The magnificent moustache, noteworthy in its perfect wave and great length, is not exceptional for a Sasanian king. It is quite unlike earlier Elamite, Achaemenian, or Parthian moustaches, but is so common a Sasanian form that it is recorded on the coins of most Sasanian kings and is therefore no cri-



16. *Rock relief of Shapur I (241-272) at Naqsh-i-Rajab, Iran.*
Photograph: Elsie J. Holmes

17. *Rock relief of Bahram II (276-293) at Sar Meshed, Iran.*
Photograph: Herzfeld Archives, Freer Gallery of Art, Washington, D. C.



15. *Rock relief of Ardashir II (379-383) at Taq-i-Bustan, Iran.* *Photograph: Herzfeld Archives, Freer Gallery of Art, Washington, D.C.*



18. *Back view of the silver head*



terion for dating. Such minor elements as the shape of earring and the form of the necklace also persisted for too long a time to be significant.

What evidence there is, then, seems to point to the fourth century as the most likely time in which the silver head was made. The hair style resembles that of Ardeshir II (379-383) and Shapur II and III on their reliefs; the tied or ringed beard was retained on the conservative images of the coins no later than Yazd-gard II. The strongest evidence is that given by the crown, which is closest to one of Shapur II. In spite of the fact that it is Shapur III, not Shapur II, who first appears on a rock relief with a crescent as part of his headdress, his crowns are in no other way similar to that of the silver king. Without the crescent there would be almost no question that the crown is that of Shapur II. With the crescent in such a minor position, it still seems likely that this is Shapur II. If the son Shapur III used the crescent in a rock relief where he wished to emphasize his closeness to his father, it may be that Shapur II had already used it in one of his own crowns.

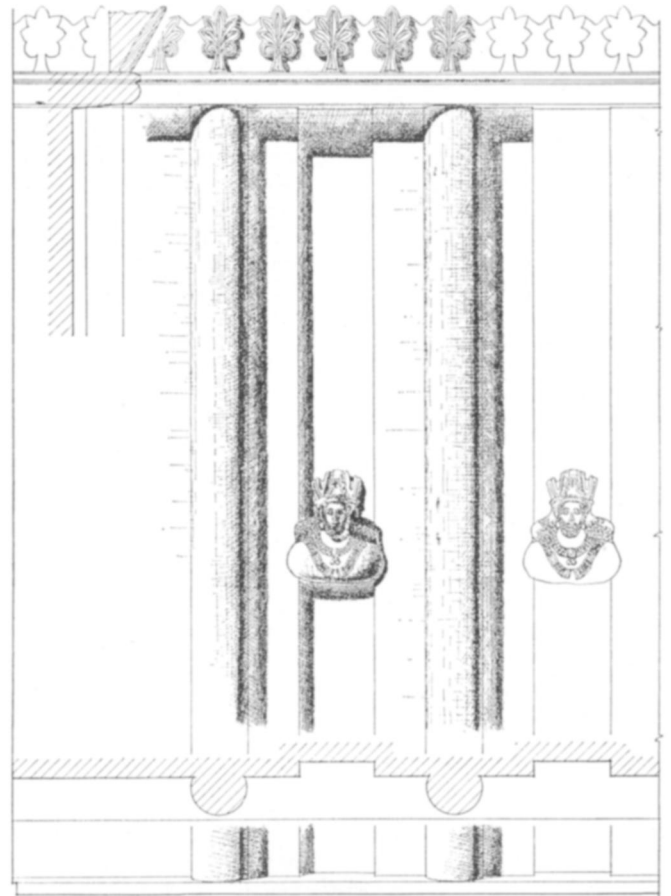
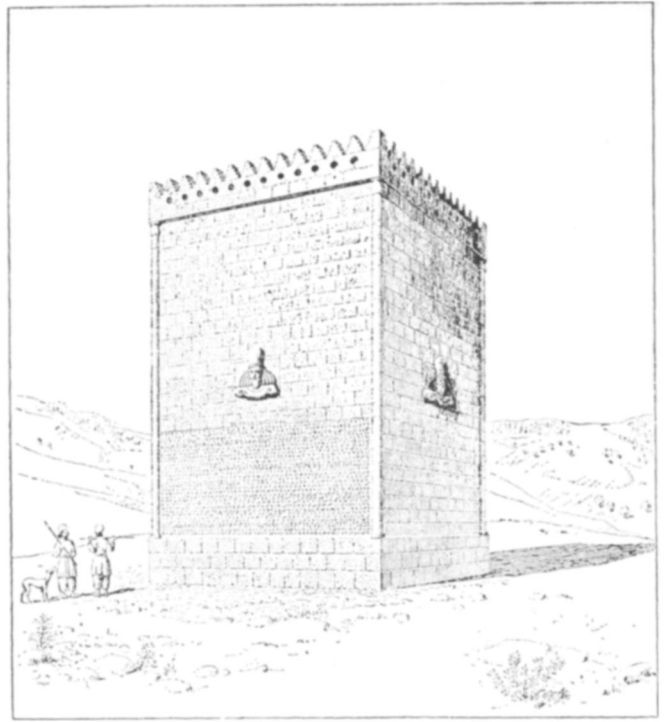
If this is Shapur II, then this is a king who ruled Iran in a flourishing period. Although during a considerable time at the start of his reign he was in his minority, when he took over the government he became a vigorous and successful king. By the 330s he had occupied Armenia, and during his reign Sasanian princes ruled in the Kushan east. This was the period in which Constantine embraced Christianity, and therefore it became in the Sasanian empire the religion of the enemy. In consequence, the first harsh persecutions of Christians belong to this reign.

The contemporaneous Roman historian Ammianus Marcellinus has left us descriptions of Shapur II. At the siege of Amida in Armenia, Marcellinus writes of the Persian host: "And when the first gleam of dawn appeared, everything so far as the eye could reach shone with glittering arms, and mail-clad cavalry filled hill and dale. The king himself, mounted upon a charger and overtopping the others, rode before the whole army, wearing in place of a diadem a golden image of a ram's head set

19. *Reconstruction of the Paikuli monument, Iran, III century.*
A. U. Pope, ed., *A Survey of Persian Art*, 1, fig. 164

with precious stones, distinguished too by a great retinue of men of the highest rank and of various nations. . . . However, the power of heaven, in order to compress the miseries of the whole Roman empire within the confines of a single region, had driven the king to an enormous degree of self-confidence, and to the belief that all the besieged would be paralyzed with fear at the mere sight of him, and would resort to suppliant prayers. . . . And so the night watches were passed under the burden of arms, while the hills re-echoed from the shouts rising from both sides, as our men praised the power of Constantius Caesar as lord of the world and the universe, and the Persians called Sapor 'saansaan' and 'pirosen,' which being interpreted is 'king of kings' and 'victor in wars'." Shapur's success as a military commander and administrator is heightened by comparison with his immediate successors. After his death the power of the nobility grew, and in a time of unrest the kings Ardeshir II and Shapur III held the throne for only a few years.

There is no way of knowing how or where the Museum's silver sculpture was used. It is impossible to tell whether it was only a fragment of a complete statue – made of additional pieces of silver or of some other material – since the entire lower edge has been ruthlessly torn and cut away. There is one complete over life-size statue in the round, the figure in stone of Shapur I at Bishapur mentioned above. Somewhat more common are busts of Sasanian kings. Four of Narseh (293-302) in stone adorned a square tower, the Paikuli monument, north of Kermanshah in Kurdistan (Figure 19). A number in stucco were placed on the walls of Palace II at Kish in Iraq (Figure 20). A few other heads of kings in stone or stucco exist, but are of uncertain



20. *Reconstruction of the stucco decoration from Palace 11, Kish, Iraq.* A. U. Pope, ed., *A Survey of Persian Art*, 1, fig. 172

provenance and date. It is evident, therefore, that busts of the king were placed on special monuments or on the walls of palaces. A sculpture in precious metal such as this silver head, if it comes from a province (northwestern Iran has been suggested), may have been set up in the residence of the princely governor as a tangible sign of the king's presence and authority.

Ramsey MacMullen has written that in Roman art of the third and fourth centuries "imperial statues were coming to resemble their subjects [the emperors] by being borne about in processions, carried in chariots, wreathed and hailed and addressed as witnesses to oaths." The somewhat staring visage, as he has said, becomes an important sign of "imperturbable omnipotence." Within Sasanian Iran it is perfectly credible that this sculpture of the king also had such significance and was thought to be an actual embodiment of the king, an awesome and revered symbol of a powerful monarchy.

NOTES

The description of the crowns in the Sasanian book of kings is from J. M. E. Gottwaldt, ed., *Hamzae Ispahanensis Annalium*, Lipsiae, 1848, Liber primus, Caput quartum, pp. 35-39. The Naqsh-i-Rustam relief with the striated globes is illustrated in F. Sarre and E. Herzfeld, *Iranische Felsreliefs*, Berlin, 1910, pl. vi. The Bibliothèque Nationale cameo, probably the work of a Roman craftsman for his Sasanian overlord, is in R. Ghirshman, *Persian Art*, New York, 1962, fig. 195. The quotation from *Ammianus Marcellinus* is

the Loeb Classical Library translation, I, Book 19, 1:2-3,4; 2:11. That from R. MacMullen is from *The Art Bulletin*, XLIV (1964), p. 439.

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For Sasanian coins the only well-illustrated volume is F. D. J. Paruck, *Sasanian Coins*, Bombay, 1924; for the most recent identifications of the coins: R. Göbl, *Die Münzen der Sasaniden im Königlichen Münzkabinett, Haag*, The Hague, 1962.

For illustrations of Kushan coins: R. Göbl, "Die Münzprägung der Kušan, von Vima Kadphises bis Bahram IV," in F. Altheim and R. Stiehl, *Finanzgeschichte der Spätantike*, Frankfurt am Main, 1957, pp. 405-419. Göbl also discusses the use of the crescent in both Sasanian and Kushan crowns on p. 239.

Kidara and Kushano-Sasanian coins are illustrated and discussed in: E. Herzfeld, *Memoirs of the Archaeological Survey of India*, no. 38, Calcutta, 1930; R. Curiel, "Le Trésor du Tépé Maranjan," *Mémoires de la Délégation Archéologique Française en Afghanistan*, XIV, Paris, 1953; M. F. C. Martin, *Journal of the Royal Asiatic Society of Bengal*, series 3, III, no. 2 (1937), pp. 23-50.

The *Annals* of Hamza are discussed in: H. H. Schaeder, *Jahrbuch der preussischen Kunstsammlungen*, LVII (1936), pp. 231-232; A. Christensen, *L'Iran sous les Sassanides*, Copenhagen, 1944, pp. 59-68; E. Herzfeld, *Archaeologische Mitteilungen aus Iran*, IX (1938), p. 103.

For the striated globe: E. Herzfeld, *Archaeologische Mitteilungen aus Iran*, IX (1938), pp. 129-138; F. Sarre, *Klio*, III (1903), pp. 356-358. Many other scholars have also discussed this feature.

Technical Notes

KATE C. LEFFERTS *Associate Conservator in Charge of Conservation*

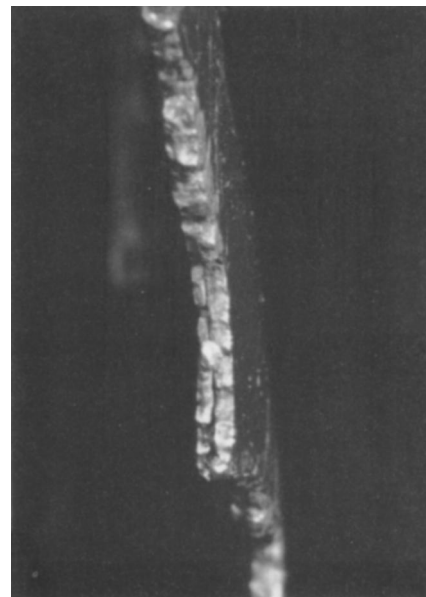
Among the many remarkable features of the rare piece of Sasanian metalwork described in the preceding article is its fine condition, although it exhibits appropriate signs of age. Intergranular cracks form a fine network over the surface, widening into fissures at points where the plane of the metal changes abruptly; they possibly account for the loss of certain portions around the base, most conspicuously one side of the beard and neck. In many areas corrosion has penetrated to the center of the metal, forming a stratified layer that tends to separate from the sounder material next to it (Figure 1). Such stratification often occurs when corrosion takes place over a long period of time. But these flaws and losses are not serious enough to detract from the over-all effect. Under a thin layer of corrosion, the outer surface is still smooth and unpitted, as was revealed by the partial cleaning the piece had received before coming to the Museum, and mild cleaning and polishing has restored its brightness.

This striking portrait is a tribute to the skill of the Sasanian metalworkers, whose tools were relatively simple, but who were masters of difficult and complex procedures. The head was neither cast nor fastened together from separate pieces, but laboriously hammered out of a single piece of metal. Study with the microscope and x-rays shows no sign of join lines or overlapping, and close examination reveals many steps in the process of its shaping. The basic technique was already old in Sasanian

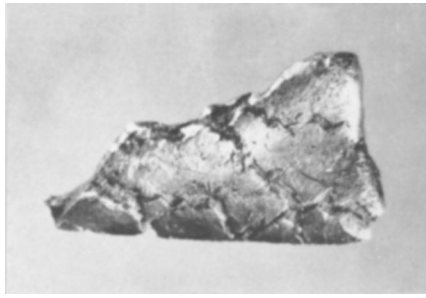
times, but to create in this fashion so large a piece in the round is a tremendous achievement.

The first step would have been to refine the ore. The early metallurgists in Asia Minor had learned to obtain silver from lead ores, and both metals were common by the fifteenth century B.C. The principal ore used in the production of silver was galena (lead sulphide), of which there are extensive deposits in this region. Spectrographic analysis reveals that the silver is alloyed with from one to ten per cent copper, and metallurgical analysis suggests the more precise figure of five per cent. On the spectrogram measurable amounts of other elements appear as well: about 0.1 to one per cent gold, 0.05 to 0.5 per cent of lead and of silicon, and 0.01 to 0.1 per cent each of iron, calcium, and bismuth. There are also traces of aluminum, magnesium, nickel, titanium, manganese, tin, zinc, sodium, potassium, and lithium. The presence of these additional elements indicates that the metal was refined by a relatively crude process; with the simple methods available at the time it would have been difficult if not impossible to obtain purer silver.

It is certainly unlikely that the presence of these elements, except possibly the copper, is anything but accidental. Bismuth, even in small amounts, tends to make silver brittle; under certain circumstances so do copper and lead, for they may precipitate during cooling and make the metal more difficult to work.



1. Detail of bottom edge enlarged about three times. Strata of corroded metal, cerargyrite, and sound metal



2. *Sample for metallurgical analysis, enlarged seven times*

RIGHT:

3. *Cross section through silver fragment, etched in potassium bichromate reagent, enlarged 100 times. The layers rich in copper oxide follow the contours of the cracks*

4. *Detail of cross section near the surface, enlarged 1000 times. The heavily oxidized zone is at the left*

5. *Detail of cross section near the center of the sheet, enlarged 1000 times. Typical microstructure with local grain boundary displacement and bent annealing twins*

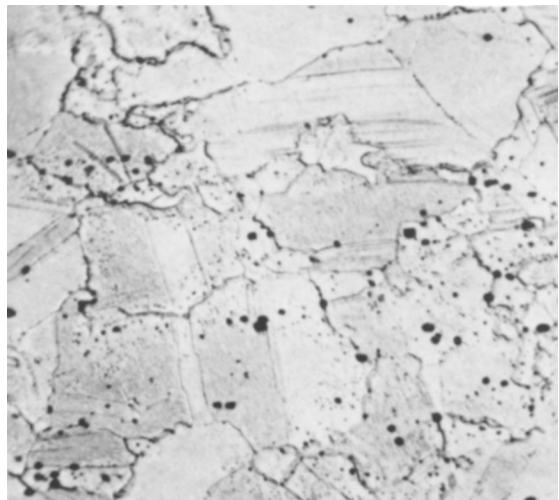
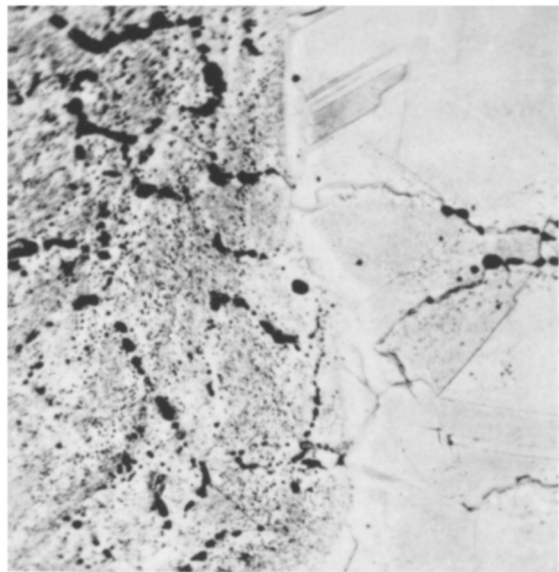
The photographs on this page are by Katharine Ruhl of the Massachusetts Institute of Technology

Metallurgical examination of a small sample from the broken bottom edge (Figure 2) shows a vague, irregular network of fine copper oxide particles throughout the structure (Figures 4 and 5); these almost certainly originated when the metal was originally solidified and mark the last areas to harden. Later precipitation of the copper is also indicated by the irregular grain boundaries of the silver.

To form the head, the silversmith would heat a quantity of silver and hammer out and cut a piece of sufficient size to accommodate the height and diameter of the finished object. If the ratio of height to diameter is no greater than three to two, the piece can be round; otherwise it must be elliptical. Working from the center in concentric circles, the smith would then begin to hammer the flat metal into a hollow shape. He could work from the inside, sinking the metal into a hollowed block of wood, or from without, placing it over a stake. To keep the thickness of the metal uniform, it is easier to alternate these methods. The concentric circles of tool marks are still visible on the inside of the relatively unadorned ball on top of the head. Near the top these courses are about two centimeters apart, and become closer together as the diameter narrows, reaching a width of about half a centimeter above the beaded band of the crown.

The skill of the smith is apparent in the evenness with which he formed the shape, despite its complexity and frequent change of plane. The thickness of the metal varies only from 1.02 to 1.82 millimeters, with most areas between 1.2 and 1.4. Starting from the top of the ball and working down to the ears, he was able to keep the metal of approximately the same thickness. The thinnest sections are those that had to be pushed out the farthest from the center, such as the earrings, and the thickest are the cheeks, which are closest to the center.

Once the general shape is achieved, details are executed by a more refined variation of the same technique, with tracers and punches used both within (repoussé) and without (chasing). So that the proportions and changes in level and angle will be correct, the design must be carefully laid out and traced in ad-



vance. Visible in a number of places on the head are punch marks that served as guides. The mark at the very top of the ball was the starting point for the design of concentric circles around it and for the vertical striations below as well as for the shaping. Marks of the tracer used to form the grooves of the striations are also visible (Figure 7). Down the center of each crenellation of the crown is a line of five punched dots that evidently aided in the placement of the motif (Figure 8). The crenellations are so uniform that it seems likely they were shaped by embossing over the same form. The beads below appear to have been formed by a reverse process, using a round hollow punch on the outside and a stake within. It is hard to control such punches perfectly; overstrikes in the beading occur in several places, particularly near the left ear (Figure 9). The size and shape of several other chasing tools can also be ascertained. A larger and rounder tracer was used between the lips, for example, than on the moustache (Figure 6). Though careful study will generally reveal tool marks, the clarity and variety of these marks is noteworthy; the smith evidently did not feel it necessary to polish them out.

In forming the finest details, the reverse side of the area being worked must be firmly supported, usually by a bed or filling of warm pitch. The pitch adheres closely to the metal and yields just enough to allow it to be shaped without being deformed or punched through. At this stage it is time-consuming to alternate surfaces more than necessary, for the pitch must be melted out each time.

One of the greatest problems the silversmith faced, and one that he did not completely solve, was the tendency of the metal to crack during the hammering process. As the metal is hammered, its crystalline structure is distorted and it becomes hard and brittle. To prevent it from cracking, it must be repeatedly annealed—made red hot until it again becomes ductile. This piece was probably annealed several times, but there is evidence (Figure 5) of some cold working following the last anneal: the grain shape and annealing twins (parallel bands extending across the grain) are distorted, strain markings appear,

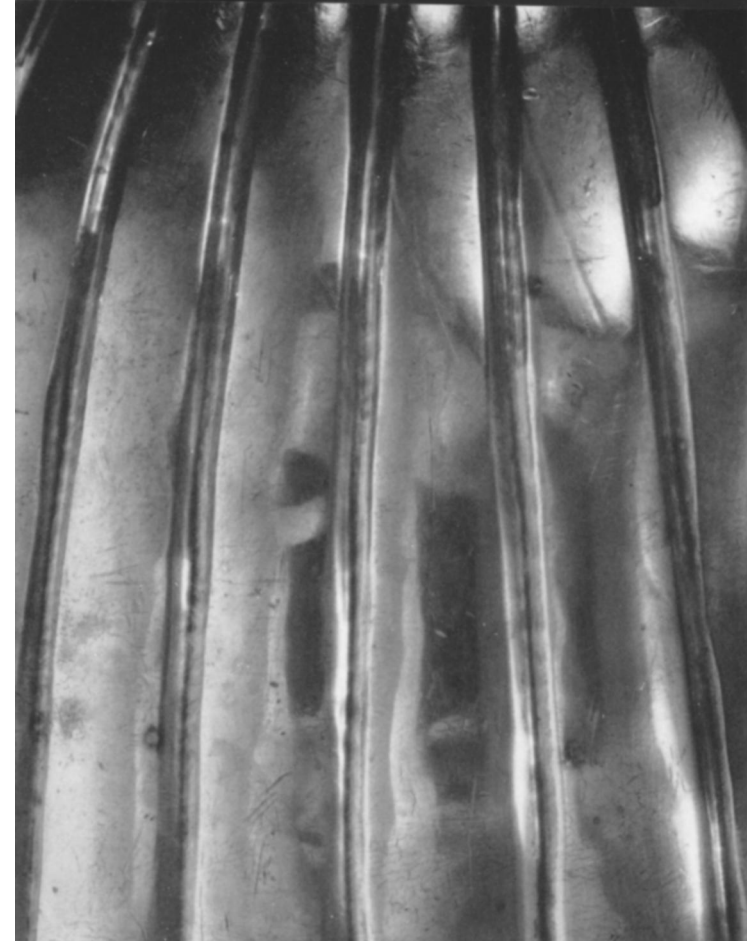
and the metal is hard (84 on the Vickers hardness scale as opposed to 43 for the same alloy freshly annealed).

In the ball, above the right ear, there is a small round silver plug 1.5 millimeters in diameter, which would make it appear that the smith had to mend a small rupture that occurred during the first hammering of the silver into a sheet. Furthermore, the silversmith apparently did not anneal the metal sufficiently in the subsequent working. The intergranular cracks referred to earlier seem to have occurred in the process of manufacture. Under magnification a cross section of the metal shows on the inner and outer surface a thin layer particularly rich in copper oxide (Figure 3). This layer was produced during the annealing process; when the piece was heated, the copper near the surface oxidized more readily than the silver around. There is no doubt that the layer was formed after the cracks, for it follows their contours.

The final step in making this piece was the gilding of certain details—the earrings, the crown, the necklace, and the top of the ball. The usual procedure is to apply an amalgam of gold and mercury, and then to heat the

6. *Enlarged detail of mouth and moustache*





7. *Striations of the ball show tracer marks at right angles to the grooves*

object slowly until the mercury evaporates. The gilding, about seventeen carat, is thin, and has become badly abraded, disappearing almost entirely from the center of the crenellations. Because of the size and roundness of the piece, the application was undoubtedly difficult, and often the gold spilled over into adjacent areas. On the ragged bottom edge of the back there is a spill that lies above a line of faintly visible punch marks, suggesting that the gilded necklace on the front might have continued behind.

Examination of the gilding also confirms that many of the intergranular cracks are not caused by age hardening, but existed from the time the piece was made, for the gilding runs into them and often fills them. There is in addition a rupture along the top edge of the front crenellation that has been roughly hammered together, bending the edge of the metal; since unburnished gold lies between the fold and the background it seems probable that this accident occurred during shaping and before gilding.

Treatment of the object has been dictated by the condition of the metal. Many large cracks and dents have been left alone, although enough ductility remained to straighten out some of the more badly distorted areas along the front edge. The lower cheeks and jaw lines were straightened by hand pressure and hammering, as were the broken pieces of the neck and beard, to which a high degree of ductility was restored by heating to 650 degrees Centigrade. A piece of modern sterling silver was fitted to replace the distracting lost area of the neck.

The corrosion products on the inside were left largely undisturbed. Analysis of a sample by x-ray diffraction showed only the presence of silver and cerargyrite (silver chloride). The latter is benign, that is, it will not react with



8. *Five punch marks run vertically down the center of the crenellations*

the silver to produce further deterioration. Moreover, it forms a smooth tough film that fills some of the intergranular cracks and consolidates some of the almost disassociated strata. Removal would only further weaken the metal.

A large part of the corrosion on the outer surface was removed by gentle rubbing after soaking for several weeks in distilled water. A thin black underlayer that did not respond to this treatment was also analyzed and found to contain, in addition to cerargyrite and elemental silver, acanthite (silver sulphide) and silver oxide. The conjunction of these salts with the redeposited silver may have been responsible for the firm adherence to the surface. They were removed by local application of specific solvents. Final polishing gave the piece its present glowing luster.

NOTES

I should like to thank most particularly Cyril Stanley Smith of the Massachusetts Institute of Technology, who was kind enough to perform

the metallurgical examination of the sample taken from the broken edge. He has been most generous with his time and advice. His interpretation of the metallurgical findings, to which frequent reference is made in this note, has been most helpful.

In addition, tests were performed by the following laboratories: spectrographic analysis, by National Spectrographic Laboratories Inc., Cleveland, Ohio, semi-quantitative analysis with Bausch & Lomb Dual Grating Spectrograph; x-ray diffraction of corrosion products inside the head, by Smithsonian Institution Museum of History and Technology Conservation Analytical Laboratory, Washington, D.C., with x-ray diffraction powder pattern camera, analysis by R. Josephs; x-ray diffraction of surface corrosion products, by New York University, two-radian powder camera, analysis by W. T. Chase.

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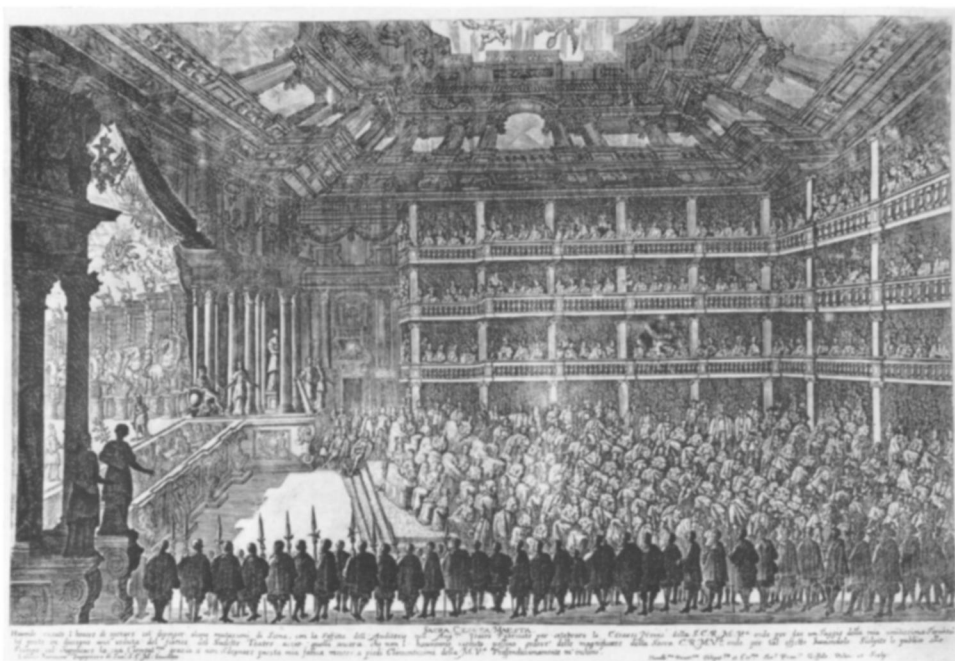


9. Overstrikes in bead on lower part of crown



10, 11. The silver head before and after treatment

*Performance of Cesti's opera
Il Pomo d'oro staged by Ludovico
Burnacini at the court theater in
Vienna, celebrating the marriage of
the Emperor Leopold I and the
Infanta Margherita Theresa in
1668. Engraving by Franz Geffels.
13 $\frac{3}{8}$ x 20 inches. Harris Brisbane
Dick Fund, 53.600.3561*



Notes THE OPERA HOUSE

The exhibition *The Opera House* salutes the opening of the new Metropolitan Opera House at Lincoln Center. The prints and drawings of stage sets, theater interiors, and costume designs depict the richness and splendor that have always been associated with the opera.

Ranging from a sixteenth-century woodcut of a theater set at Siena to Soudeikine's cos-

tume drawing for the Metropolitan Opera's 1924 production of Stravinsky's *Petrouchka*, the show gives glimpses of the lavish productions, splendid theaters, and glittering audiences that constitute the performance of an opera.

The exhibition will continue until November 30.

J. J. M.

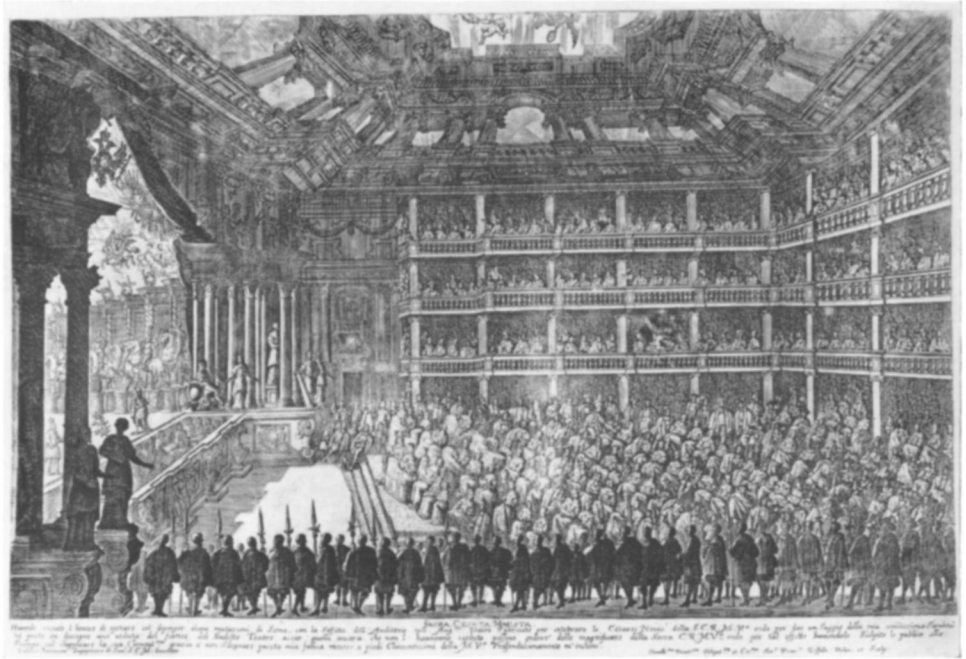
INTERNAL REVENUE RULING

The Museum received a ruling from the Internal Revenue Service, dated September 12, 1966, that contributions to it made by indi-

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