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Hidden Treasure from the Royal Cemetery at Ur

Technology sheds new light on the ancient Near East

By Alexandra Irving and Janet Ambers

It is a common misconception to pity the poor museum curator. He or she appears as a shadowy figure tirelessly working in the background to preserve, curate and research only what has already been discovered. The idea that only archaeologists working in the field experience the thrill of excavation and new discoveries is equally misleading. Excavation of sorts occurs constantly in museum study collections, and fresh approaches to such artifacts can yield exciting and surprising results. Research conducted within the Departments of Scientific Research and the Ancient Near East at the British Museum, London, has shed new light on one of the richest collections within the museum—Sir Leonard Woolley's spectacular discoveries at the Royal Cemetery at Ur.

The Ur Excavations

The ancient city of Ur lies in the desert of southern Iraq. The city was inhabited from the Ubaid period, ca. 5900–4300 BCE, until the fourth century BCE when it appears to have been abandoned after the river Euphrates changed its course. The site is still dominated by the remains of a ziggurat, or temple-tower, dedicated to the Moon God Nanna and built by the rulers of the Third Dynasty of Ur, 2111–2004 BCE. Ur was the subject of extensive excavation between 1922 and 1934 by the joint expeditions of the British Museum,

London and the University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia. The excavations were directed by Leonard Woolley and it is thanks to his care and methodical approaches that the great variety of evidence gathered from Ur is still of relevance to modern archaeologists.

The location of the cemetery was discovered during the very first week of work in the autumn of 1922. Woolley began work at Ur by excavating two narrow trial trenches. Trench A ran to the south of the Nanna temple platform, which had been exposed in 1919 by H. R. Hall. Trench B was located to the east of the ziggurat and was probably designed to explore the principal buildings on the surface of the site (Zettler 1998a: 15; Moorey 1977: 24; Hall 1930: 158–68). Trial trench A ran across the cemetery, which occupied an area that had been used for the disposal of rubbish, causing the town to extend into the area of surrounding marshland (Woolley 1934: 12–15).

Despite tantalizing glimpses of gold, Woolley claimed he had shown incredible foresight and restraint by deciding not to excavate immediately.

In the first place our diggers were raw and clumsy ... we were ourselves new to the country and had not had time to secure proper influence over the men ... very little indeed was known of Mesopotamian archaeology, so little that the objects from these graves were vaguely dated ... (Woolley 1934: 5).

His early interest actually appears to have been in the architectural remains found in trench B, but the above account of the excavations placed the fact that trench A was initially ignored in a more positive light (Zettler 1998a: 14).

Woolley returned to the cemetery during December 1926, but did not publicize his findings straight away. By the middle of the winter season's work, however, Woolley was running out of money to pay his workmen. Valuable finds, such as those emerging from the graves, were paid for using the baksheesh system. Woolley therefore sent two telegrams to his co-sponsors on January 13th in order to secure further funds. The telegram sent to London was written in code, because Woolley feared interception, and translates as "Found prehistoric cemetery very rich in gold." In the 1927–1928 season, the spectacular finds within the graves of Meskalamdug and Queen Puabi were announced by telegrams written in Latin.¹

The cemetery excavated by Woolley contained over two thousand burials (Woolley 1934: 33; 1956: 38–40, 127–45). Two main groups of graves, separated by layers of debris, were identified. The earlier graves



Leonard Woolley and his wife Catherine excavating at Ur. All illustrations courtesy of the Trustees of the British Museum.

were assigned to the Early Dynastic period using clay tablets, seal impressions and cylinder seals. The later group was believed to belong to the Sargonic period (ca. 2334–2279 BCE). Inscribed cylinder seals found in two of the graves referred to officials of Enheduanna, daughter of Sargon, who founded the Akkadian dynasty. The cemetery had been cut into sloping ground, which had been further modified by the deposition of mounds of rubbish. Some graves were superimposed so that later burials had disturbed earlier ones. Woolley realized that these factors meant that the relative heights of the graves could not be used to place them in a chronological sequence. He therefore developed a typological sequence for dating the graves based on artifacts found within them. Pottery, stone objects, metal vessels, tools and weapons were all placed in a developmental sequence. The deposits are difficult to interpret, however, and the relative dating of the cemetery's graves has remained an issue for research.

Modern radiocarbon dating has assisted in assigning the earlier group of graves to the Early Dynastic III A period, ca. 2600–2400 BCE, (Moorey 1977: 24; Zettler

1998b: 21–22). The graves within this group totaled 660. Most were simple inhumations but among these were sixteen termed “royal” by Woolley, a definition based on their structure, rich grave goods and evidence of ritual practice (Zettler 1998b: 22). These tombs appeared to form a focal point within the early cemetery, around which other graves were clustered (Woolley 1934: 15). The tombs were numbered and a prefix PG, denoting private grave, was added. The royal tombs showed varied individual characteristics, but they did exhibit certain common themes in their construction. The general pattern consisted of a vaulted stone tomb chamber set into a deep pit accessed by a ramp. The principal occupant of the burial was interred within this chamber with significant quantities of high value grave goods, and in some cases, with a group of human attendants. Numerous skeletons were also found in areas immediately outside the tomb and Woolley termed these mass inhumations “death pits” (Woolley 1934: 33).

The elevated social position of the tombs' main occupants is further indicated by the grave goods interred with the attendants. Woolley predicted the

gender of skeletons according to the grave goods with which they were buried. Although such assumptions are made less readily by modern archaeologists, for the Royal Cemetery the male/female grave good associations have persisted. In PG 789, for example, skeletons wearing copper helmets and carrying spears were stationed at the entrance and appear to be male soldiers guarding the tomb (Woolley 1934: pls. 29, 36, 148a–49, 218).

Further inside the tomb structures, the attendants appeared to be mostly female. They were richly adorned with jewelry made from gold, silver, lapis lazuli and carnelian. Slight differences are identifiable between different individuals, but each woman wore a combination of necklaces, earrings, headdresses and hair rings. Although the remains were crushed and distorted, it appears that ribbons of gold and silver lay in festoons over the wearer's hair and combs decorated with inlaid rosettes probably rose from the crown of the head. Large lunate earrings and smaller spiral hair rings were also worn (Woolley 1934: pls. 11b, 20b, 37, 43b, 72, 74b, 127–29, 135–36, 138 144–45, 148b, 218–20: 240–42; Pittman 1998: pls. 29–95: 87–122). Wreaths of gold leaves held together with strings of lapis lazuli beads appear to have been worn low over the forehead. Woolley originally called these willow and beech leaves, but the latter species is not native to southern Iraq. More recently they have been identified as willow and poplar, both of which grow along river banks in the region (Miller 2000: 149–55). Given the elaborate nature of this jewelry, it is likely they were worn with wigs, or hairpieces, in order to support their weight. Although no organic remains survived, examples of complex hairstyles can be seen on statues and incised plaques dating from the Early Dynastic period (Woolley 1934: 240; Pittman 1998: 89–92).

Remarkably little textual evidence is available to illuminate exactly how and why these high status graves were created, or to describe the rites of passage that accompanied the dead. It is possible that this is because the use of writing for keeping records was still in its early stages at this time. Limited conclusions can be drawn



A female skeleton under excavation. Lunate earrings, necklaces and gold ribbons can be clearly seen.

about some of the tombs' occupants based on the presence of cylinder seals bearing their names and titles (Moorey 1977: 27–32). The character of the burials indicates that the primary inhumation was an individual who commanded great status within the community. Woolley suggested that these figures could have been royalty. In PG 800 the title *-nin* was inscribed on the seal also bearing the name Puabi and indicates a queen or great lady. The title *lugal* on seals bearing the names Meskalamdug and Akalamdug, from graves PG 1054 and 1050 respectively, may denote kings, but it is also possible that they could have been important religious figures such as priests. Another possibility is that the principal occupant was a priest or priestess who was sacrificed with others to ensure the fertility of the land. There is little textual

evidence to support this idea however, and too few graves for this to have been an annual event (Woolley 1934: 37–40, 317; Moorey 1977: 25–26).

It is difficult to explain how or why the attendants were placed in the graves. Perhaps important individuals were buried with their entire entourage. Few parallels exist within Mesopotamia, although the practice of including attendants in the tombs of kings and queens are known from other cultures; Early Dynastic Egypt and China are just two examples (Zettler 1998b: 30). Woolley and Moorey have suggested that a passage in the Epic of Gilgamesh seems to describe a parallel for the royal tombs (Woolley and Moorey 1982: 91–92; Moorey 1977: 38).

His beloved wife, his beloved children,
His beloved favorite and junior wife,
His beloved musician, cup bearer and ...,
His beloved barber, his beloved ...,
His beloved palace retainers and servants and
His beloved objects were laid down in their places as if ...
In the purified (?) palace in the middle of Unug.²

From the relative quality and quantities of their grave goods, the attendants buried in the royal tombs appear to have different ranks or functions and thus,

form a plausible profile for a household. Grooms and musicians for example, were identified in PGs 789 and 800 (Woolley 1934: 64, 69–70, 74). It is possible the household accompanied its head in death, into another form of life, through a type of willing sacrifice, or self-immolation (Woolley 1934: 41–42; Moorey 1977: 37). Other suggestions have included that the burials represent a suicide cult connected with the worship of Inanna (Wickramasinghe 2001: 55–59). It is also possible that the true retainers were not killed, in order to ensure the smooth transition of secular, or religious, power. Perhaps only representations of their personages were sent to the grave, for example prisoners of war or slaves (I. Finkel, personal communication). It has been suggested that some of the attendants could have come from the Indus Valley. Parallels have been drawn between the hair combs decorated with rosettes at Ur and female terracotta figurines with flowers in their hair found at sites such as Harappa. Contact through trade existed, as carnelian beads found in the Royal Cemetery came from the Indus Valley (Kenoyer 1997: 273–74; 1991: fig. 2:83).

The manner of death is also a mystery. The bodies lie in neat ordered rows, seemingly peaceful in death. Often individuals are associated with a small cup, made from pottery, stone or copper. The lack of disturbance to the elaborate and delicate headdresses worn by the women suggests that the wearers were already sitting or lying in position when they died. Woolley felt that this indicated they had died by taking poison, either carried in each cup or taken from a large vessel within the grave. The orderly arrangement of the bodies may suggest a sedative drug such as an opiate was taken (Woolley 1934: 35–36). It is possible that after falling asleep the bodies were arranged and then the tomb refilled, resulting in suffocation and death. The exact nature of the poison taken is very difficult to assess, but a more extreme toxin, such as cyanide or hemlock, would have produced such writhing and contortion as it took effect that the jewelry and artifacts



Reconstruction of Ur jewelry as worn.

associated with the bodies would have shown far more disturbance (T. Molleson, personal communication). It is thus possible that the attendants participated in the rituals of death willingly, but it cannot be discounted that they were forced to imbibe poison.

The cemetery is enigmatic and mysterious, with few textual sources or parallels elsewhere in Mesopotamia. Moorey has correctly emphasized that the rich royal tombs may be as closely associated with religious power as secular power and their unique character may be linked to ritual practices specific to the city state of Ur (Moorey 1977: 39). The breathtaking treasures and seemingly macabre ritual practices accompanying their burial have fascinated archaeologists since

their discovery over seventy years ago, but recent work at the British Museum has shown that the Royal Cemetery still has some secrets waiting to be revealed.

New Light on the Ancient Near East?

The Need for Radiography

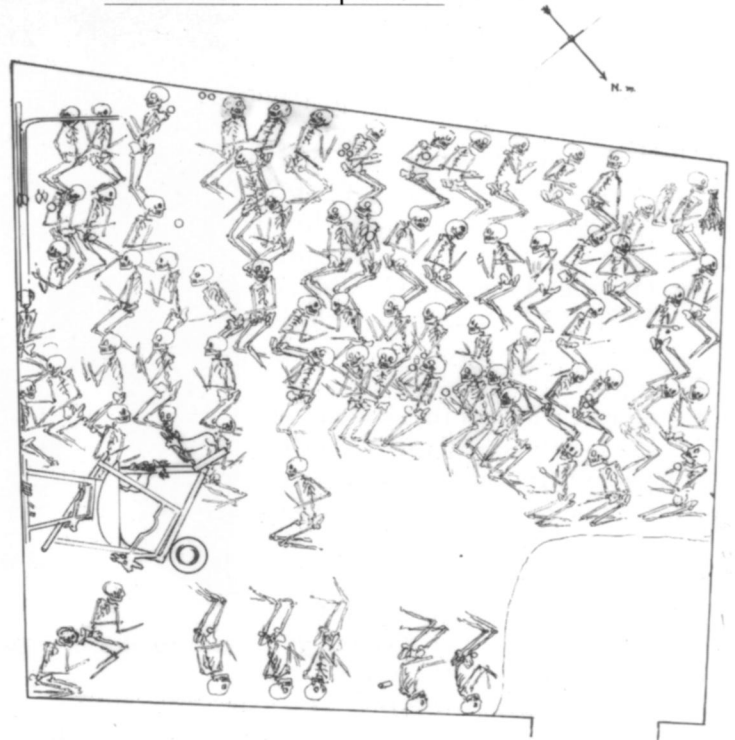
A renewed interest in the Ur material at the British Museum was sparked by a request from Theya Molleson of the Natural History Museum, London. Her forthcoming report, concerning the human remains from Ur and Tell Al'Ubaid, will greatly expand on earlier studies of the skeletal material. After excavation, the Ur artifacts were divided between London, Philadelphia (the two excavating bodies) and Baghdad, following the antiquities laws established by figures such as Gertrude Bell. The skeletal material removed from Iraq was initially examined by Sir Arthur Keith (1934: 400–409). The bone assemblage was then stored at the Natural History Museum, London, with the artifactual material being kept within the British Museum. This artificial separation of artifacts and skeletal evidence from the same contexts is less acceptable today and for this reason a collaborative project began between the Department of the Ancient Near East at the British Museum and the Department of Vertebrates and Anthropology at the Natural History Museum (Molleson and Hodgson in press).

The division between the Natural History Museum and British Museum sometimes comes as a surprise to those not immediately concerned with the institutions, but it has a historical context. Both museums can trace their origins back to the private collections of the physician Sir Hans Sloane (1660–1753) which were donated to the nation upon his death. By the mid 1880s it was realized that more space was needed and the zoological, botanical and geological collections were transferred to a new building in South Kensington. Despite their new location, the natural history collections were not fully and officially separated from the other collections of the British Museum until 1963, when an Act of Parliament established the Natural History Museum as an independent museum (Stearn 1998). The human remains from Ur were considered part of the natural history collections and so were separated from their associated artifacts. Only a few exceptions, including bones so closely associated with jewelry and other artifacts that they could not safely be detached, remained at the British Museum.

Among the artifacts from Ur presently in storage at the British Museum are two objects described in the departmental registers as “crushed skulls with fragmentary jewelry.”³ These came from PG 1237, the so-called Great Death Pit. This was the largest death pit found, but the tomb chamber of the primary burial had been destroyed, probably by tomb robbers. The area was accessed by a *dromos*, a long, sloping passageway, at the end of which lay the bodies of six men carrying knives or axes. The bodies of sixty-eight women were found in the main pit area. The women were laid out in ordered rows running northwest to southeast. All were heavily adorned with gold, silver, lapis lazuli and carnelian jewelry. In the southern corner six women, four of them associated with lyres, appeared to have been separated from the rest. Nearby lay a large copper cauldron, thought to be a vessel that could have held poison, and two statues of stags also made from copper. Within the southern corner was an enigmatic collection of poles or rods decorated with shell, gold, copper and silver. This may have been some sort of canopy or awning although its exact use is not clear (Woolley 1934: pls. 71, 73, 75, 111–15: 113–24).

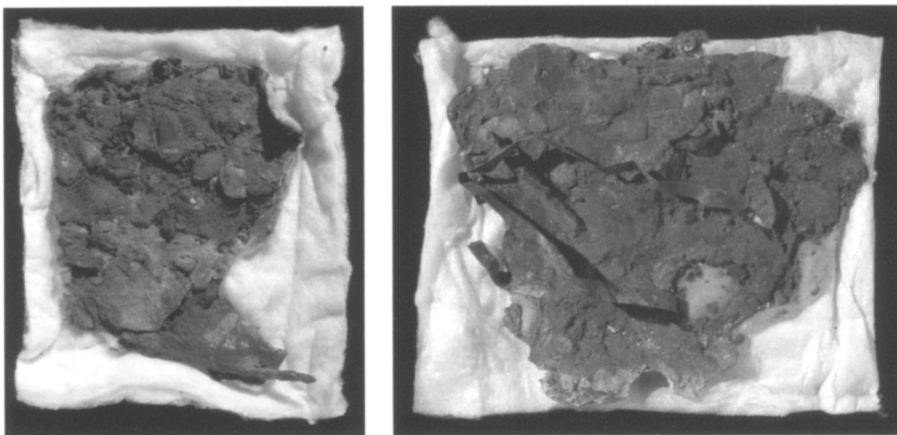
The other important finds from this grave were two statues found in the west corner of the pit. Although these statues are clearly goats, Woolley was fond of biblical allusion and so christened them “rams in the

Plan of the Great Death pit at Ur.



thicket.” They were badly crushed and broken when they were discovered. Each statue is a goat standing on hind legs framed by gold branches, surmounted by rosettes. The bodies of the statues were constructed from a wooden core overlaid with gold and silver. The fleeces were constructed from shell in the lower half and lapis lazuli in the upper. The highly twisted horns were also made from lapis (Woolley 1934: pls. 87–90a–b: 121–22, 264–66).

It was hoped that much more evidence could be obtained from the stored specimens. Most important was an assessment of the age at death of the individuals, which can usually be determined by examining the teeth and the stage of tooth eruption present (T. Molleson, personal communication). The condition of the stored skeletal material, however, made this a complicated procedure. Much of the material found at the site was in very fragile condition. In order to overcome this problem, Woolley block-lifted many of the objects, coating them with paraffin wax or plaster of Paris before removing them from the ground. The most famous examples of the successful use of this technique are the lyres lifted from PG 1237, PG 1151, the standard of Ur (PG 779), gaming boards such as those found in



The headaddresses as stored in wax.

PG 513 and PG 800, and the so-called rams in the thicket from PG 1237 (Woolley 1934: 61–62, 70, 75, 81, 121–23, 169, 253, 275–76). Where skulls were associated with jewelry or helmets, all the associated material was encased in wax in order to ensure its safe transportation (Woolley 1934: 121).

Two examples of the successful use of this wax technique can be seen in the Early Mesopotamia Gallery⁴ at the British Museum. A male skull wearing a copper helmet,⁵ was one of six guards placed at the entrance to PG 789, the Kings Grave. The other is a female skull covered in gold and lapis jewelry found within the “Great Death Pit.”⁶ In both examples the wax was subsequently cleaned off and the pieces mounted within supports for display. Two supposed skulls placed in storage, however, never had their wax packaging removed. This is perhaps not surprising, given the huge quantities of material that must have arrived from Ur in the Museum at this time. These two pieces were obviously low in priority for examination and, fortunately for us, seem to have been accessioned and put into storage while remaining encased. Further information about these objects, beyond their entries in the departmental register, was difficult to find. Although Woolley’s original field notes are archived within the Department of the Ancient Near East, they provide little information concerning the fate of objects after their excavation. Over the years the wax had become discolored and dirty and the pieces now appear as flat brownish-gray objects with little distinguishable detail. This has given us an opportunity to examine material untouched since its excavation, using modern techniques.

For these reasons Dr. Molleson suggested that X-rays be taken in order to reveal more of the bone structure preserved. The radiography was conducted within the Department of Scientific Research at the British Museum and to everyone’s great surprise did

not reveal any skeletal evidence. Within the dull uninspiring wax packages were fabulous headaddresses constructed from precious metals and stones.

Techniques of Radiography

Radiography is one of the most useful scientific techniques available for the investigation of antiquities (Lang and Middleton 1997). It allows the non-destructive and non-invasive examination of a huge range of materials and is widely used throughout the museum world. It

can be used to look at items as diverse as paintings, revealing details of brush strokes and under-painting; paper, particularly to look for watermarks, which can give clues as to date; metals, for construction methods and to reveal the true original form of heavily corroded objects; and bone, where it can show details of age and illnesses. The techniques used in museums are very similar to those with which most people are familiar in a medical context, although the power of radiation used tends to be higher than that employed in medicine. An advantage of looking at the long dead is that it is seldom necessary to worry about the health of the subject! Radiography involves firing a stream of radiation, usually, but not always, in the form of X-rays, at the object under examination. Some of this radiation will pass through the object, some will be absorbed and some will be scattered. The amount that passes through the object depends on a number of factors, but mostly on its composition and thickness, thus making it possible to use radiography to look at differences inside the piece.

The British Museum has a number of different types of radiographic equipment. These pieces were examined using an industrial X-ray tube, similar to those used for the inspection of aircraft engine parts. The film radiographs produced were then digitized using a specialized film scanner. Working with a digital image has a number of advantages. X-ray films hold far more information than can be seen with the human eye. Humans can only perceive a very limited number of shades of gray, around eighty, whereas, a 12-bit computer system can distinguish between 4096 levels. Digitally applying false colors or altering the levels at which black and white begin can make these tiny differences in shade visible on a computer screen, thus giving us a chance to look at very fine changes in object density. Digital images can also

easily be enlarged to look closely at small details. Such enlargement is a vital tool for the investigation of complex objects.

Amazing Results

To our amazement, what emerged on the developing films was not human bone, but two beautiful hair combs decorated with rosettes. No skull fragments were visible on either piece and it has to be concluded that these objects had lain, unobserved, in the stores since their accession in the 1920s. Each comb consists of a metal pin, flattened, spilt into three prongs and finished with inlaid flowers. They are similar to those described by Woolley (1934: pls. 136, 144: 240–41), but the radiographs reveal intricate details of their construction.

A length of twisted wire can be seen looping between each of the flower heads. This may have acted as a guard chain or as a strengthening wire to hold the flowers securely in place. As it seems likely that the attendants had elaborate hairstyles, perhaps the chain helped to secure the comb within a mass of braided hair. Alternatively, the chain was part of the decoration. It could have moved and thus caught the light as the wearer walked. An example can be seen on the headdress of Queen Puabi (Pittman 1998: pl. 29: 90; Woolley 1934: pls. 43, 127, 130), but is neither illustrated elsewhere nor present among examples on display at the British Museum⁷ that have undergone restoration in the past (Pittman 1998: pls. 54–55: 106, Woolley 1934: pls. 136, 144). It would seem that the chain was so fine that it is present only as a corrosion product.

It was also possible to identify some of the inlaid petals by using another non-destructive scientific technique available to today's curators. This is Raman spectroscopy,

which relies on changes in the wavelength of an incident laser beam to distinguish between materials, without any damage to the object. The petals were a mixture of lapis, shell, gold leaf and pink limestone. Each section of inlay was held in place with a small metal pin. Some petals were covered with a thin metal foil, probably gold leaf. Around the edge of the petals the crimping and folding of the gold leaf around a shaped material, possibly bitumen, can be seen. This demonstrates that appearance was important, but that economies could be made regarding materials in areas where they were not easily seen.

A scattering of high density material was observed around the combs. This possibly represents corrosion

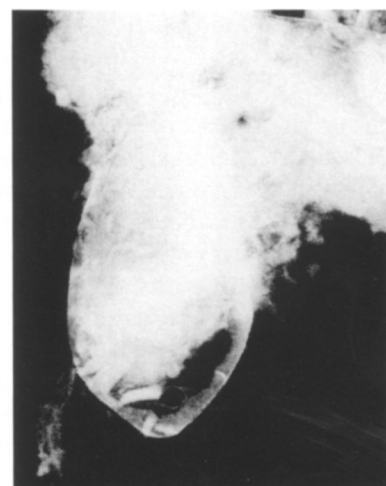
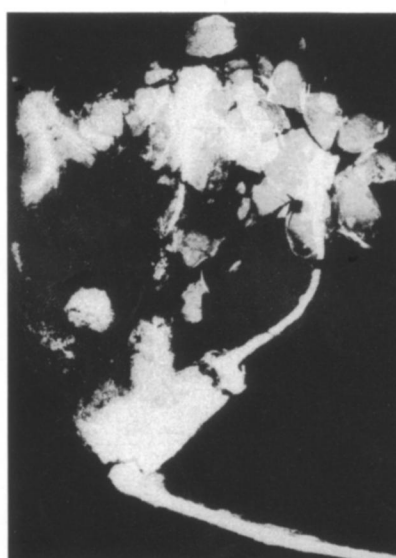
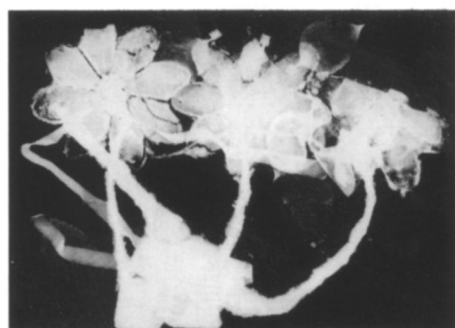


Detail of the radiograph of ANE 122298 to show the twisted wire between two rosettes (at bottom right of picture). Metal pins can be seen in position holding the

petals of the central flower. The white bands across the bottom of the picture are gold ribbons.

Detail of the radiograph of ANE 122363 to show metal foil wrapped around a less dense core to form a petal. The punched hole used to attach the petal to the main object is also shown. The dense (white) object immediately above the hole is the metal pin which originally held the petal in position.

Full radiographs of the two headdresses (taken at 70 kV and 15mAM on Kodak MX film; digitized at 50µm resolution).



products from the silver hair ornaments identified. Yet Woolley emphasized the lack of disturbance within the graves and the scatter does not show a regular pattern or alignment such as might be left by a completely corroded silver ribbon. It could be suggested that a final aspect of embellishment before entering the grave was a light dusting of gold or silver leaf fragments so each woman would glitter in the light as she walked towards the tomb.

Overall, the jewelry recovered from the royal tombs consists of beautifully crafted individual pieces held together to form a stunning ensemble. It should not be forgotten that these pieces would have caught the light and made slight sounds as the wearer moved. Add to that the possibility of a light covering of glittering particles and the final journey of the attendants to their resting place must have been an awesome sight.

The radiography of material from Ur at the British Museum has now been expanded to cover other objects not included in this article, and will be published fully at a later date. Even if this investigation had been confined to just these two pieces, it would have far exceeded our expectations and yielded some fascinating insight into the construction and preservation of different artifacts from the Royal Cemetery. Although the interment of individuals within the graves must have been a breathtaking sight, it would also appear that economies were made where they would not be easily perceived. If the tiny details observed among the X-rays are added to the ideas we already have about the Royal Cemetery, it is possible that women walked to their graves as glittering, shimmering forms. Had the pieces been cleaned and recorded in the 1920s when first found, the Museum would not have had the capacity to carry out such a detailed investigation. Here, fate and overwork have conspired to retain objects in a near untouched condition for modern research. Such a study clearly demonstrates the wealth of material that can be rediscovered within museums and just how exciting this task can be.

Notes

1. The letters are housed in the British Museum Archives (Department: Ancient Near East).
2. See "The Death of Gilgamesh: Another Version from Nibru" lines 1–7 in *The Electronic Text Corpus of Sumerian Literature* (www-etcsl.orient.ox.ac.uk/section1/b1813.htm).
3. ANE 122363 and 122298.
4. Gallery 56 cases 12 and 13.
5. ANE 121414.
6. ANE 122294.
7. Gallery 56 Early Mesopotamia, cases 12 and 13, ANE 121478, 122294, 122301.

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