

THE CEREMONIAL CANOPIED CHARIOT OF TUTANKHAMUN (JE61990 and JE60705): A TENTATIVE VIRTUAL RECONSTRUCTION*

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The Japan International Cooperation Agency (JICA) and the Ministry of Tourism and Antiquities, Arab Republic of Egypt, have been conducting the Grand Egyptian Museum Joint Conservation Project (GEM-JC) since November 2016, after having completed two phases of cooperation to improve conservation techniques at the Grand Egyptian Museum Conservation Center (GEM-CC). The GEM-CC conservation specialists will have their skills enhanced through this experience and GEM-CC's capacity and efficiency as an important conservation centre will also be improved. It is expected that GEM-CC staff will ultimately complete all conservation activities and treatments.

Among the 72 target objects for the GEM-JC Project, designated to be transferred from the Egyptian Museum in Tahrir Square to the Grand Egyptian Museum in Giza and jointly conserved by Egyptian and Japanese conservators, five chariots were selected. In particular, the 'second state chariot' (GEM 4940; JE61990; Carter no. 122; A1 of Littauer and Crouwel¹) (fig.1) was chosen as the lead object, with Japanese and Egyptian experts working jointly on all aspects of the treatment, including remedial conservation, as a model for the conservation of the other chariots. In the course of the project, we confirmed that this particular chariot originally had a canopy (GEM 4539; JE60705; Carter no. 123) (fig. 2) attached to the chariot body, as first proposed by Edwin Brock in 2012.² However, it is impossible to join these two artifacts together because of their fragile condition, and it has been decided to display them separately. Based on our recent research into this chariot and the canopy, we propose to show them together in virtual reality.

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† We would like to dedicate this article to the late Ted Brock who first suggested that Tutankhamun's canopy had been mounted on the so-called 'second state chariot' in his 2012 article. We are pleased that his hypothesis is now proved by our detailed investigation of both the chariot and canopy during the conservation assessment.

¹ Littauer and Crouwel 1985: 9-17.

² Brock 2012.



Fig. 1: The second state chariot of Tutankhamun (GEM 4940; JE61990; Carter no. 122; A1 of Littauer and Crowel: 1985) ©JICA/GEM



Fig. 2: The canopy of Tutankhamun (GEM 4539; JE60705; Carter no. 123) ©JICA/GEM

Tutankhamun's second state chariot

Howard Carter found the three most elaborately decorated chariots in the antechamber among the six chariots found in the tomb of Tutankhamun. Carter referred to two as 'state chariots'. The second of these is our main concern in this article. The second state chariot is constructed with a bent wood body, 1.02 m wide and 0.44 m deep, partially filled with a thin wooden sheet. The frame is strengthened at the front with an additional top-rail and the space between it and the body is decorated with openwork representing a *sm3-t3wy* symbol, with six foreign captives (one is now missing) on its right side. The exterior of the body is decorated with glass-inlaid bands of feather patterns alternating with bands combining running spirals and rosettes.

The central inner and outer panels (fig. 3) are decorated in raised relief with a solar falcon with outstretched wings, identified in the inscription as Horus-of-Behedet, from which descend crowned



Fig. 3: The Second state chariot of Tutankhamun (GEM 4940; JE61990; Carter no. 122; A1 of Littauer and Crowell: 1985) seen from the back © JICA/GEM

uraei. Below are the king's prenomen and nomen and the name of Queen Ankhensnamun. On the lower part of the 'heraldic' panels, two *rekhyt*-birds, representing the people of Egypt, adore a *djed*-pillar flanked by ankh-signs while, below, foreign captives are shown entangled in a *sm3-t3wy* motif. This entire design may be interpreted as the appearance of the royal couple adored by the people of Egypt, ensuring the life and stability of the king and queen under the sun god who is hovering above and protecting them.

On either side of the exterior of the chariot body an inlaid *wd3t*-eye roundel is present. This medallion contains a *wd3t*-eye, with a pendant uraeus, surmounting a *hb* (festival)-sign. The interior decoration of the chariot body is essentially similar to that of the exterior. Below, covering the juncture of the floor with the siding, is a 'kick board' of badly preserved painted blue cloth. Inside the lower right corner, a bronze snake sign is attached. Below it is the hieroglyph *t* and in the left corner, where the snake is missing, there is a second hieroglyph representing a land sign beneath it. The reading is *dt*.

Two inscriptions, each starting in the centre of the rail and running towards the back, are incised in the gilded surface and feature the five names of Tutankhamun and the name of Ankhensnamun. The rear faces of the verticals of the side-frame carry identical columns of hieroglyphs incised in the gilded surface, and are partly inlaid with blue and green glass and translucent calcite, the latter backed with red or yellow paint (fig. 4). The hieroglyphs are flanked by narrow bands of a thicker

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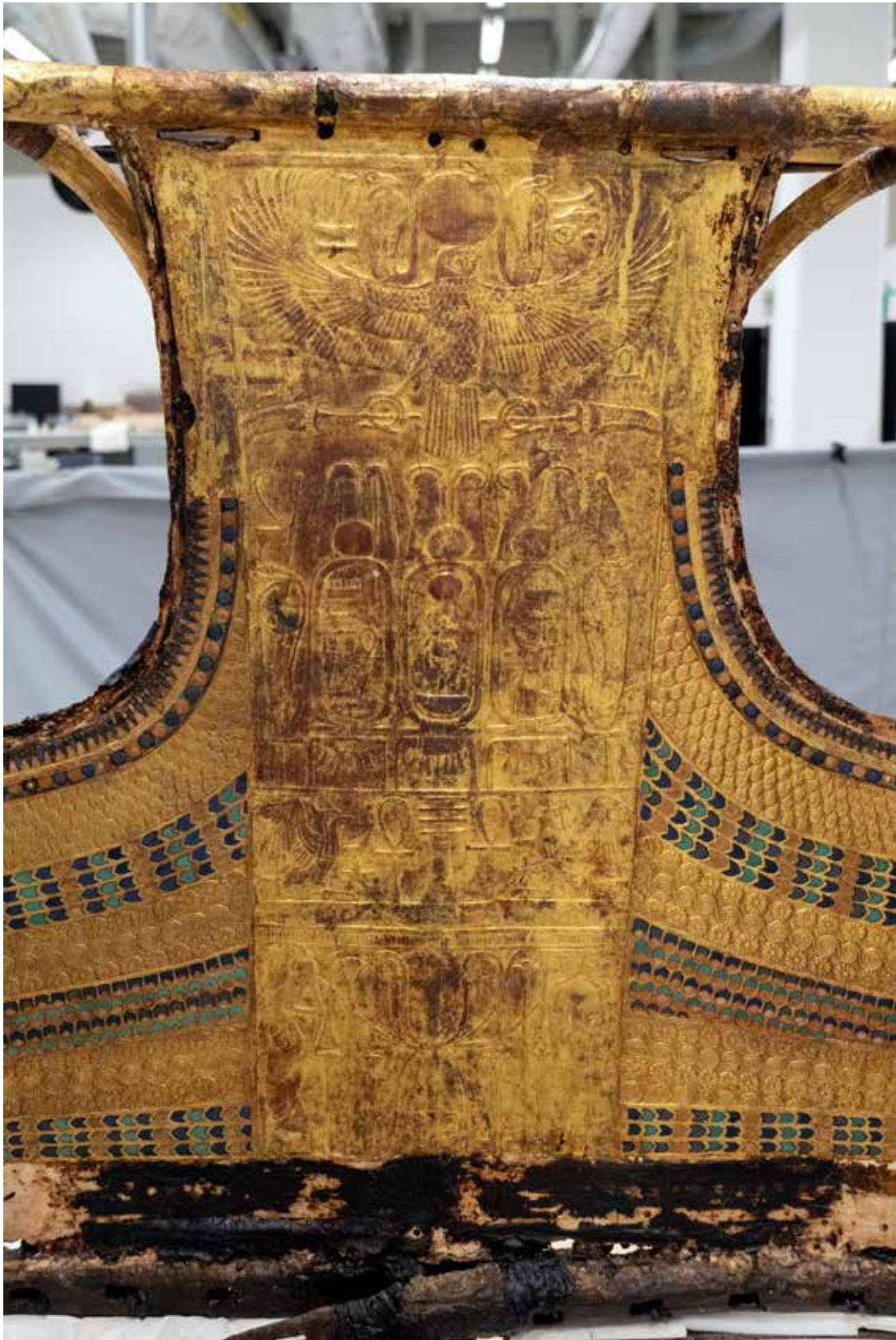


Fig. 4: Detail of the central panel on the chariot body of the second state chariot of Tutankhamun @JICA/GEM

spiral pattern. The inscription includes the king's prenomen, Nebkheperure, alternating with groups that read *ḥnh w3s nb* 'all life and dominion' or *wḏ3 w3s nb* 'all stability and dominion' encircled by a

pair of notched palm ribs resting on *šn*-rings with tadpoles symbolizing many regnal years, held by the god Heh. On top of the inscription are the signs of *nḥḥ* 'eternity' and *ḥb-sd* 'sed festival.' Thus, the text wishes Tutankhamun countless regnal years with endless jubilee festivals. Below this is a *sm3-t3wy* motif and the depiction of foreign captives on both sides.

The chariot also featured a large wooden figure of a falcon wearing a solar disc, which was attached to the chariot's long central pole (connecting the yoke to the chariot).³ As Calvert suggests, the king in his chariot may have been portrayed intentionally as the sun disc, coming forth from the *3ḥt* as represented by the heads of the horses.⁴ The decorations and texts of the second state chariot clearly suggest that it was made for a ceremonial purpose. It should be noted that from our observation the axle of this chariot bears fewer traces of grinding on the axle than other chariots apparently intended for hunting, suggesting the chariot may have only been used for particular occasions.

The canopy and the surface damage on the exterior of the chariot body

While examining the condition of the exterior surface of this chariot before it was transferred to the Grand Egyptian Museum Conservation Center, we noticed localized surface damages. These indicate



Fig. 5(a) (left) and 5 (b) (right): The exterior surface of the body of the second state chariot, showing the locations of the lost elements, supposedly the four poles of the canopy (marked with arrows), the ovals indicate the two holes with the remnants of leather strips which may have secured the poles. © JICA/GEM

³ This wooden falcon figure is displayed separately from the chariot and is not seen in the photographs.

⁴ Calvert 2012: 59.

material having been torn away in antiquity from the corners and near the rear of the sides and assumed that something had been attached to the body of the chariot in the past (figs. 5 (a) and (b)). We considered that poles might have been attached in these locations, and speculated that Tutankhamun's so-called 'travelling canopy' could be most suitable, owing to its trapezoidal plan suggesting that it could be attached to the body of a chariot (fig. 6). Subsequently, we learned that this damage had already been remarked upon by Arthur Mace, who notes: 'At the bottom of the body, at the rear on both sides and in the centres of the curves, four heavy objects had been attached, fastened to the body by bronze pins. These had all been wrenched off.'⁵ However, Mace does not speculate what the four heavy objects might have been. Then, we learned that Edwin Brock had

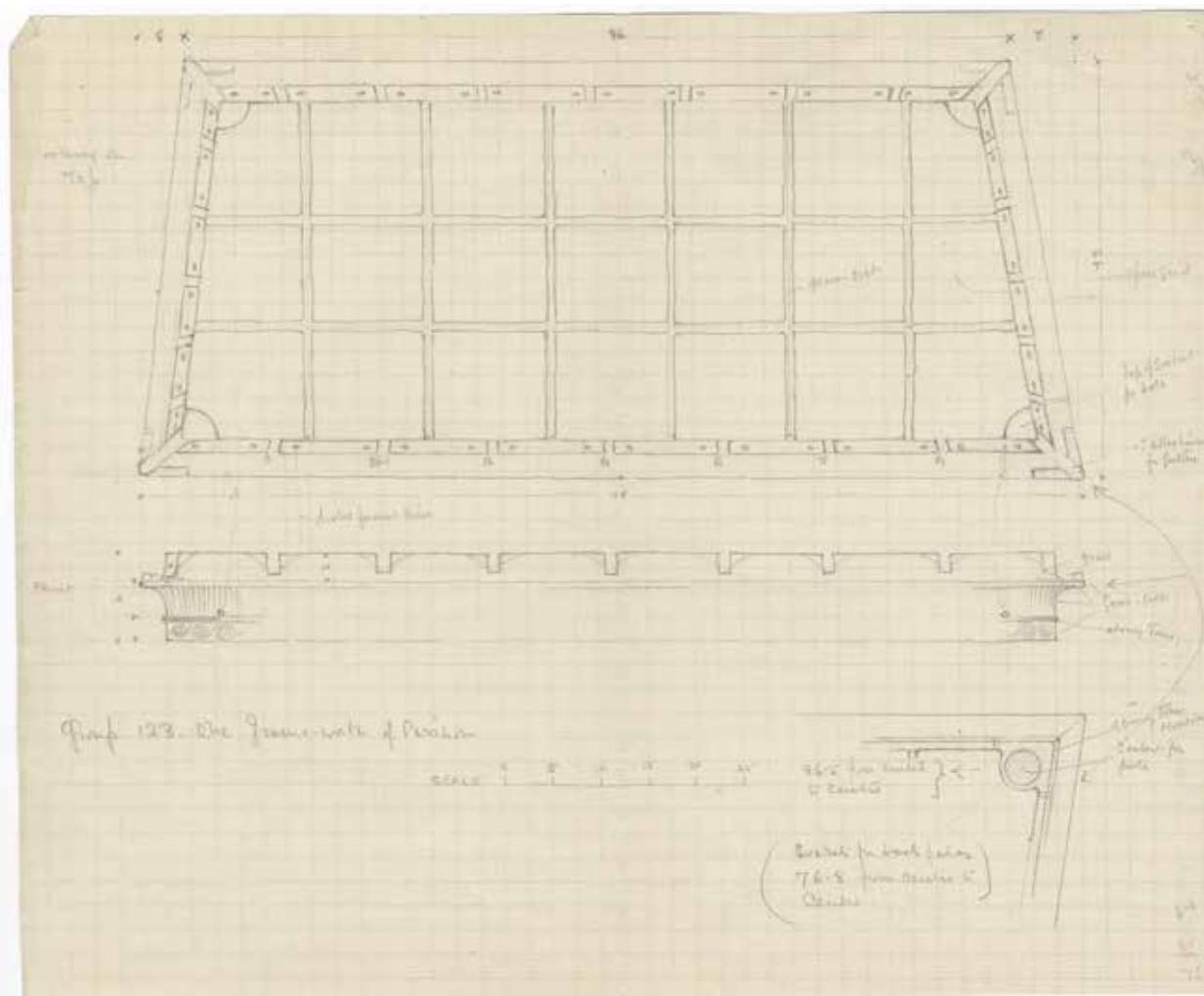


Fig. 6: Drawing of the upper frame of the canopy of Tutankhamun. © The Griffith Institute, The University of Oxford.

published an article that suggested that Tutankhamun's so-called 'travelling canopy' or 'portable pavilion' had indeed been mounted on the second state chariot.⁶

⁵ Littauer and Crowell 1985: 10.

⁶ Brock 2012.

The canopy consists of a wooden frame, trapezoidal in plan, taking the form in elevation of a cavetto cornice 9 cm in height, with twenty-eight ribs hanging from the top of the cavetto cornice. The longer side (back) has a length of 98 cm, while the shorter side (front) is 86 cm long. The ends are each 44 cm in length. The canopy-frame is supported by the four wooden poles, 201 cm long. Carter described the object as a ‘traveling canopy’ or ‘portable pavilion,’ supposed to have been set up when the king was to have an outdoor audience or when he wished to sit in the shade.⁷ He described the frame as missing its base. More recently, James and Reeves have followed this interpretation,⁸ but Brock⁹ questioned the lack of any base for the poles to be set into and the trapezoidal plan of the canopy frame. As for the poles, he noted that their ends are blunt and covered in leather, appearing not to have been reinforced with any stronger material. As for the trapezoidal plan of the canopy frame, he argues that a square or rectangular base would have been more likely for the function of the portable pavilion suggested by the excavator.



Fig. 7: The second state chariot and the canopy frame in situ in the antechamber at the time of the discovery of Tutankhamun's tomb (KV62). © The Griffith Institute, The University of Oxford.

Brock rightly mentioned that significant traces can be seen at the outer (front) corners and rear ends of the chariot body of possible semi-circular metal sleeves attached by pins having been removed in antiquity (figs. 5 (a) and 5 (b)).¹⁰ He suggested that these are the remnants of the four attachments of the canopy frame.¹¹ However, he was not able to take detailed measurements since the chariot was inaccessible within its showcase. In the course of our investigation, we took such measurements and, in addition, identified two

small holes with a remnant of a leather strip on the upper rear edge of the fenestration on both sides, which was not noticed by Brock (fig. 5 (a) and 5 (b) indicated by the oval). Together with the traces near the bottom of the exterior of the body, strips of leather may have tied the poles of the canopy to the chariot-body. As already noted, the canopy frame and most of the ribs for the canopy were found right next to the state chariots in the tomb of Tutankhamun (fig. 7). This strongly suggests that the canopy was part of the equipment for one of the state chariots. Brock also pointed out that the

⁷ Carter and Mace 1923: 120.

⁸ James 2000: 294; Reeves 1990: 187.

⁹ Brock 2012: 33.

¹⁰ Brock 2012: 35-36.

¹¹ Brock 2012: 36-37.

position of the missing parts approximates to the bottoms of the poles as now displayed, with the two supports at the forward curved corners being closer together than the two at the rear edges of the body of the chariot.¹² Accordingly, we examined the positions of the remnants of the attachments on the exterior surface of the body in conjunction with the plan of the four poles of the canopy made by Howard Carter, proving that the distances between two poles on both sides measure approximately 37 cm, matching with the dimensions between the remnants of the attachments on the body of the chariot.¹³ In July 2019, when the canopy was transferred to the GEM-CC, we were finally able to measure the area between the two poles of the canopy that were assumed to be attached to a side of chariot-body. This came to approximately 37cm, which again matches the dimensions between two remnants of the attachments on the body of the chariot. Therefore, it can now be confirmed that the canopy was not a portable sunshade for Tutankhamun but was attached to the second state chariot. For conservation reasons, it is not possible for the canopy to be reattached to the chariot. The two elements will be displayed separately in the new Tutankhamun gallery in the Grand Egyptian Museum, accompanied by a virtual reconstruction.¹⁴

We scanned the chariot and the canopy using an Imager 5010C laser scanner, and a handy Artec Eva optical scanner. We used the former in obtaining the overall shapes, to eliminate the accumulation error in the detailed 3D data scanned by the latter. We integrated these two 3D models in a virtual space and reconstructed the original appearance of the chariot as shown in fig. 8. While the overall shape of the chariot in the image looks well-formed, the 3D models do not precisely fit each other: the forms of both the chariot and the canopy have slightly distorted over thousands of years. Thus, we are now manipulating the reconstructed 3D model to correct the distortions through computer graphics technology and virtually restore the original state of the canopied chariot.



Fig. 8: A tentative reconstruction of the canopy mounted on Tutankhamun's second state chariot. © Oishi laboratory of the Institute of Industrial Sciences at the University of Tokyo.

¹² Brock 2012: 36.

¹³ Nozomu Kawai would like to thank the staff of the Griffith Institute at the University of Oxford for permission to study Carter's archive.

¹⁴ 3D laser scanning and the reconstruction by computer graphics are being conducted by the laboratory of the Institute of the Industrial Sciences at the University of Tokyo. Prof. Takeshi Oishi and Dr Masataka Kagesawa are in charge of the virtual reconstruction of the canopied chariot.

The usage of the second state chariot

It seems likely that, as Brock already suggested, this chariot was utilized in royal parades and ceremonies, driven at a moderate pace.¹⁵ The canopy, especially if decorated with further ornaments, would certainly have enhanced the display of royal power and might. As the texts on this chariot mention both Tutankhamun and his queen, it is not unlikely that the chariot was intended to carry the royal couple in ceremonial parades. It was apparently Akhenaten who introduced the chariot for royal parades:¹⁶ in some tomb-chapels at Amarna, Akhenaten, Nefertiti and a princess are depicted riding in a chariot during a royal parade (fig. 9).¹⁷ Although there is no pictorial evidence showing Tutankhamun riding on the chariot in such a context, it is plausible that he followed what Akhenaten initiated as a means of royal display.

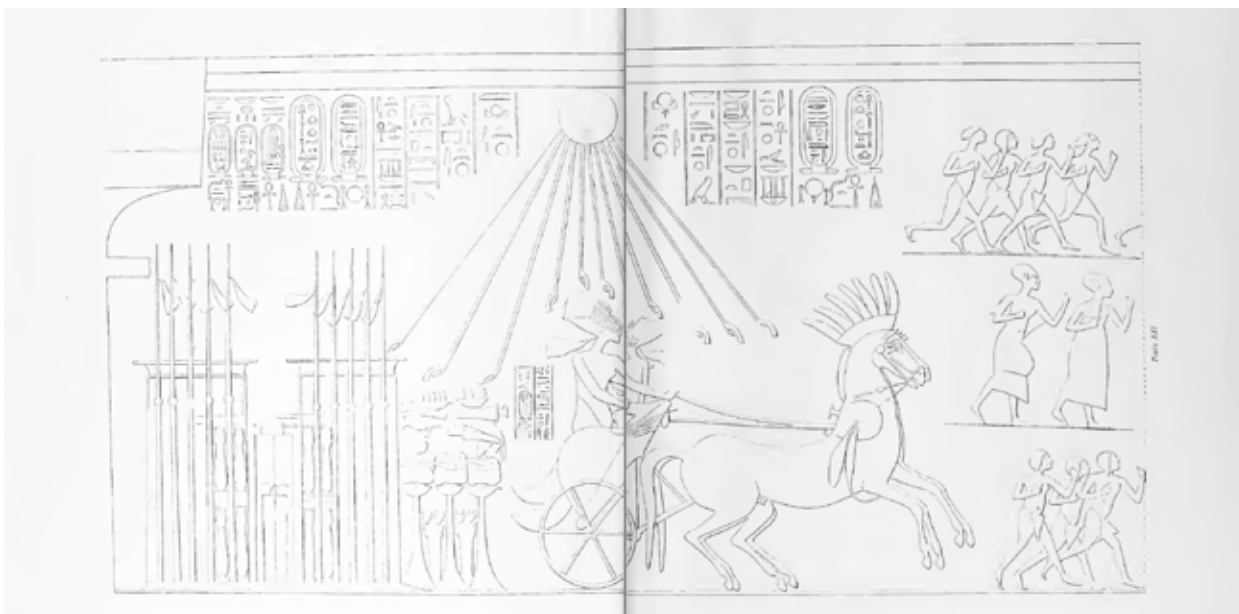


Fig. 9: Akhenaten and Nefertiti on a chariot for a royal parade from a wall scene in the tomb of Mahu (Davies 1906: pl. XX; public domain).

Although there are some representations of chariots with canopies from the reign of Rameses II, none of them show four poles (fig. 10).¹⁸ All examples have only a single pole and the canopy resembles, in outline, an umbrella. However, we must remember that Egyptian art does not necessarily represent reality. If the canopy was mounted on the chariot, it would, as Brock already suggested, have obscured forward vision. Thus, the current reconstruction of the canopy should perhaps be reconsidered. Brock suggested that the ribs with hinges may have been placed upside down. If reversed, the ribs would then splay out at a much shallower angle, improving vision as well as extending the shaded area. According to Brock's reconstruction of the chariot, showing the canopy

¹⁵ Brock 2012: 41.

¹⁶ See Sabbahy 2012: 196-197. For example, the tomb of Ahmose (TA3 - Davies 1905b: pl. xxxva), the tomb of Meryre (TA4 - Davies 1905a: pl. x).

¹⁷ For example, see the tomb of Mahu (TA9 - Davies 1906: pl. xx), the tomb of Panehesy (TA6 - Davies 1905b: XVI), and the tomb of Ahmose (TA2 - Davies 1905c: pl. xxxii)

¹⁸ Brock 2012: 39-40, Figs. 9, 10, 11, 12.

with extended ribs in place,¹⁹ the tips of the long ribs extending from the corner of the trapezoidal frame of the canopy are bent down. However, there is no single rib that could be bent down near the tip of the rib. This reconstruction thus needs further revision. More recently, we examined and measured every single rib for the canopy to consider a better reconstruction of the canopy mounted on the chariot.²⁰ The results of our ongoing research will be reflected in a future virtual reconstruction.



Fig. 10: A canopied chariot in the Battle of Kadesh 'audience scene' on the first pylon of Luxor temple. © Nozomu Kawai

Conclusion

Our investigation of both Tutankhamun's second state chariot and canopy has now proved that the canopy, which had been considered as a portable sunshade, was actually mounted on the chariot. The four poles of the canopy were clearly attached to the bronze bands placed near the bottom of the outer surface of the body and leather strips from the edge of the fenestration on both sides seem to have tied to the two rear poles of the canopy. It is confirmed that the distance between two poles on both sides of the canopy coincide with that of the remnant of the attachment on the body of the chariot, proving Brock's hypothesis that the canopy was mounted on the chariot. Thus fitted, the chariot could not have been used for hunting or warfare and instead this canopied chariot could only have been used for parades, displaying Tutankhamun, or both he and his wife Ankhesenamun, as though upon thrones.

Virtual reconstruction is an ideal method to show reconstructions that cannot be implemented with the actual artefacts, in museums or on archaeological sites. One of the great advantages of the virtual display is that we can modify the reconstruction as research progresses, which certainly

¹⁹ Brock 2012: figs. 18 and 19.

²⁰ The result of this research will be presented elsewhere in the near future.

enhances the value of and offers different perspectives on cultural heritage. In response to this, we intend to make a new virtual reconstruction of the canopied chariot in the near future.

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