On the Roman-Byzantine adoption of the stirrup once more

On the Roman-Byzantine adoption of the stirrup once more: a new find from seventh-century Aphrodisias in Caria

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Abstract

Archaeological evidence and the text of the *Strategikon* show that it was only in the late sixth century AD that the Roman-Byzantine military adopted the stirrup. It is now widely argued that the Avars, who settled in the Carpathian basin in the sixth century, played a key role in introducing iron stirrups to the Roman-Byzantine world. However, the evidence to support this assertion is limited. Although hundreds of stirrups have been found in Avar graves in the Carpathian basin, very few stirrups of sixth- or seventh-century date are known from the Roman-Byzantine empire – no more than seven – and only two of these are of definitively Avar type. The text of the *Strategikon*, sometimes argued to support this Avar source, can be interpreted differently, as indeed can the archaeological evidence. While the debate about the Roman-Byzantine adoption of the stirrups has focused mostly on finds from the Balkans, two early stirrups are known from Asia Minor, from Pergamon and Sardis. This paper presents a third, previously unpublished stirrup, from a seventh-century deposit at Aphrodisias in Caria; this is the first stirrup found in Asia Minor from a datable context. Here we present this find and its context, and use it to reconsider the model of solely Avar stirrup transmission that has dominated scholarship to date. So varied are the early stirrups that multiple sources of influence, Avar and other, and even a degree of experimentation, seem more likely to underpin the Roman-Byzantine adoption of this technology.

Introduction

The date of the stirrup's arrival in Western Eurasia, along with its significance in equestrian history, have been hotly debated in recent scholarship. More than 50 years ago, Lynn White Jr posited that the stirrup was introduced to the West via the Islamic world after AD 700 and drew a connection between the appearance of the stirrup, the advent of heavy cavalry, and the rise

of feudalism (White 1962: 1-38). Where White saw the stirrup as ushering in a revolution in European warfare, most scholars now agree, as Philip Rance states, that they 'probably made easier what was already possible' (Rance *forthcoming*: 16; also Gyftopoulou 2007-2008: 389-392). Stirrups allowed greater stability while riding and, in particular, facilitated mounting during combat. The stimulus for their adoption by the Roman-Byzantine army probably resulted from an increased reliance on heavy cavalry with lances and/or horse archers, and the need to train troops quickly in these demanding new combat techniques (Curta 2007: 301; 310-314; Rance 2007: 357-358). Further research, drawing on both textual and archaeological evidence, has also now made it clear that the advent of the stirrup in Europe was considerably earlier than White proposed. In particular, Florin Curta's recent contributions highlight and restate the long-recognised fact that stirrup technology was known to the Avars in the late sixth or early seventh century (Curta 2007; 2013); it is now widely, though not universally, accepted that the Roman-Byzantine military adopted the stirrup from the Avars, following the settlement of the latter in the Carpathian basin in the second half of the sixth century.

The archaeological evidence for stirrup-use in the Roman-Byzantine empire of the sixth and seventh centuries, however, is extremely limited. Depending on how one defines a stirrup there are between four and seven of these devices possibly datable to this period known from Roman-Byzantine territory:

- Two D-shaped devices from Caričin Grad (*Justiniana Prima*) in Serbia, identified as stirrups by Vujadin Ivanišević and Ivan Bugarski but as more simple 'mounting devices' by Curta (Ivanišević, Bugarski 2012; Curta 2007, 307-308); these are found in contexts with *termini post quos* of the early seventh century.
- A fragment of another D-shaped device from *Karasura*, near modern Rupkite/Ripkit, Bulgaria, from a context with a *terminus post quem* of the early seventh century, though it has recently been argued, on unclear grounds, that this does not belong to a stirrup (Curta 2013: 818 n. 30; *contra* Herrmann 1992: 175).
- An apple-shaped stirrup of Avar type from Pernik in western Bulgaria, which comes from an unknown context and is dated by comparison with Avar material elsewhere (Changova 1994: 181, fig. 168.1).
- Another apple-shaped stirrup of Avar type from an unknown location in north-eastern Bulgaria, again of uncertain date (Iotov 2004: pl. 71.753).
- An iron stirrup from Pergamon, apple-shaped but with a different form of suspension loop to the standard Avar type, from an unknown context and dated to the 'früh- oder mittelbyzantinisch' period (Gaitzsch 2005: 56, cat. V29).

- A stirrup from Sardis, again from an uncertain context, which has been simply dated to the 'Byzantine' period (Waldbaum 1983: 42, cat. 90, pl. 7).

Two of these stirrups are of the distinctively apple-shaped Avar type, on which more below. So small is this dataset that new archaeological discoveries have the potential to substantially alter our understanding of the transmission of this technology in this crucial period.

In this paper we present a previously unpublished iron stirrup from a seventh-century context in Asia Minor. This D-shaped device shares similarities with the two objects from Caričin Grad , which have been published by Ivanišević and Bugarski as stirrups but dismissed by Curta as 'mounting devices' rather than true stirrups (Ivanišević, Bugarski 2012; Curta 2007, 307-308). Here we argue that these devices in fact could have functioned as stirrups, propose a reconsideration of the evidence on which an exclusively Avar transmisson of stirrups is based, and suggest that other routes for the dissemination of this technology to the Roman-Byzantine military, especially in the East, should be considered.

The Aphrodisian stirrup

In 1990, excavations in the Place of Palms at Aphrodisias, then known as the South Agora, uncovered an iron stirrup. According to the excavation notebook, the object came 'from the floor' of the pool occupying the centre of this space (Notebook 316, PTE.1.1990, F24 Photo 22 (A. Tolga Tek)). A photograph of the item *in situ* corroborates this find spot (fig. 1), as does the excavator's personal testimony. Prior to 2012, only the east and west ends of the pool, and some sondages along its length, had been excavated, and the stirrup came from the eastern end. New excavations in this area between 2012 and 2017 uncovered the entire pool, allowing the deposit in which the stirrup was found to be closely dated.

These new excavations and associated epigraphic research have shown that the Place of Palms was a monumental urban park with palm grove arranged around a colossal pool and enclosed by stoas (Wilson et al. 2016; Wilson 2016; 2019a; Wilson, Russell *forthcoming*). Although most of the architecture of the Place of Palms dates to the first and second centuries AD, the complex was extensively refurbished in the late fifth and early sixth century (Wilson 2019a: 198–205; 2019b: 476–484). The Place of Palms saw limited changes in the sixth century but remained a popular public space, as abundant graffiti and incised gameboards attest, until the seventh century (Wilson, Russell *forthcoming*).

The lowest excavated deposit within the pool running down the centre of the Place of Palms comprised a substantial dump of debris deposited during an apparent cleaning-up operation. Abundant roof tiles, broken architectural elements, and marble revetment panels,

along with wooden planks and rafters, some of which had been burned, show that whatever prompted this clearance had caused substantial damage. Coins of Constans II provide a *terminus post quem* for this activity c. AD 643/4 but other small finds from this deposit can be dated earlier in the seventh century (Wilson, Russell *forthcoming*). Alongside the evidence for burning, a small but significant assemblage of weapons (a javelin, spearheads, arrowheads and knives) from this deposit have been used elsewhere to argue that Aphrodisias was attacked in this period (Wilson, Russell *forthcoming*). The evidence for destruction by fire from other areas of the city can be more closely dated to the first quarter of the seventh century and has been associated with Persian forces thought to have invaded western Anatolia in AD 615/16 (Wilson 2019a: 212–218; Wilson, Russell *forthcoming*). The material in the bottom of the pool of the Place of Palms was deposited here later; either it took a generation before a clean-up of the area was undertaken, or a second attack occurred, possibly as late as the late 650s (after 658 coin finds across the site cease until the 790s), followed more swiftly by a clean-up of the resulting detritus.

The photograph and description of the stirrup's find spot indicate that it came from the lowest level of this deposit. It belongs to the same context, therefore, as the weapons discussed above and the coins dating up to AD 643/4. At this date, a stirrup would almost certainly have been a piece of military equipment and it is tempting to connect it with the weaponry, which, as noted, might date as early as AD 615/16; even without this connection, a date in the first half of the seventh century is probable and one before AD 660 almost certain. Whether this stirrup belonged to a Roman-Byzantine defender, as opposed to an attacker, Persian or Arab, of the city is unclear, but it shows that this technology was known and used in this region at this date.

The stirrup itself is 11.9 cm tall and at its broadest point 12.5 cm wide. Its arms (thickness: 0.9 cm) and foot plate were probably cast; no seams are visible, though heavy corrosion means we cannot rule out that the stirrup was forged (fig. 2). The D-shaped arms terminate in a flat, horizontal foot plate (depth: 1.9 cm, breadth: 10.5 cm, thickness: 0.4 cm). An attached iron coil forms the arced suspension loop (interior height: 1.7 cm; greatest width: 2.0 cm). This loop terminates in trailing ends coiled around the arms, perhaps for decorative purposes or to add strength; one trailing end has broken and partially detached from the arm. Whether this damage occurred before or after deposition is unclear, but the defect may have led to the stirrup being discarded. This coiled suspension loop differs from other published examples, discussed below, on which the suspension loops appear to have been cast together with the rest of the objects. It is possible that this represents a weak point not found on other

examples.

D-shaped stirrups elsewhere

Comparable D-shaped stirrups are limited to the two examples from Caričin Grad (Werner 1984; Ivanišević, Bavant 2002; Ivanišević, Bugarski 2012: 135-138). The fragment of a possible third from *Karasura* has been argued on unclear grounds not to belong to a stirrup (Curta 2013: 818 n. 30; *contra* Herrmann 1992: 175), while another similar item from Krasen, Bulgaria, is dated by the excavator to the twelfth century (Grigorov 2010: 796-797). The two examples from Caričin Grad were both forged (fig. 3), and feature comparable D-shaped forms and rectangular footplates, though variations between the two mean they are close cousins rather than exact copies (Ivanišević, Bugarski 2012: 135-136, fig.1). The first stirrup (fig. 3.1), at 9 cm high and 12 cm wide, features wider, steeply curving arms (Werner 1984: 147). Its frame is relatively lightweight, with a footplate which is 1.5 cm deep, c. 10 cm wide and 0.1 cm thick; the arms vary in thickness between 0.3 and 0.5 cm. The frame of the second Caričin Grad stirrup (fig. 3.2) is larger at 13 cm tall and 11 cm wide, though its arms are straighter than the first example (Ivanišević, Bavant 2002: 1099-1100). Precise dimensions are not provided but the published drawings suggest that the second item's footplate may be thicker, in the region of c. 0.2–0.25 cm, c. 1.45 cm deep and c. 10 cm wide; the arms seem to be between 0.5 cm and 0.6 cm thick.

The first Caričin Grad stirrup was recovered in a building southwest of the acropolis, within a destruction layer ascribed to the late sixth or early seventh century on unspecified grounds (Ivanišević, Bugarski 2012: 135-136). The second was found in the southwest of the lower city in a building facing the south street, which may have served as a stable in its final phase (Ivanišević, Bugarski 2012: 136; Ivanišević, Bavant 2002: 1099-1110). Five coins of Maurice (AD 569–597) and a demi *follis* of Phocas (AD 602–610) provide a *terminus post quem* in the early seventh century. The tentative identification of a *principia* and the presence of three lines of massive fortifications at Caričin Grad suggest that this was a militarised settlement (Ivanišević 2017). Ceramics of the late sixth or early seventh century in the same context as the fragment from *Karasura*, even if it is not a stirrup, suggest a similar chronology (Herrmann 1992: 175). This site was originally a fortress, though it may have lost this function by the late sixth century (Herrmann 1992, 175, Von Bülow 1996). Significantly, both Caričin Grad and *Karasura* are set back from the Danube frontier, along main lines of movement through the Balkans.

Stirrup typologies

These D-shaped stirrups are typologically distinct from the apple-shaped stirrups of Avar type. The latter are found in archaeological contexts in the Carpathian basin from roughly AD 600 onwards and in large numbers (Curta 2007: 304-305). Examples with elongated suspension loops (fig. 4) appear in the first half of the seventh century, before falling out of favour after AD 650, while stirrups with circular bow and eyelet suspension loops (fig. 5) continue to appear into the early eighth century (Curta 2007: 304). Both types have a slightly curved footplate, occasionally reinforced with a supporting rib underneath. Though their full dimensions are not provided, published illustrations suggest the thickness of these footplates ranges from between c. 0.2–0.3 cm (Curta 2013: 814, fig. 1, nos 2-3) to as much as 0.35-0.45 cm (Curta 2013: 814, fig. 1, no. 5).

For Curta and others, these Avar stirrups are the forerunners of the stirrups later used by the Roman-Byzantine military and by knights in the medieval West. While Avar stirrups may well have proven successful in the long term, these apple-shaped stirrups are either contemporaneous with or later than the D-shaped devices from Caričin Grad, which complicates this assertion of their influence. Those arguing for the Avar connection have confronted this issue by proposing that these D-shaped versions cannot actually be considered 'true' stirrups. Instead, it has been claimed that they 'are in fact a [type of] mounting device, whose function was not unlike that of the stirrups early Byzantine corpsmen [medical orderlies] attached to the front and back of their saddles in order to transport the wounded on horseback' (Curta 2007: 307-308; 2013: 818, n30; also Werner 1984; Lazaris 2011: 262-263). Curta, in particular, buttresses this contention with two strands of evidence: a passage in the late sixth-century *Strategikon* of Maurice mentioning stirrups, and earlier discussions of the functionality of the D-shaped devices from Caričin Grad.

The first of these pieces of evidence is a passage in the *Strategikon* discussing the equipment of medical orderlies, which is in fact the second reference to stirrups in this text:

> 'To make it easier for the orderly and the wounded or fallen to mount the rescue horses, they should place both stirrups (σκάλας) on the left side of the saddle, one at the pommel, as is customary, the other at the cantle. When both want to get up on the horse, the orderly and the man who is out of action, the first mounts by the regular stirrup on the front, the other by the one to the back.' (Maurice *Strategikon* II.9.22-28; adapted by authors from Dennis 1984)

Curta argues that this passage implies two distinct kinds of equestrian equipment, a stirrup and a mounting device of the sort that he is keen to identify the Caričin Grad objects as. Here he follows Stavros Lazaris, who also argued that the device described in this particular passage of the *Strategikon* was an 'étrier de monte' rather than 'un veritable étrier' (Lazaris 2005: 279). Two criticisms of this conclusion can be made, concerning both saddle arrangements and the technical terminology used to refer to the stirrups. First, while François Aussaresses originally argued from this passage that Roman-Byzantine medical orderlies had two pairs of stirrups (Aussaresses 1909: 65, 109), the text instead strongly implies there were still only two stirrups in use. Both might hang from the left-hand side and the second stirrup may simply be the one from the other side transferred across the saddle to aid a second soldier in mounting. This arrangement would permit the rider to restore the right-hand side stirrup to its original position when needed. Secondly, these would seem to be the same objects used in different ways. In the two passages of the *Strategikon* that discuss stirrups (this passage and an earlier one that is discussed more fully below) there is no clear terminological disparity between different kinds of stirrup, and there is no inherent reason why these items must be typologically distinct. In both cases, the same word, σκάλας, is used to describe the stirrups, and the modifiers employed do not imply a differing design. The appearance of σιδηρᾶς (iron) in the first passage and its absence in the second in all likelihood reflects an avoidance of repetition. The *Strategikon*, therefore, does not support the idea of a differentiation between the two types of objects, and provides no evidence of a mounting device distinct from a stirrup with which we might identify these D-shaped objects.

Curta has also drawn on earlier scholarship by Joachim Werner regarding the functionality of the D-shaped devices to support his interpretation (Werner 1984). Werner argued that the first Caričin Grad D-shaped object, the only example known at the time, was not *really* a stirrup. When citing Werner, however, Curta does not confront a key part of this earlier scholar's analysis. Werner argument rested on his assertion that the thin footplate (c. 0.1 cm) and frame (0.3–0.4 cm) allows us to exclude '… that it is a stirrup in the strictest sense, i.e. that it allows a rider to mount the horse or even to draw a bow when standing in the saddle' (Werner 1984: 147: '…daß es sich bei diesem Bügel um einen Steigbügel im eigentlichen Sinne handelt, d.h. daß ihn ein Reiter zum Besteigen des Pferdes benutzen oder gar beim Aufrichten im Sattel zum Bogenschuß strapazieren könnte'). Werner suggests that the formal similarity between this object and Avar-age stirrups is misleading and that it would be best described as a 'stirrup-shaped footrest' ('steigbügelformige Fußstütze', Werner 1984: 147, fig.

156). If Werner is correct, this device would also not have been able to function as a mounting aid, as Curta suggests. Mounting momentarily places the rider's entire weight on one stirrup, and we should expect that mounting platforms would be as robust as 'true' stirrups, or indeed more robust. As such, the two arguments are incompatible, and Curta's interpretation is not supported by Werner's.

In fact, we should not assume that the light frames of D-shaped stirrups necessarily precluded them from bearing substantial weight. As Ivanišević and Bugarski suggest, some of the apple-shaped stirrups are of similarly light-framed construction (Ivanišević, Bugarski 2012: 136). On apple-shaped stirrups, as noted above, footplates range between c. 0.2 and 0.45 cm. Moreover, the recovery of multiple broken apple-shaped stirrups from the Early Avar cemetery at Pókaszepetk, Hungary, which had fractured at either the suspension loop or the footplate, in graves where the remaining assemblages were well preserved, may suggest that such objects were subject to frequent failure and indeed had to be replaced regularly (Sós, Salamon 1995: pl. III, grave 11.2; pl. XIII, grave 176.2; pl. XIV, grave 133.3; pl. XIX, grave 329.12). D-shaped stirrups are indeed characterised by a thinner footplate (0.1–0.4 cm) but also a deeper (1.4–1.6 cm) and wider (9–10 cm) one, and it is worth considering whether the length and breadth of these footplates may have helped spread the rider's weight. If this was the case, the thin footplates of these objects might not affect their functionality as 'true' stirrups. Additionally, whilst they bear no direct typological relation, securely identified examples from medieval London also serve to show that relatively thin footplates (ranging between 0.4 cm and 0.5 cm) need not preclude these objects from functioning as stirrups (Clark 1995: 72, fig. 54, no. 82, 73, fig. 55, nos. 83 & 86). In practice, the slim suspension loops (consistently c. 0.4 cm) on D-shaped stirrups might have been the actual weak point in these devices and perhaps explain why stirrups of this exact form are not found in later periods. But it should be noted here again that apple-shaped stirrups with elongated suspension loops also disappeared after the first half of the seventh century; new, more effective suspension loops were developed but this does not mean that the original devices were not intended to function as stirrups.

In sum, there are no good reasons to assume that the D-shaped stirrups from Caričin Grad were not true stirrups, and this suggests that multiple stirrup types were in use in the Roman-Byzantine empire in the early seventh century. In fact, in addition to these D-shaped and apple-shaped stirrups, there is suggestive evidence of even greater variety in stirrup technology at this date. The iron stirrup from Pergamon, though loosely dated to the 'früh- oder mittelbyzantinisch' period, could belong to the seventh century (Gaitzsch 2005: 56, cat. V29) and, while it is similar in form to the apple-shaped stirrups with circular bow and eyelet

suspension loops found in Avar contexts (see fig. 6), it has a wider and more open suspension loop. The stirrup from Sardis is of a different type again, though it is simply dated to the 'Byzantine' period (Waldbaum 1983: 42, cat. 90, pl. 7). If we add the Aphrodisian stirrup with its iron coil suspension loop to this list, it is clear that these early stirrups show considerable variety.

The Avar connection

It has long been argued that stirrups were invented by nomads in Siberia or the Southern Altai in the fifth century, and were then transmitted to the south, to China, Korea and Japan, before moving westwards (Bivar 1955; Littauer 1981: 99; Nawroth 2005). More recent evidence shows that the stirrup originated in China itself (Littauer 1981): the earliest known stirrups are either a gilt bronze-encased wooden example from Kirin province, possibly dated to the first half of the fourth century AD (Littauer 1981: 102), or a fully metal example from Jiangsu province, dated to AD 383 (Desroches 1995: 14). A possible forerunner appears on a statue of a saddled but unmounted horse from Hunan province, dated to AD 302 (Cartier 1993: 33). The presence of stirrups at the fifth- to sixth-century Ust-Karasu complex in the Central Altai (Seregin, Vasyutin 2019), in a late fifth- or early sixth-century tomb at Burakovo (Izmailov 1990: 64, 70, fig. 2), and another example of comparable date in the Penza Museum's collection (Izmailov 1990: 62-63, 70, fig. 1), both in the Middle Volga region, attest to the transfer of the technology westwards over the following centuries. Since the Avars originated in Central Asia, passing through present-day southern Russia and Ukraine before arriving in the Balkans, it is conceivable that they acted as a vector for the transmission of this technology into Europe.

While this reconstruction is plausible, it is worth examining the evidence underpinning the argument that the Roman-Byzantine military adopted stirrups specifically from the Avars. For Curta, two mentions of Avar military customs in a long passage also referring to stirrups in the *Strategikon* '…[leave] no doubt as to the source of inspiration' for this introduction (Curta 2007: 304-305). This passage comes earlier in the text than the section already discussed above.

> 'The horses, especially those of the officers and the other special troops, in particular those in the front ranks of the battle line, should have protective pieces of iron armour about their heads and breast plates of iron or felt, or else the breast and neck coverings *such as the Avars use*. The saddles should have large and thick cloths, the bridle should be of good quality; attached to the saddles should be two iron stirrups (σκάλας

> σιδηρᾶς), a lasso with a thong, hobble, a saddle bag large enough to hold three or four days' rations for the soldier when needed. There should be four tassels on the back strap, one on top of the head, and one under the chin. The men's clothing, especially their tunics, whether made of linen, goat's hair, or rough wool, should be broad and full, *cut according to the Avar pattern*, so they can be fastened to cover the knees while riding and give a neat appearance.' (Maurice *Strategikon* I.2.35-49; Dennis 1984, emphasis follows Curta 2007: 302).

According to Curta's argument, the sandwiching of a discussion of saddles between references to horse armour 'such as the Avars use' ('κατὰ τὸ σχῆμα τῶν Ἀβάρων σκέπεσθαι' (Maurice *Strategikon* I.2.37-38; Dennis 1984)) and cavalrymen's clothing 'cut according to the Avar pattern' ('κατὰ τὸ σχῆμα τῶν Ἀβάρων κεκομμένα' (Maurice *Strategikon* I.2.46-47; Dennis 1984)) implies that stirrups were adopted by the Roman-Byzantine army from their Avar adversaries. However, the text does not make the link between Avars and the stirrup explicit, a point acknowledged by Curta (2018: 811) and also advanced by Rance (Rance *forthcoming*). The technical language used in discussing the 'iron armour about their heads and breast plates of iron or felt, or else the breast and neck coverings' ('προμετωπίδια ἔχειν σιδηρᾶ κατὰ τῶν μετώπων τῶν ἵππων καὶ στηθιστήρια σιδηρᾶ ἢ ἀπὸ κεντούκλων' (Maurice *Strategikon* I.2.36-37; Dennis 1984)), or 'tunics, whether made of linen, goat's hair, or rough wool' ('τουτέστι ζωστάρια, εἴτε λινᾶ εἰσιν, εἴτε αἴγεια, εἴτε ῥάσα' (Maurice *Strategikon* I.2.47-48; Dennis 1984)), suggests a careful exposition of military gear and its origins and does not justify extending an Avar origin to all the other pieces of equipment listed; the lasso, hobble and saddle bag are certainly not equipment specific to any single group. Additionally, as Curta concedes, in the section of the *Strategikon* that specifically discusses the Avars and their military tactics, stirrups are not mentioned (Curta 2007: 302, Maurice *Strategikon* XI.2; Dennis 1984).

The *Strategikon's* date is also relevant here. Most scholars now agree that it was written under Maurice (r. AD 582–602, see discussion in Rance *forthcoming*), which would suggest that the Roman-Byzantine cavalry were already using the stirrup by the time of the earliest archaeologically-attested Avar stirrups, which date to c. AD 600. Lazaris is right that the textual references in the *Strategikon* serve specifically as a *terminus ante quem* for the arrival of stirrups in the Roman-Byzantine orbit, but it is not clear *how much earlier* they arrived (Lazaris 2005: 277). In making this point, Lazaris also suggests that the lack of a detailed description of what a stirrup was indicates that the author of the *Strategikon* assumed his

readers would be familiar with these objects. The debate is further complicated by the fact that stirrups can be made from perishable materials. It is possible that rope stirrups were known well before metal ones became common, a point Lazaris raises (Lazaris 2005: 279, 283-284); the *Strategikon*'s specific reference to iron stirrups, in fact, shows that alternatives were known, and visual material collected by Lazaris, including ivories and Coptic textiles datable to the sixth to eighth centuries, also shows a range of stirrup-like devices in use, many of them apparently of rope or leather (Lazaris 2011: 264-269, fig. 11-16). In the end, therefore, the *Strategikon* provides no clear evidence that the Roman-Byzantine military specifically adopted the stirrup from the Avars.

Discussion

The large number of apple-shaped stirrups from the Avar-controlled Carpathian basin dated to AD 600 and the century following demonstrate that the Avars played a key role in bringing this technology to Europe (Curta 2007: 316. fig. 5). They also helped disseminate it: stirrups of this type appear in burials in Lombard Italy, perhaps in association with Avar immigrants or troops (Genito 1997), and in a limited number of Merovingian contexts in the Rhineland (Oexle 1984; 1992: 99; von Freeden 1987: 524); in these latter cases they date as early as the late sixth century. Only two stirrups of this type are known from within the Roman-Byzantine territory, however: the one from Pernik in western Bulgaria and the one from an unknown location in north-eastern Bulgaria (Changova 1994: 181, fig. 168.1; Iotov 2004: pl. 71.753). Neither of these pieces has a good archaeological context, nor are they closely dated. An apple-shaped stirrup from Strezhevo in Northern Macedonia has been shown to belong to a much later, probably tenth-century, hoard (Janakievski 1980; Curta 2013: 822-824). The Pergamene variant on an apple-shaped stirrup is typologically similar to one version of these apple-shaped stirrups but whether it derives from them is uncertain. The Sardis stirrup is of different form, as are the three D-shaped stirrups now known for certain, from Caričin Grad and Aphrodisias, which we would argue are true stirrups and not simply mounting devices. The archaeological evidence from within the Roman-Byzantine empire, therefore, does not seem to support the idea that the military adopted the stirrup from a single Avar source or indeed any single source – or, if they did, a range of experimentation occurred within the first century or so following this adoption. The evidence from the *Strategikon* provides no support for a functional distinction between stirrups and footrests in the late sixth century AD, nor does it indicate that the Roman military necessarily adopted these devices from the Avars. Since, in fact, the *Strategikon* provides a *terminus ante quem* for the use of the stirrup by the Roman-Byzantine

military and all the archaeological finds of stirrups in Roman-Byzantine territory post-date the *Strategikon*, these objects do not clarify who was responsible for this introduction or when it occurred.

This is not to say that the Avars were unimportant in this process. The mention of Avar cavalry equipment in the *Strategikon* shows the influence they had. Ivanišević and Bugarski even suggested that the D-shaped stirrups from Caričin Grad might represent early Roman-Byzantine experimental versions of stirrups inspired by Avar examples (Ivanišević, Bugarski 2012: 135-138). This is a possibility, and the examples from Asia Minor might represent further localised experiments in stirrup design over the next century or so. But it is possible that the Roman-Byzantine adoption of stirrup technology was influenced by multiple sources, as Ivanišević and Bugarski also acknowledge. In the context of Asia Minor, it is worth noting that there is suggestive (though not clear-cut) evidence for stirrup-use by the Sasanian cavalry by the early seventh century (Farrokh et al. 2018: 56-57; Kennedy 2001: 172-173; Michalak 1987; Farrokh 2017: 107, 197, 310-311; Herrmann 1989). Stirrups from the northern Caucusus and north of the Black Sea have also been found in association with Roman coin finds (Curta 2013: 815-818): three stirrups of the circular bow and eyelet format were found in the Klin Yar cemetery near Kislovodsk, Russia, along with coins of Maurice and Heraclius (Härke, Belinskii 2000: 201-202); a stirrup from the cemetery at Romanovskaya, Russia, was found with a coin of Constans II (Semenov 1988: 109); and a stirrup was found in the grave at Malo Pereschchepyne, Ukraine, which has been connected to the Bulgar king Kubrat, ally of Heraclius against the Avars (Aibanin 1974: 33-34; Werner 1984: pl. 7.15). These examples show contact between the Roman-Byzantine empire and other stirrup-using peoples to the east and north; even if these examples date to the seventh century, earlier stirrups have also been found in these areas, as noted above.

Finally, the *Strategikon* nowhere describes the form of iron stirrups. They are described simply as σκάλας, that is devices for climbing or mounting. Their primary function, therefore, was originally to facilitate mounting, even if they may also have reduced the strain of more complex mounted actions. The Avar apple-shaped stirrups might have proven more successful in the longer term than D-shaped stirrups but, importantly, even those apple-shaped stirrups with elongated suspension loops disappeared from use by the mid-seventh century. This was a period of experimentation, in other words, when the ideal stirrup form appears not to have been fixed; in Asia Minor alone, we know of three stirrups, all of different forms. The sixth to eighth centuries, in fact, saw experimentation in various military technologies, with new ideas spreading from China and the Steppe world to both Byzantine and Sasanian contexts; examples

include, but are not limited to, the emergence of P- and D-shaped sword suspension gear, and the appearance of the sabre (Bálint 1978: 184-186, Borisenko et al. 2006; Farrokh 2017: 101-104; Nickel 2002).

The Aphrodisian stirrup shows that early experiments in stirrup-use were not limited to the Balkans, even if this region has produced much of the evidence for this technology to date. Further finds might even indicate that stirrup use was more widespread in late antique Asia Minor than has previously been thought; the majority of Avar stirrups come from graves and yet few graves of comparable date have been excavated in Asia Minor. If further evidence from Asia Minor or other eastern areas materialises then an additional route for the spread of this technology into the Roman-Byzantine sphere of influence should be considered.

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