The Missing Link

Filling the Gap in the Evolution of Medieval Domestic Looms

Jennifer Ball

The history of looms in the medieval world has focused on the development of the horizontal treadle loom with its built seat, wooden framework, and elaborate pattern-making device, which was used to make the complicated silks that characterize medieval luxury textiles (fig. 1). Scholars naturally have been fascinated with the origins of the technology used to create such masterpieces of weaving. This thrust in scholarly interest has produced a great deal of knowledge about treadle looms, first documented in Europe in an eleventh-century text, and about their use in professional contexts. While what little is known about workshop practices comes to us through extant textiles and the occasional literary mention, even less is known about domestic weaving in the Middle Ages.

Literary sources, citing the virtuous woman as weaver, confirm that nearly all women, regardless of class, practiced domestic weaving.[1] It is difficult, however, to glean what domestic weaving actually entailed. It is unclear what articles of clothing or furnishings were woven in the home, how supplies were obtained, and what type of loom was used, to name the most salient questions to which we are seeking answers.

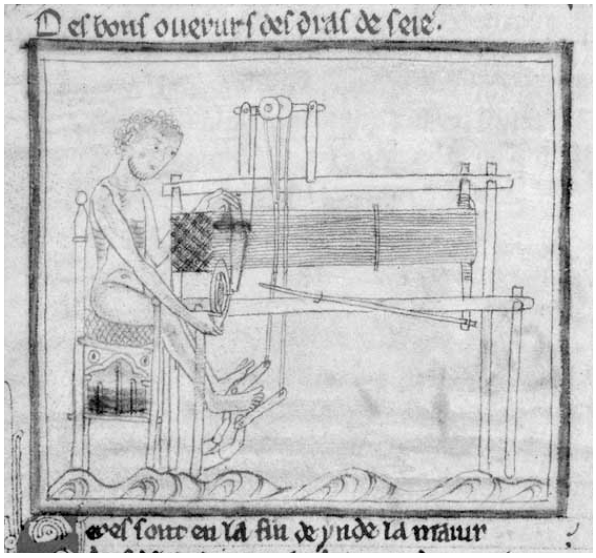

Fig. 1 Male weaver, from the Romance of Alexander. Cambridge, Trinity College Library, ms. O.9.34, fol. 32b

This study adds to our knowledge of domestic looms with a discussion of two pit looms found in the early eleventh-century Byzantine settlement of Selime in Cappadocia, Turkey (figs. 2–3).[2] The pits looms, in use sometime between the late eleventh and sixteenth centuries, are not part of the construction of the original settlement but were constructed at some point after. The looms provide evidence of domestic practices helping to fill an evolutionary gap between the warp-weighted looms of Antiquity and the horizontal treadle looms of the late medieval world. Many hypotheses abound as to the form and technological capabilities of the loom types that bridged this evolutionary gap; historically, pit looms are rarely considered due to lack of physical evidence.

In 1999, while doing dissertation research on portraits in wall paintings of Cappadocian rock-cut churches, I came across two pits in the Cappadocian site of

My sincerest thanks to Sarah Brooks and Kostis Kourelis for their many helpful discussions of this work with me, in addition to reading drafts (but of course, all mistakes are entirely mine). I offer my deepest gratitude to Tom Mathews, for teaching me to imagine as a scholar. His encouragement and enthusiasm led me to trek around Cappadocia and discover these pits in the first place.

1 Thomais of Lesbos and Theodora of Thessalonike are just two of many examples of the weaving virtuous woman. Their stories are translated by Paul Halsall and Alice-Mary Talbot respectively in *Holy Women in Byzantium* (Washington, D.C., 1996), 200 (Theodora) and 304 (Thomais).

2 The settlement is dated by Veronica Kalas from tomb inscriptions, "The 2004 Survey of the Byzantine Settlement at Selime-Yaprakhisar in the Peristrema Valley, Cappadocia," in *Dumbarton Oaks Papers* 60 (2006): 276.

Selime.[3] They consisted of an excavated seat for the weaver and holes for the loom itself. A pit loom is not in fact a single type, as many types of looms can be constructed in a pit. The pits themselves suggest horizontal looms with a foot-operated treadle, a feature reinforced by pictorial, anthropological, and literary evidence. Due to the makeshift character of these transportable looms, the pits for which can easily be filled in, little physical evidence survives, thus it is often overlooked in the history of medieval looms. Anthropological evidence, however, suggests that pit looms were quite common in the Eastern Mediterranean.

Before offering a full description of these pit looms, it will be helpful to present a chronology of concrete evidence for medieval looms along with some likely hypotheses. This allows us to properly situate the Cappadocian pit looms within the development of medieval looms. The ancient world passed onto medieval weavers the warp-weighted vertical loom. In this type, the supporting warp threads, through which the weft passes, are weighted with individual weights. Later Roman examples used a beam for warp tension, a type which survived well into the medieval period as seen in an illumination in the Utrecht Psalter dated to the ninth century (fig. 4).

The use of warp-weighted vertical looms is well documented archaeologically in the large number of loom weights excavated at ancient and medieval sites. Textual sources verify the continued domestic use of warp-weighted looms up through the thirteenth century. For example, at the Roman and Byzantine city of Amorium, Turkey, dozens of loom weights have been found.[4] The majority of these date prior to the fifth century, with their use tapering off in the Byzantine period. Nevertheless, Middle Byzantine loom weights at Amorium demonstrate the continued use of this type of loom in Anatolia.

In using the warp-weighted loom, the weaver had to stand, working the weft against gravity. Textiles were limited by the height of the loom and no mechanism existed to lift the warp, which had to be done by hand. A related vertical loom was developed with a second beam to roll up the woven cloth, allowing the weaver, now able to sit, to create textiles that were longer than the height of the loom (fig. 4). Nevertheless, these cumbersome looms faded out and new types were invented.

Hypotheses abound as to what replaced this vertical loom. Based on the shift from tapestry to twill weave at the end of the fifth century, J. F. Flanagan proposed the introduction of the draw loom in the Near East.[5] Based on surviving damasks, John Peter Wild posited that the horizontal loom came into existence even earlier, before the mid-third century, in Syria.[6] Furthermore, an oft-cited passage from the fifth-century Theodoret of Cyrrus describing complicated woven patterns suggesting some mechanized pattern device was in use in Syria, "myriad images of various animals and human forms, some hunting and some praying and pictures of trees, and many other things are woven."[7] Complex patterns need more sheds – the space between odd/even warp threads under which a shuttle can be passed and the various colored threads need to be organized, especially for repeated patterns. This organization can be achieved

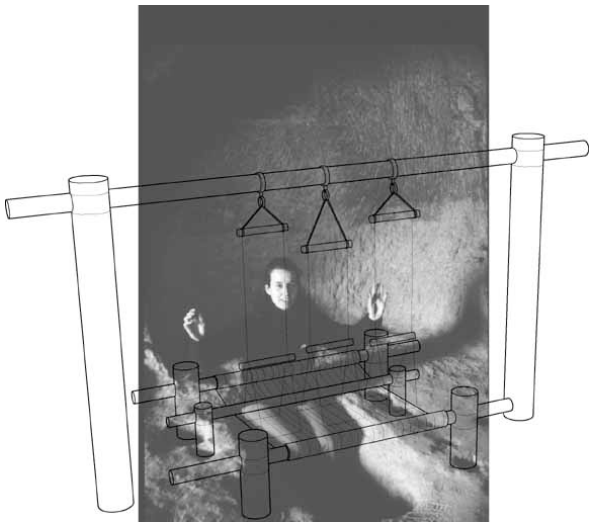

Fig. 2 Reconstruction of loom over one of the pits with Sarah Brooks as weaver

[3] I first mention these in my dissertation, "Byzantine Dress" (Institute of Fine Arts, New York University, 2001), and then in Jennifer Ball, *Byzantine Dress: Representations of Secular Dress in Eighth- to Twelfth-Century Painting* (New York, 2005), 75n94.

[4] Feruzat Ulker in C. S. Lightfoot, et al., "The Amorium Project: The 1997 Study Season," *Dumbarton Oaks Papers* 53 (1999): 344. Even while acknowledging that some of these objects may be bottle stoppers, Ulker notes forty-six examples found in the 1993–97 seasons alone.

[5] J. F. Flanagan, "The Origins of the Drawloom Used in the Making of Early Byzantine Silks," *Burlington Magazine,* October 1919, 167–72.

[6] John Peter Wild, "The Roman Horizontal Loom," *American Journal of Archaeology* 91 (1987): 459–71. Anna Muthesius concurs with Wild that a loom with an elaborate pattern-making device must have existed before the Arab conquest in Syria and Egypt; see Muthesius, *Byzantine Silk Weaving AD 400 to AD 1200* (Vienna, 1997), 23.

[7] Ibid.

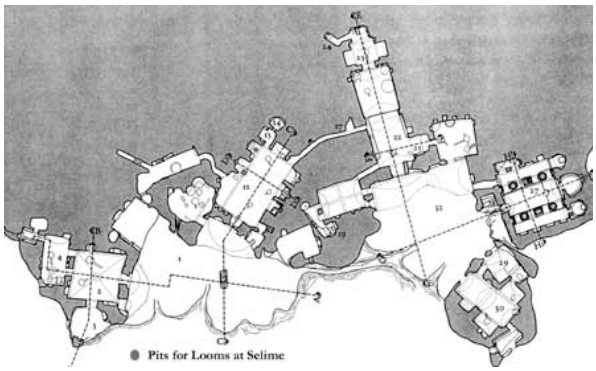

Fig. 3 Plan of Selime denoting the location of the two pits

by using a pattern-making apparatus labeled to lift the appropriate shed, usually housed above the loom with heddles to work the warp below. The presence of such a pattern-making device implies a movement from a vertical to a horizontal loom, where the heddle is foot-operated. Such a loom is also suggested by Diane Carroll,[8] who proposed a shift to a low-warp, foot-powered loom beginning in the fourth century, based on a pattern change in Egyptian tunics.

Some literary and pictorial evidence can be added to these hypotheses. An eleventh-century passage from a Talmudic commentary by Rabbi Rashi of Troyes in Northern France, describes in detail a foot-powered, horizontal loom employed in a professional context – the earliest mention of such a loom. In discussing whether weaving was permitted on the Sabbath, he refers to the "part of the loom of [professional] weavers who weave by foot which is in place of the rod that goes up and down in the loom used by women."[9] Thus in the eleventh century two loom types were in Europe (at least), one with foot peddles used by (presumably male) professional weavers, and another (women's) loom with a rod for lifting the warp by hand. We can also infer that this second loom was used domestically, as he does not use the term for professional weavers. The author makes it clear that this domestic loom had no peddles, suggesting that it might be vertical. Four images of horizontal treadle looms, albeit of slightly later dates, confirm Rashi of Troyes's description and allow us to visualize what the author describes; the most detailed of these manuscript paintings of 1250 depicts a naked man working a loom (fig. 1).[10] Finally, several scholars have looked at Chinese looms, assuming this knowledge passed along the Silk Road into Europe.[11]

Pit looms have been largely ignored in discussions of medieval loom technology due to a lack of physical evidence. However, one image of a pit loom survives in a manuscript illumination from the Paris Book of Job, created in the Peloponnesus in 1361–62, illustrating two domestic female weavers (COLORPLATE I). One weaver uses a backstrap loom and another, on the lower right, uses a pit loom similar to the one that I propose at the Cappadocian site. The weaver sits on the ground, and her feet work peddles attached to the heddles. While the artist has not clearly indicated a hole in the ground, it would be impossible for her feet to rest at ground level without her knees hitting the loom. Furthermore, it would be back-breaking work to reach over one's knees all day to weave. The weaver's feet at least, if not her buttocks, must be below ground level to enable this particular loom to be operated comfortably.

The two Cappadocian pit looms, which may predate the fourteenth-century Job image, should be added to our chronology of medieval horizontal treadle looms. Selime is a domestic complex hewn from the local volcanic rock consisting of two main halls, a kitchen, rooms for lodging, a church, storage, and a stable.[12] The pit looms, located in Room 12, were rectangular (approximately two feet wide and three-and-a-half feet long), each with a seat about four inches deep and with a foot rest about eighteen inches deep.[13] (figs. 3, 5). Six holes, three on the left and right each, lined these seats and would have anchored the loom; two pairs at either end held the warp beams and two were placed above the weaver's feet, across which the pattern-making device was situated.

The loom was secured probably a few inches above the weaver's lap, which was sunken into the ground, making it about six inches in height, not including the pattern-making apparatus. The weaver's feet operated

[8] Dianne Lee Carroll, "Dating the Foot-Powered Loom: The Coptic Evidence," *American Journal of Archaeology* 89 (1985): 168–73.

[9] Eleanora Carus-Wilson, "Haberget: A Medieval Textile Conundrum," *Medieval Archaeology* 13 (1969): 165.

[10] The other representations of horizontal treadle looms are two stained glass images, one at Chartres and one at Amiens, both from the twelfth century, and folio 2v in the British Museum ms. Egerton 1894 of 1300.

[11] John Becker, in *Pattern and Loom: A Practical Study of the Development of Weaving Techniques in China, Western Asia, and Europe* (Copenhagen, 1987), and Muthesius, in *Byzantine Silk Weaving*, are just two of the more recent scholars who have suggested a connection.

[12] Veronica Kalas, *Rock-cut Architecture of the Peristrema Valley: Society and Settlement in Late Byzantine Cappadocia*, PhD diss., Institute of Fine Arts, New York University, 2000.

[13] Dimensions are approximate, as the two loom pits differ slightly in size.

Fig. 4 Weaver on vertical loom, from the Utrecht Psalter. Utrecht, University Library, ms. 32, fol. 84r

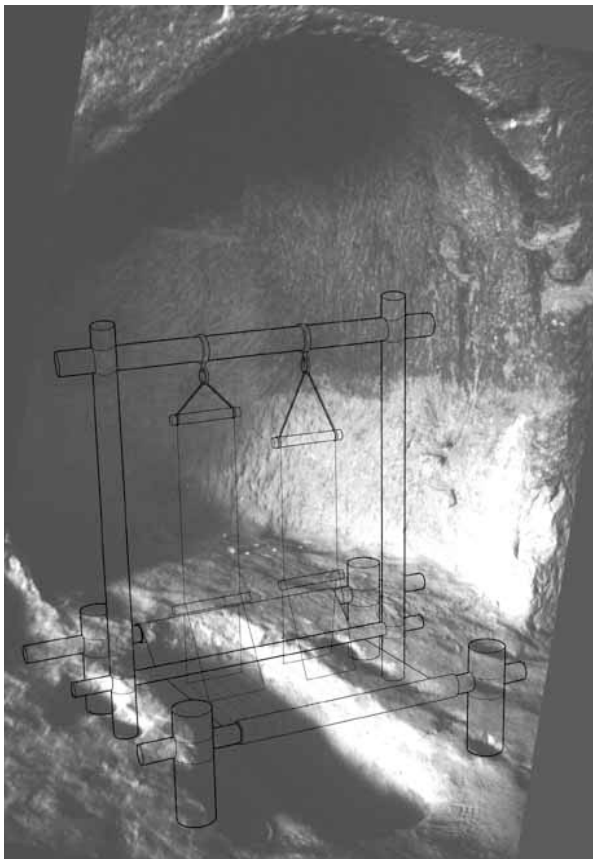

Fig. 5 Reconstruction of loom over empty pit

treadles, allowing for the possibility of two heddles, used to lift groupings of warp threads to create a shed, under which the weft may pass. In a simple weave, even- and odd-numbered warp threads each have their own heddle. Two additional pegs above the weaver's knees anchored an upper beam, which held the heddles. On the wall next to one of the pits there is a hole, possibly another anchor point for the pattern apparatus, although modern pit looms demonstrate that this was not a necessary feature.[14]

Pits are commonly found in domestic sites, so it is important to rule out other uses for these examples. Pits were used for storage as well as for various other activities, such as wine or olive oil production, or for ovens or baths. For example, Selime preserves pits that served as a *tandir* oven and baths,[15] and wine production has also been proposed here.[16] The two pits that I propose functioned as looms lack drainage channels typically found when used for extracting juice or oil. No traces of metals, ceramic, or cloth lined the pits, and such traces have been commonly found in pits used for food manufacture and baths. Finally, the room itself does not suggest any special manufacturing function.[17]

The complexities of dating the pits, not to mention the site itself, are numerous, and it cannot be confirmed whether these pits are medieval or postmedieval. According to Veronika Kalas, who most recently surveyed the site, the pits of Room 12 appear to be part of the original excavation and not a later cutting,[18] thus concluding that they date to the early eleventh century. However, the cuttings for the pits themselves are very informal, not taking into account any of the architectural motifs or niches in the room. While all of the excavated elements in the room – columns, arches, niches – are of a very high quality, suggesting a formal space, the pits are cut crudely. Most importantly, the original use of the room must have been for receptions, as it is the largest hall containing the finest of the excavated decoration at the site. The pits, therefore, must have been dug later in the life of the house. The question as to how much later is impossible to answer with certainty.

Cappadocia went through major changes in the eleventh century following a period of peaceful prosperity beginning in the early tenth century. Selime was probably built during this time of stability when the military aristocracy was at its height in the region. Attacks by Turks in 1057, 1059, and 1067 weakened the Byzantine position in Cappadocia. The territory was finally lost at the battle of Mantzikert in 1071. The reuse of the site when the pit looms were likely dug could have happened under a new regime as early as the late eleventh century. In his publication of Çanli, a similar settlement nearby to Selime that was part of the same system of towns surrounding the regional city of

[14] For example, in Central Asia, where the pit loom was actually preferred even in professional workshops to the drawloom used in neighboring China and India, documentary photographs show examples not attached to the wall. The four- and eight-shaft pit looms favored in Central Asia date back at least into medieval times. See Janet Harvey, *Traditional Textiles of Central Asia* (New York, 1996), 90–91. However, an early-twentieth-century pit loom in Central Anatolia had an upper anchor to the wall in Füsun Ertug-Yaras, "An Ethnoarchaeological Study of Subsistence and Plant Gathering in Central Anatolia," vol. 2, PhD diss., University of Washington, St. Louis, 1997, pl. 110.

[15] Kalas, "The 2004 Survey," 278, 287.

[16] Kalas, *Rock-cut Architecture*, 139–44.

[17] Ibid., 139–141; Kalas's additional pits, discovered after the dissertation research, are found in the storage room off of the kitchen (Room 4) and in the *triclinium* (Room 22). See "The 2004 Survey," 288.

[18] Kalas, "The 2004 Survey," 288.

Koloneia, Robert Ousterhout proposes that Çanli was destroyed and rebuilt in 1155 or 1171.[19] Several phases of building at Çanli suggest that the majority of the site was built in the tenth through eleventh centuries, as at Selime. Later additions to the site were made in the thirteenth and fourteenth centuries,[20] with tombs added as late as 1532.[21] Selime was likely occupied, and abandoned, following the same chronology, as the two sites were protected by the same fortress and on the same trade route. Without further archaeological evidence at Selime, the history of the settlement suggests that abandonment and subsequent reuse of the site occurred as early as the late eleventh century, when the region first fell under attack, and as late as the mid-twelfth century, when the surrounding area was definitively rebuilt. As there is evidence for continued use of Çanli up until the sixteenth century, we cannot rule out a later date for the cutting of the pits at Selime, but the pit looms represent the only later addition to the site, implying that the site was used as is soon after its initial abandonment.

Evidence for pit looms in the region is substantial, although none can be dated with any certainty. Kalas has recently proposed two additional pits in the Selime settlement, for example – one in the other formal space known as Room 22, and one off of the kitchen in a possible storage area (fig. 3, room 4).[22] In addition, she has documented examples at Hasankeyf in eastern Turkey.[23] Ample anthropological *comparanda* in the Eastern Mediterranean demonstrating the use of pit looms has been documented by Shelagh Weir in 1960s Syria, Egypt, and Palestine.[24] More recently Füsun Ertug-Yaras discusses Central Anatolian pit looms.[25] Finally, Joan Bouza Koster has recorded the common use of pit looms in the southern Argolid region in Greece.[26]

These sociocultural anthropological studies suggest the historical use of pit looms around the wood-poor Eastern Mediterranean. However, because wood disintegrates easily and pits could be filled when no longer in use, it is very difficult to find extant examples with which to compare Selime. Two sites with pit looms have been proposed in the Byzantine world: Herbert Winlock and W. E. Crum proposed seventh-century brick-lined trenches for foot treadles at the Monastery of Epiphanius in Thebes, Egypt; R. A. Farag also cites treadle pits in a loom factory in Abydos, Egypt.[27] Wild, Anna Muthesius, and others have raised skepticism about both sites, and I am inclined to agree about Abydos, especially, because the pits seem too small and do not have other cuttings to suggest looms. Those at the Epiphanius, however, have been primarily written off for being too narrow (only ten inches), an argument that does not hold when one looks at the range of pit looms throughout Central Asia and the Middle East, some of which are just the width of the weaver's feet, for which ten inches is plenty. The well-known *ikat* textiles of Central Asia, where the pit loom is preferred, were typically only nine to twenty-four inches wide up until the nineteenth century when they began to widen.[28]

The discovery of two pit looms at the Selime complex in central Turkey sheds light on domestic weaving practices in this region. It can be inferred that women weaving in the home continued to use what was cheap and available, including both the vertical and pit looms. A pit loom is rather inexpensive, can be easily constructed for home use, and represents an intermediary step between a vertical loom, with limited capability, and a full-frame treadle loom. It is more desirable than the vertical warp-weighted loom: the weaver can sit down; the threads can be beaten down easily, rather than working against gravity; and pit looms do not take up significant space as with a standalone loom, making them even more attractive to the domestic weaver.

What might be woven on these hypothetical looms is hard to say. One is always tempted to propose silk, as Cappadocia lay on the Silk Road and there is much evidence that its citizens were well dressed.[29] The length of the pits is irrelevant, as the cloth was rolled as it was woven and thus could be any length; significant are the pits' fixed widths, which could produce a fabric with a maximum twenty-five-inch width. Modern pit looms

[19] Robert Ousterhout, *A Byzantine Settlement in Cappadocia* (Washington, D.C., 2005), 8.

[20] Ousterhout, *A Byzantine Settlement*, 61.

[21] The tombs are dated by dendrochronological evidence of a nearby door; see Ousterhout, *A Byzantine Settlement*, 203.

[22] Kalas, "The 2004 Survey," 288.

[23] I am grateful to Dr. Kalas for sharing her images of this site with me in 2005.

[24] Shelagh Weir, *Spinning and Weaving in Palestine* (London, 1970), 27–35. Plates 21–24 are all pit treadle looms, a Syrian example of which (pl. 22) was purchased for the British Museum.

[25] Ertug-Yaras, "An Ethnoarchaeological Study of Central Anatolia," 396–400 and pl. 110.

[26] Joan Bouza Koster, "From Spindle to Loom: Weaving in the Southern Argolid," *Expedition* 19 (1976): 29–39; see esp. plate 14.

[27] Herbert Winlock and W. E. Crum, *The Monastery of Epiphanius at Thebes* (New York, 1926), and R. A. Farag, "Excavations at Abydos in 1977: A Byzantine Loom Factory" *Mitteilungen des Deutschen Archäologischen Instituts* 39 (1983).

[28] Kate Fitz Gibbon and Andrew Hale, *Ikat: Splendid Silks of Central Asia* (London, 1997), 89.

[29] Ball, *Representations of Secular Dress*, 62–69.

of the Eastern Mediterranean were primarily used for wool. The only Byzantine Anatolian textiles with which to compare the proposed Selime products – the finds at Amorium and at Manazan[30] – are wool. Petra Linscheid has suggested the textile finds at Amorium were woven locally.[31] Fine clothes such as those seen in painted portraits found in Selime and other sites of the region were less likely to be made at home; a domestic loom probably produced textiles for immediate functional needs – storage sacks, blankets, furnishings, textiles for farm uses, and so on.

Selime, a domestic site with a scarcity of wood, was an ideal setting for such a pit loom. Its cuttings suggest a horizontal loom with foot peddles, the immediate origins of which can be traced the Near East,[32] where this loom form is still in use today. This is especially important, as the Selime pits provide physical evidence for this type of loom possibly as early as the twelfth century. Innovations in loom technology occur professionally first, trickling down to domestic use. Thus foot-operated horizontal looms were already established in Anatolia when these pits appeared.

We know little about the second wave of inhabitants at this site and their comparative wealth. Even if their standard of living had dropped considerably from the original elite occupants, evidenced by their large stables, painted church, and highly decorated halls, an agrarian life must have persisted here. Woolen textiles would be regularly used, and the climate probably called for wool throughout much of the year. No matter what they wove, it seems that the women of this household kept their families in handmade cloth.

[30] Tim Dawson, "A Tunic from Eastern Anatolia," *Costume: The Journal of the Costume Society* 36 (2002): 93–99, and Petra Linscheid, "Textile Fragments from the Lower City, Trench AB and Trench LC5," *Amorium Reports II: Research papers and Technical Reports*, ed. C. S. Lightfoot, *BAR International Series*, vol. 1170 (Oxford, 2003), 185–91.

[31] Linscheid, "Textile Fragments," 185–91.

[32] Eric Broudy traces pit looms from India to the Near East along the cotton route in *The Book of Looms: A History of the Handloom from Ancient Times to the Present* (Hanover, N.H.), 105–11.1.