



The Emperor's Clothes: The Fold Lines

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The Cleveland bronze (Covers, Kozloff, Figures 1-3) depicts Marcus Aurelius wearing the basic item of Greek clothing, a rectangular draped mantle (*himation* in Greek, *pallium* in Latin).¹ Its most arresting aspect is the crisscross pattern of lines covering it. Just visible at the neck, is another textile, a tunic (*chiton* in Greek, *tunica* in Latin) which, although not discussed here, resembles the mantle in its treatment and woven construction. The only technical difference between the two is that the tunic would have had simple seams while the mantle required none.²

Like the semicircular Roman toga, the Greek mantle retained the same basic construction throughout antiquity; unlike the toga, however, it continued unchanged in size and draping. There were a number of possible ways of wearing it, but none is associated with any particular period. A range of about a thousand years from the fourth century BC onward is possible for this combination,³ though if the specific form of the fold lines is taken into account, then the earliest date can be moved forward to the late third century BC. The dating of the bronze to the second century AD depends on its context and artistic style.

The draping of the mantle on the Cleveland bronze follows the basic rules for that garment, but exhibits an unusual variant in that the right arm and shoulder are enclosed instead of being left free. The strong diagonal lines of drapery radiating front and back from the left hip are caused by the wearer apparently clutching bunches of cloth in his left hand. The measurements given for the original (life-sized) garment (Figure 1) have been calculated with reference to a small group of surviving excavated mantles, on which the proportion of the long sides of the rectangle to the short sides is roughly eight to five.⁴

The realistic modeling of the bronze reveals much about the material and technique of the original textile. Looking first at the edges of the mantle, one notices how those on the long sides of the cloth, running horizontally on the draped garment, are thick and firm in appearance and marked by two rounded parallel ridges (this effect is seen best at the bottom, where the mantle wraps around the legs). In contrast, the cloth at the short sides appears stretched and uneven, particularly on the edge A-B as it drapes up and over the left elbow and down to corner A behind. (Here, the sculptor has apparently erred in depicting an extra length of the firm edge; at least in reconstructing the draping it proved impossible to duplicate the edge of the mantle shown behind the left elbow meeting at edge A-B.)

Differences between the edges of the long and short sides are easily understood after seeing a surviving contemporary wool textile (Figure 2). The long sides of the mantle are in fact selvages; in almost every textile such selvages are firmer than any edge at right angles to them because the selvages run in the direction of the warp threads, the threads that are set up first on the loom and which have to take most of the strain during weaving.⁵ In antiquity the selvages of wool textiles were

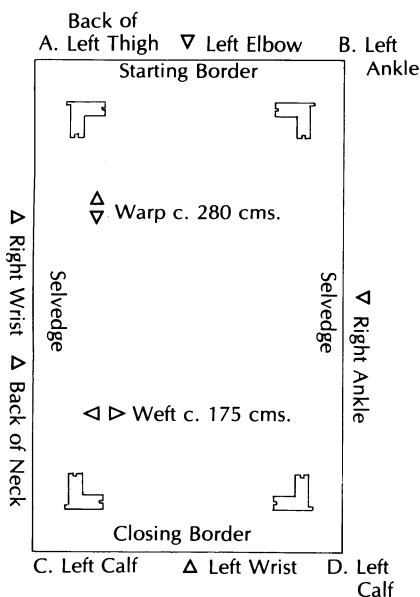


Figure 1. Diagram of the mantle. The corner motifs borrowed from Cave of Letters mantle no. 43. Draping began with the side C-D.

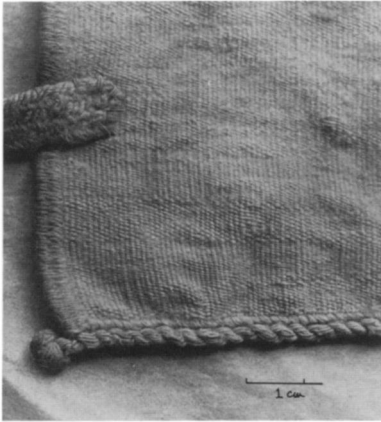


Figure 2. A typical wool textile of the Roman period. Corner of a wool hood from Tell Atrib, Egypt, second-third century AD. British Museum, M&LA 1873,7-12,4 (by courtesy of the Trustees). Selvedge on left; closing border along bottom worked from right to left, tassel beyond knot in this case worn away. (The sewn-on braid on the left side is the start of the strap which joined the hood under the chin.)

especially solid because it was usual to add weft reinforcement besides the normal grouped or thicker outer warp threads (Figure 3).

The contrasting flexibility of the short sides, the edges parallel to the weft, must be seen first of all in terms of yarn. A typical weft yarn was much less tightly spun than the warp yarn and was spun from shorter more curling fibers; it was a yarn with more “give” in it. The woven relationship between warp and weft is also relevant. The original of the bronze mantle was almost certainly in the simplest weave, plain “tabby” or “1 over 1,” but it would have been “weft-faced tabby,” with many more weft than warp threads to the centimeter with closely beaten weft threads, curving over and under the stretched warp. It would have been impossible to pull out the finished cloth much in the direction of the warp; the weft threads, on the other hand, under stress, would have tended to flatten and lengthen somewhat, especially at the edges.

The specific kinking or wrinkling along the short sides must, however, be put down to a characteristic feature of textiles in antiquity—cords or braids that closed and completed the two ends of the cloth. These cords are not actually depicted on this bronze but reveal themselves by their ends, the tassels at the corners.⁶ All four corners of the mantle are visible, though all are partially broken. Corners A, B, and D have the remains of tassels (see reconstruction in Figure 3 and Kozloff, Figure 2).

The precise forms of the upper and lower edges given in Figure 3 are hypothetical—showing for top and bottom of the cloth only one possible variant—but it must be made clear that such edgings fall into two distinct types: starting borders and finishing borders. Starting borders are made of threads that are separate from the warp and served to join its continuous thread to the loom.⁷ At the time of weaving, the ends of the starting border would have been long enough to have been tied around the cloth beam of the loom. When the weaving was completed, these ends could be cut down and knotted in a number of ways. By the standards both of sculpture and surviving wool textiles, the tassels on this bronze mantle are long. Finishing borders are made of the warp

Figure 3. Diagram of the corners of the mantle. The exact forms of the starting and closing borders and of the selvedges were each chosen from a number of possible variants.

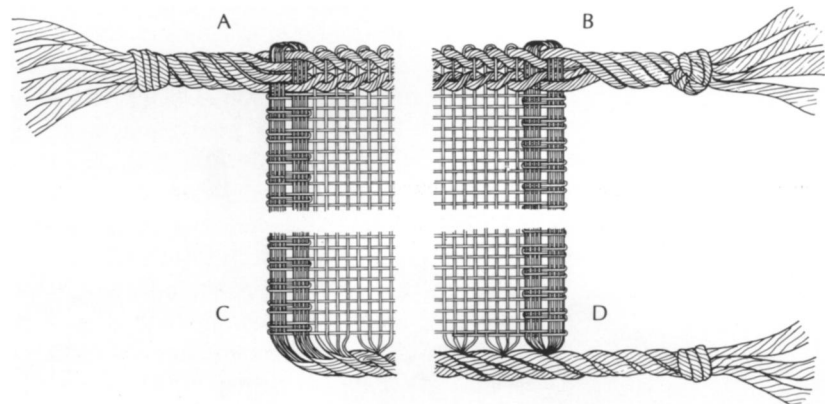




Figure 4. The “Juno Cesi.” Marble. Probably from Turkey, Pergamon, Greek, Hellenistic, late third or early second century BC (arms restored). Museo Capitolino, Rome, Stanza del Gladiatore 2.

themselves and serve to secure the weft in the completed textile. The variety shown in Figures 2 and 3 is the most common.⁸ In theory, it should be possible to begin a closing border in the middle of the side and work outward in both directions. While starting borders produce two tails or tassels, closing borders seem always to have been worked across from one corner to the other, resulting in a single tail. This fact probably explains the absence of any trace of tassel on corner C.

On the evidence of surviving textiles, it was almost impossible to make these borders the right thickness and with the right number of twists to fit exactly the spacing of the warp threads. If a closing border is too short, the weft alongside will buckle. Both starting and closing borders can be too long, forcing the border itself to undulate. And one sees a further sort of distortion when areas of uneven tension in the warp have been absorbed into the first inch or so of cloth, immediately adjacent to the starting border.

The tassels and the reinforced selvages of the mantle, as well as the reinforced selvedge visible at the neck of the tunic, confirm that the original garments were made of wool. Surviving items made of linen, the next most important fiber in antiquity after wool, almost invariably have plain selvages and usually start or finish with fringes. Silk was woven using the same techniques as for wool, but although silk clothing was a long-established feminine luxury, it seems not to have been wholly acceptable for men in the mid-second century AD.⁹

Given that the crossing lines represent folds, the aspect of the clothing about which we have no information is its original color and decoration. The subject, as a Roman emperor, would have been entitled to clothing of an almost unimaginable grandeur. One thinks of the bronze drapery fragments from the Arch of Caracalla at Volubilis in Morocco,¹⁰ decorated with trophies of arms and captured barbarians, and the real-life purple wool and gold tapestry from the tomb of Philip II of Macedon at Vergina. But at Volubilis the cloak in question is the emperor’s military *paludamentum*, an appropriate context for triumphal imagery. The feeling of the Cleveland bronze is quite different. The portrayal of the emperor in Greek clothes, emphasizing his respect for Greek philosophy and learning, was probably meant as a compliment to his sensitive Greek subjects. In such circumstances, the color and decoration of the original mantle may well have been the usual style for the Roman period: mainly white with a purple geometric motif in each corner.

The right-angled or *gamma* motifs shown in Figure 1 are borrowed from the surviving mantle closest in date to the statue, one of the textiles found in the Cave of Letters above the Dead Sea.¹¹ Although the original of the bronze mantle would have matched the excavated mantles in its construction, it would have differed in the quality of its raw materials,¹² a distinction contemporaries would have quickly noticed. The *gammas* on the Cave of Letters mantle are in a cheap imitation purple,



Figure 5. Detail of Figure 4. The folds on the mantle.

while the ground is an undyed cream-colored wool. Any dye used for the emperor's mantle would certainly have been the very expensive real purple, derived from Murex whelks; the wool would have been generally finer and softer, and where undyed, much whiter.¹³ At a time when pigmentation in fleece was much more common than now, truly white wool was rare enough to merit a considerable premium. The emperor would have made a splendid figure dressed in these clothes, despite their apparent simplicity. The areas of dark yet brilliant purple would have set off the bright whiteness of the rest, an effect seen best in strong daylight.

Turning at last to the lines representing folds, note that these occur at intervals all over the mantle as well as on what is visible of the tunic. The lines are almost invariably in pairs, varying from 2 to 2.5 centimeters apart, with pairs frequently crossing others at right angles. If one envisages the mantle before draping, it becomes obvious that all these folds are parallel either to the weft or to the warp of the cloth. (For clarity, the terms "fold" and "fold line" are used exclusively here for deliberate folds, those applied before the mantle was put on; irregular folds produced by draping are called "lines of drapery.")

As a general rule, the fold lines consist of pairs of ridges or indentations that are both convex or both concave. A complicating factor, however, is that in some places a softer ridge or indentation in the opposite sense accompanies one or both of the folds. It is as though, once the principal fold was applied, the area immediately alongside sprang backward in reaction when the cloth was eventually opened out. In some places this secondary softer mark appears more prominent than the original fold, giving the perhaps misleading impression that the pair consists of only one convex and one concave fold.¹⁴ Probably the two types of paired folds (that is, either both concave or both convex) should be seen simply as the same thing viewed from one side or the other of the cloth. While it is difficult to detect any regular system in the distribution of the two types, in detail the folds seem to be as precisely and realistically modeled as the edges already discussed.

Such fold lines are sometimes thought to be exclusively a phenomenon of "Hellenistic Baroque," the sculptural style flourishing in the Greek cities of Asia Minor and neighboring islands from about 220 BC.¹⁵ It is true that in this period the representation of regular folds became for sculptors a virtuoso device played off against the diagonal lines of drapery. The greatest monument of this period, the Great Altar from Pergamon (started ca. 180 BC), illustrates fold lines—double, triple, or even quadruple—on almost every available bit of drapery (see, for example, Figures 4 and 5).¹⁶ Also, the three portrait bronzes of Romans where folds are depicted with an equivalent thoroughness—the Cleveland bronze, the Hadrian from Adana now in Istanbul (see Kozloff, Figures 18-19), and the New York Gaius Caesar probably from Rhodes—could each be considered a late representative of this school.¹⁷

Figure 6. Portrait of a man in a toga, possibly the Emperor Gallienus (AD 253-268). Marble. Greek, Hellenistic. Villa Doria Pamphilj, Rome, no. 372. (Photo: Deutsches Archäologisches Institut, Rome.)



One conclusion of this article, however, must be that fold lines existed on appropriately treated real clothing throughout the classical period. It was a matter of choice—patron's or artist's—whether the folds were portrayed in sculpture. In fact, less conspicuous fold lines are found quite commonly throughout classical art. Single folds in only one direction of the cloth are represented by a female figure on slab III of the east frieze of the Parthenon (ca. 440 BC)¹⁸ and by the so-called Mausollos, from Halicarnassus (ca. 350 BC).¹⁹ Double folds—in both directions though nowhere actually crossing—are indicated on the toga of the late Etruscan bronze “Arringatore,” probably of the late second century BC,²⁰ and double fold lines are found as a rule on late Roman statues with togas of the “folded band” type (Figure 6).²¹ It should be noted that such lines seldom show in reproductions because oblique lighting is necessary to photograph them well and because they are usually less obvious on marble than on bronze.²²

Where fold lines have been discussed—most often in relation to a particular sculpture or group of works—they are usually, in general terms, correctly identified. Gisela Richter's interpretation of the marks on the New York Gaius Caesar as colored decoration, however, is a reminder that the case against decoration has yet to be stated.

Perhaps the strongest argument for these marks representing folds is that they are three dimensional. It would actually be impossible to reproduce in any textile technique—whether woven, applique, or embroidery—the combination of convex and concave impressions found on the sculpture. In the classical period, any decoration on clothing was nearly always woven. Because of the weft-faced character of the basic wool textile, the main plane of the cloth was scarcely interrupted by either the commonest form of decoration, simple weft-faced stripes and geometric figures, or by the more complicated tapestry designs. Furthermore, sculptors used means other than modeling for representing decorated clothing—paint on marble and terra-cotta, and inlay and plating on bronze.²³ The “Arringatore,” for example, a bronze with exceptionally good detail, wears an apparently plain-colored toga but a tunic with a shoulder stripe or *clavus*. The folds are shown in places on the toga and consist of a pair of indentations with a softer ridge running centrally between them; the tunic's stripe, on the other hand, is indicated by an inlaid strip of metal, made of a different alloy from the rest of the figure, which lies flush with the surrounding surface.²⁴

Conversely, colored checkering, in theory one of the simplest forms of textile patterns, is not easily achieved where the threads of one system more or less cover the threads of the other system, as with the weft-faced wool textiles of antiquity. To find checked examples among excavated textiles, one must look to the Celtic and Germanic north. A cloak found in northern Germany is a magnificent textile in its own



Figure 7. What the Marcus Aurelius is not wearing. Reproduction of the cloak from Thorsberg, Schleswig-Holstein, ca. AD 200. Textilmuseum, Neumünster.

way (Figure 7 shows a reproduction), but its tartan ground and wide fringed borders give it a strongly barbarian flavor.

Textiles from the Greek and Roman period, mostly recovered from burials or rubbish dumps, are generally too crushed to provide positive evidence for folds, though earlier Egyptian linen items found in tombs, often show an all-over grid of folds as a result of having been stored laundered and folded up.²⁶ The more relevant surviving piece is a fourth-century Christian relic that has remained above ground, a large sleeved tunic, or dalmatic,²⁷ probably once belonging to St. Ambrose. It has carefully made folds in both directions. The five single folds in the weft direction are alternately convex and concave (Figure 8); the folds following the warp are less well preserved, but running alongside the central convex line is a shadowy concave impression. This garment is made of silk, not wool, but just as the techniques for weaving silk were the same as for wool, so one can infer from references in Diocletian's *Edict of Maximum Prices* of AD 301 that silk garments were washed and finished in laundries, or *fullonicae*, alongside wool items.²⁸

Finally, how and why were such folds made? Rhys Carpenter thought they were formed in storage, the result of clothing being “folded and

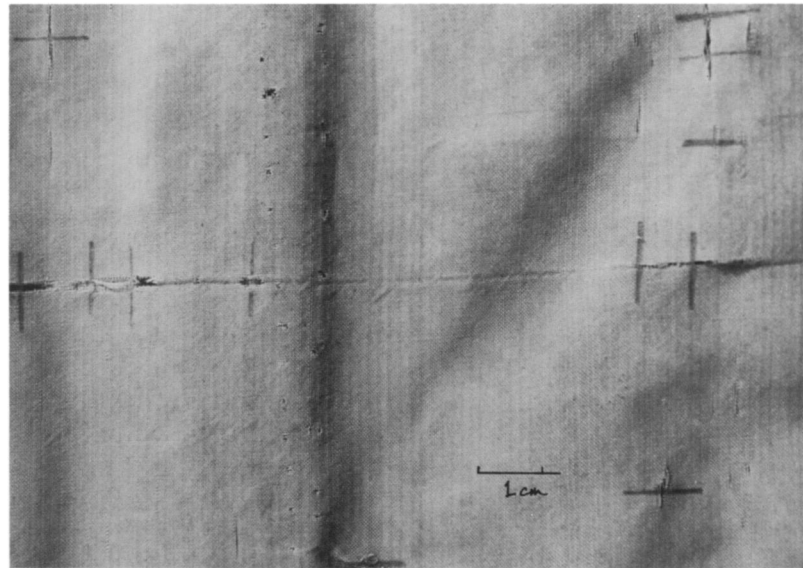


Figure 8. Detail of a white silk dalmatic that probably belonged to St. Ambrose (AD 339-397). Church of Sant'Ambrogio, Milan, S.1. Fold in the direction of the weft. (The strips of cellophane are twentieth-century repairs.)

stacked in chests.”²⁹ In support of textiles having been stored folded, one has, for instance, a carbonized wool textile fragment from Pompeii, consisting of at least twenty neatly aligned layers.³⁰ Of various depictions, one can mention a charming fifth-century BC plaque, illustrated by Martin Robertson, showing a woman putting a folded cloth away in an elaborate chest.³¹ But it would be wrong to believe that the fold lines we see could have come simply from storage. Wool is a naturally springy fiber, and wool textiles require special treatment if any kind of regular fold or crease is sought. The kind of fold depicted in sculpture must be the result of a combination of considerable pressure with moisture and either heat or time.

There is both archaeological and literary evidence for clothes-presses in antiquity. A single screw wooden clothes-press was found at Herculaneum, while at Pompeii there is a clear representation of a double screw press on the walls of a *fullonica*.³² These devices worked on exactly the same principle as the later European linen press. Since the screw principle as applied to presses cannot predate Archimedes in the third century BC,³³ earlier Greek presses must have been of the more primitive lever type, but it is unlikely that the two types differed much in the way the cloth was put in. All presses seem to have been heavily built but with a relatively small opening. R.J. Forbes considers that the typical “bed” of an ancient screw press would have been 45 x 60 centimeters,³⁴ so that a textile of any size must have been folded several times before being pressed.

The Latin word for such a press is *prelum* and the Greek, *ipos*. Pollux defines *ipos* as “what presses the clothes at the fuller’s,” as in the seventh-century poet Archilochos’s remark, “‘It lies in a press.’”³⁵ A Martial epigram addressed to the wealthy Naevolus includes the following: “Your presses [*prela*] shine with the winter cloaks placed in them, just as your chest glistens with innumerable dinner outfits, and your white garments are sufficient to dress a whole tribe.”³⁶ Seneca boasted of his frugality: “I do not like . . . clothing brought forth from a chest or squeezed by weights and a thousand torments to make it shine.”³⁷

The picture created by the written sources is that flattening wool garments in the press was the last stage of the laundering process which began with washing and continued with making minor repairs, brushing to raise a “nap,” bleaching with sulphur fumes if the garment were white, and finally possibly treating with one or several kinds of earth before pressing.³⁸ Clothes were probably also treated in presses at times between washings, such sessions including perhaps some dry cleaning with earths and brushing.³⁹ Prior to pressing, the cloth would have been dampened. As part of a discussion of rainbows, Seneca has described how this was done: a *fullo* “fills his mouth with water and gently sprays it on the clothing divided by small stretchers (*vestimenta tendiculis diducta*).”⁴⁰ Seneca does not mention a press, but the implica-

tion is that the cloth is about to go into one. One might envisage the *tendiculae*, or stretchers, as the wooden boards which are placed between the layers of cloth to ensure the even distribution of pressure.⁴¹ By pushing these boards back against the folds of the cloth before full pressure is applied, it is possible to stretch out the layers of cloth; the boards, as it were, act first as stretchers and then as flatteners. If the boards have sharp square edges, using them as stretchers does create double fold lines in one direction at least, in detail just like those found on the Cleveland bronze.⁴² The problem with attributing all the fold lines as we see them to a press is that a subsequent session in the press would tend to remove the previous fold lines. It is still difficult to explain, for instance, how the double lines on the Cleveland bronze are equally strong in both directions and how they cross so neatly.

Mention of another piece of equipment occurs in Tertullian's *De Pallio*. Tertullian, writing around AD 200, complained that the toga required far too much looking after and that an *artifex*, or craftsman, is required to get it ready the evening before, by assigning the folded cloth to the custody of *forcipes*;⁴³ he recommended the *pallium* because it does not have to be "committed to any instrument of torture in preparation for the following day."⁴⁴ Tertullian seems to have been unaware that the Greek mantle sometimes received equally lavish attention, as the Cleveland bronze attests. He may have been describing the "folded band" method of draping the toga (see Figure 6). Even so, in as much as the band surely represents press-cum-storage folds, deliberately retained when the rest of the toga was opened out, it is likely that the treatment he describes was given to the whole garment and not just the part forming the band.⁴⁵

Forcipes, literally, are tongs. Tong-like tools existed in a wide variety in antiquity,⁴⁶ and those used on cloth could have worked something like a modern iron in that heat replaces the time factor of a press. A quick freshening of the folds could have been achieved by running a pair of hot tongs down the edges of a folded garment, the imprint made by the tongs differing according to the shape of their heads and the angle at which they were applied. If one looks carefully at the fold in Figure 8, one can see a number of tiny kinks in the cloth just below the main fold line. Reminiscent of the accidental kinks that occur when using a modern iron along a fold, they could support the use of a moving instrument in place of the static press.

Although many of the practical aspects of the fold lines need further testing, one can now begin to explain why fold lines were so carefully produced, in real textiles as on sculpture. Even if Tertullian's interpretation is incorrect, and all the fold lines we see were then made by a press, we are not apparently dealing with a mere by-product of a pressing process aimed primarily at a general flattening of the cloth. At some point fold lines came to be desired in their own right.

On a purely artistic level, the subtle shadows formed by the pattern of folds would have been appreciated, particularly on a white cloth with a lustrous brushed nap. It is worth noting that fold lines seem to have faded from prominence in the Late Roman period—the late fourth and fifth centuries—a time when the best quality clothes began to have all-over figured decoration⁴⁷ and when draped clothes started to disappear. Such changes were related in turn to an increasing neglect of three-dimensional art.

But just as really white wool carried a message about status, so too fold lines must be thought of as implying status. Significantly, outside the heyday of fold lines in art (Hellenistic art of the second and first centuries BC), it is usually only on portrait sculpture that we find them. Besides the imagery of torture, a common theme of the references to presses or pressing is that of extravagant display. Fold lines on clothing directly imply status because they show that the wearer could afford to have his clothing well maintained. Indirectly they reinforce status by emphasizing the cleanliness, volume, and quality of the apparel. The Cleveland bronze shows the Roman emperor dressed as a Greek intellectual, but he is an intellectual who is not unmindful of his personal appearance or actual social standing.

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1. I have not yet seen the statue myself; therefore, my observations are based on photographs and details sent from the Museum by Diane Kelling. Besides Mrs. Kelling, I also thank: Ella McLeod for sharing her knowledge of wool; Klaus Tidow and Rosalind Hall for lending photographs; Lucilla Burn for tireless advice on Greek art and for correcting my draft; my father, Jerry Granger-Taylor, for thoughts on the engineering of folds; and above all, Arielle Kozloff, for proposing such an interesting subject.

2. For the construction of tunics, see H. Granger-Taylor, "Weaving Clothes to Shape in the Ancient World: The Tunic and Toga of the Arringatore," *Textile History*, 13(1) (1982), 3-25 (hereafter cited, "Arringatore").

3. The *himation*, of course, goes back much earlier; it is unusual to see Greek men in tunics before the fourth century BC.

4. More or less complete mantles have been recovered from: the Cave of Letters, above the Dead Sea (Y. Yadin, *The Finds from the Bar Kokhba Period in the Cave of Letters*, *Judaean Desert Studies* [Jerusalem, 1963], pp. 230 ff.); from Ballana and Qustul, Nubia (C.C. Mayer Thurman and B. Williams, *Ancient Textiles from Nubia* [Chicago: Art Institute, 1979], cat. nos. 69, 94, 108, 139, and 156); from various other

Nubian and Egyptian sites, e.g., Textile Museum, Washington, 72.186, from Egypt, site unknown. Notable finds of fragments of mantles are from Dura-Europos (R. Pfister and L. Bellinger, "Textiles," *The Excavations at Dura-Europos, Final Report*, ed. M.I. Rostovtzeff, no. 4, Pt. 2 [New Haven, 1945]) and Palmyra (R. Pfister *Textiles de palmyre, nouveaux textiles de palmyre, and Textiles de palmyre III* [Paris 1934, 1937, and 1940]). For a discussion of the relationship between surviving textiles and works of art, see H. Granger-Taylor, "Arringatore," p. 3.

5. For terminology, see Dorothy K. Burnham, *Warp and Weft: A Textile Terminology* (Toronto: Royal Ontario Museum, 1980).

6. Cords are depicted on the clothes of the Arringatore (T. Dohrn, *Der Arringatore*, *Monumenta Artis Romanae* 8 [Berlin, 1968], and H. Granger-Taylor, "Arringatore"); and down the side of the *peplos* of the fourth-century BC Small Artemis at Athens (repr. Semni Karouzou, *National Museum; Illustrated Guide to the Museum*, The Greek Museums series [Athens, 1979], pp. 113-114).

7. The principle of starting borders is explained in Marta Hoffmann, *The Warp-Weighted Loom* (Oslo, 1964 and 1974), pp. 151-183.

8. For other types of closing borders, see Ingrid Bergman, *Late Nubian Textiles*, The Scandinavian Joint Expedition to Nubia (Copenhagen, 1975); some of these may be peculiarly Nubian. Note that with classical textiles the weft is not woven right up to the second end of the warp, as in the manner of American Indian textiles. With a warp-weighted loom, it would not have been possible to do so. With the other common loom, the two beam upright loom, weaving also seems to have ceased at the point where the use of heddles became no longer feasible.
9. John-Peter Wild, "Some Early Finds of Silk in Northwest Europe," *Textile Museum Journal* (Washington), 23 (1984), 19-20. Elagabalus (r. AD 218-222) was said to have been the first Roman emperor to have worn clothing of pure silk (*Oxford Classical Dictionary*, 2nd edition, "Silk").
10. Christiane Boubé-Piccot, *Les bronzes antiques du maroc* (Rabat, 1969), 1: 87-103; 4: pls. 16-37.
11. Y. Yadin, *Finds from the Bar Kokhba Period*, p. 229, no. 43.
12. Very fine textiles do survive, but not recognizably in the form of mantles. The published pieces include: the gold and purple tapestry from Vergina (Manolis Andronicos, *Vergina* [Athens, 1984], pp. 81, 192, and 195); some of the finds from the Cimmerian Bosphorus (in D.S. Gertsiger, "Antichniye tkani v sobranii Ermitazha," in K.S. Gorbunova, *Pamyatniki Antichnovo Prikladnovo Iskusstva* [Leningrad, 1973], pp. 71-100); the two dalmatics of St. Ambrose mentioned below (note 27). Among unpublished pieces are: two fragments of wool of the first century BC, probably from Cyprus (British Museum, GR 1982,3-15,1 and 2); two fragments of silk of the second century AD from Rome (Museo Sacro, Vatican), and a number of lumps of carbonized textiles, some showing traces of gold and purple, from Pompeii (Museo Nazionale, Naples).
13. For the price by the pound of wool dyed in purple, see *Diocletian's Edict of Maximum Prices*, ed. Siegfried Lauffer (Berlin, 1971), chap. 24, p. 167. For the prices of the best wools, see *ibid.*, chap. 25, p. 168, though their whiteness is not specified.
14. Remember that I have not examined them myself.
15. Rhys Carpenter, *Greek Sculpture* (Chicago, 1960), p. 221.
16. Evamaria Schmidt, *The Great Altar of Pergamon* (Leipzig, 1962); H. Stuart Jones, *The Sculptures of the Museo Capitolino* (Oxford, 1912), pp. 340-341; Andreas Linfert, *Kunstzentren hellenistischer Zeit: Studien an weiblichen Gewandfiguren* (Wiesbaden, 1976), p. 108.
17. Devambez, *Grands Bronzes du Musée de Stamboul*, *Memoires de l'Institut Français d'Archéologie de Stamboul*, 4 (Paris, 1937); G.M.A. Richter, *Greek, Etruscan and Roman Bronzes* (New York: Metropolitan Museum of Art, 1915); G. Hafner, *Späthellenistische Bildnisplastik* (Berlin, 1954), pp. 17-18.
18. Frank Brommer, *Der Parthenonfrises* (Mainz, 1977), p. 110 and pls. 167 and 169,1.
19. G.B. Waywell, *The Free Standing Sculptures of the Mausoleum at Halicarnassus* (London, 1978), pp. 69, 100.
20. T. Dohrn, *Der Arringatore*, p. 8.
21. Figure 6 is published in the *Catalogue of the Villa Doria Pamphilj*, ed. Raissa Calza (Rome, 1977), no. 372. On two contemporary busts, fold lines are visible in the body of the toga and not just on the "folded band"; see Walther Amelung, *Die Sculpturen des Vaticanischen Museums*, 1 (Berlin, 1903), Braccio Nuovo nos. 54 and 124, "Pupienus" and "Philip the Arab."
22. For instance, compare J.C. Carter, *The Sculptures of the Sanctuary of Athena Polias at Priene*, Reports of the Research Committee of the Society of Antiquaries of London, 42 (London, 1983), pl. XLI, a-b, with fig. 30, p. 279.
23. Martin Robertson, *Greek Painting* (London, 1978), p. 9; Boubé-Piccot, *Les bronzes antiques du maroc*, pp. 87-103. For instance, there are traces of paint on the back of a second-century BC figure of a Muse, from Erythrae, now in the British Museum (BM cat. sculpt. 1684), illustrated A. Linfert, *Kunstzentren hellenistischer Zeit*, figs. 101-103.
24. T. Dohrn, *Der Arringatore*, p. 6.
25. K. Schlabow, *Textilfunde der Eisenzeit in Norddeutschland*, Göttinger Schriften zur Vor- und Frühgeschichte 15 (Neumünster, 1976), pp. 50-65. Lise Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien* (Copenhagen, 1986), pp. 150-151, 350-351.
26. For laundering in ancient Egypt, see Rosalind Hall, *Egyptian Textiles*, Shire Egyptology series (Princes Risborough, 1986), pp. 48-54. No presses are known from ancient Egypt.
27. H. Granger-Taylor, "The Two Dalmatics of Saint Ambrose?" *Bulletin de liaison du centre International d'études des textiles anciens* (or *CIETA Bulletin*), 57-58 (1983), 127-173.
28. *Diocletian, Edict of Maximum Prices*, chap. 22 (in Lauffer, ed., pp. 162-167). Silk would not have been brushed or bleached, though.
29. Carpenter, *Greek Sculpture*, p. 220.
30. Originally a single lump but now separated into two fragments; one in store, the other on display. Museo Nazionale, Naples, probably no. 84734.
31. Martin Robertson, *A History of Greek Art* (Cambridge, 1975), 2: pl. 65a.
32. J.P. Wild, "Textiles," in *Roman Crafts*, ed. D. Strong and D. Brown (London, 1976), p. 176; A. Maiuri, *Ercolano: nuovi scavi* (Rome, 1965), fig. 172.
33. K.D. White, *Greek and Roman Technology* (London, 1984), p. 15.
34. R.J. Forbes, *Studies in Ancient Technology* (Leiden, 1955-64), p. 137.
35. Quoted in Pollux, *Onomasticon*, 10: 135 and 7: 41.
36. Martial, *Epigrams*, 2: 46, 3.
37. Seneca, *De Tranquillitate Animi*, 1: 5.
38. Hugo Blümner, *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern* (Leipzig, 1875), 1: 157-178; Robert H.S. Robertson, *Fuller's Earth: A History of Calcium Montmorillonite* (Hythe, 1986), pp. 42-43.
39. Dry cleaning may have been the job of the colorator, as in *Diocletian's Edict of Maximum Prices*, chap. 7, 54-63 (Lauffer, ed., pp. 122-123).
40. Seneca, *Naturales Quaestiones*, 1: 3, 2.
41. Such boards were also used in the later European linen presses.
42. In experiments, it was found that when the cloth is opened out after pressing, softer contrasting ridges sometimes occur just as they seem to appear on the bronze.
43. Tertullian, *De Pallio*, 5: 1 (in *Corpus scriptorum ecclesiasticorum Latinorum*, 76 [1957], 120).
44. *Ibid.*, 5: 3 (p. 121).
45. See above, note 22.
46. See, for instance, W.H. Manning, *Catalogue of the Romano-British Iron Tools, Fittings and Weapons* (London, 1985), pls. 2-4.
47. The change to all-over pattern is discussed in Granger-Taylor, "The Two Dalmatics of Saint Ambrose?" pp. 149-151.