

TECHNICAL OBSERVATIONS ON THE SCULPTURES FROM THE TEMPLE OF ZEUS AT OLYMPIA

ABSTRACT

Technical observations on the sculptures from the Temple of Zeus at Olympia allow a reconstruction of their appearance at installation and of the major changes made afterward. At installation, many sculptures were unfinished; the west pediment had more centaur groups than are preserved today; and the horse blocks on the east pediment were separated, one in front of the other. By the time of Pausanias's visit in A.D. 174, the sculptures had suffered major damage at least twice (in the mid-4th century and the early 2nd century B.C.); his identification of Kaineus in the west pediment may refer to a headless Apollo propped up on his knees, flanked by centaurs.

INTRODUCTION

Most discussions of architectural sculpture pay little attention to the process of creating and installing it, and even less to what happens afterward.¹ For the pedimental sculptures from the Temple of Zeus at Olympia (Fig. 1), scholars have been interested primarily in the identification and arrangement of the figures, especially those in the center of the east pediment (see Figs. 1:a and 46, below), in the identity of the sculptors, and in Pausanias's description, since it differs in details from what has been

1. Paul Rehak, the coauthor of this article, died on June 5, 2004. On behalf of us both, I am grateful to the Greek Archaeological Service and to Xenia Arapogianni for granting us permission to conduct a close inspection of the pedimental sculptures and metopes on display in the Archaeological Museum (hereafter, the New Museum) at Olympia; I also thank the American School of Classical Studies at Athens for facilitating our visit. I appreciate the comments made by our colleagues,

especially the anonymous *Hesperia* reviewers, and by Aileen Ajoonian, Judith Binder, Frederick Cooper, Evelyn B. Harrison, Kim J. Hartswick, Jeffrey Hurwit, Brunilde S. Ridgway, Ann Steiner, and Mary Sturgeon. I would also like to thank our students for their help in this project: Emily Arnold, Laura Brett, Jill Chmielewski, Bradley Dodson, Derek Isenberg, Robin King-Hoard, John Lazar, Angelina McIntire, Catherine Miller, Barbara Olsen, Elizabeth Rollins, Kristen

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A recent study of the Olympia sculptures (Barringer 2005) focuses on the impact the sculptures may have had on spectators—but only at the time of their installation, since there is no discussion of subsequent changes. The Acropolis Restoration Project, however, has concentrated on the complete history of all buildings (e.g., Tanoulas 1997).

reconstructed.² Most, however, have not tried to understand the history (or “biography”) of the building and its sculptures up to Pausanias’s day (or more recently).³

We began this study because we found ourselves puzzled by the doughy plasticity of the sculptures⁴ and the jumble of figures in the pediments. The more we grappled with these issues, the more we realized that they required a broader approach before we could understand them. We applied, therefore, for permission to examine the sculptures in the New Museum at Olympia at close range; on Monday, July 12, 1993, we removed our shoes and were allowed to move about the pedimental sculptures for an entire morning (Fig. 2).⁵ Many of our previously published observations and the results presented here derive from that opportunity.⁶

Our approach has been algorithmic: to start with a consideration of how temples were built and sculptures created, to reconstruct the history of the Temple of Zeus and its sculptures since completion, and to appreciate the history of scholarship, especially that of the German excavators.⁷ We now know, for example, that the sculptures look doughy because they are unfinished, not just in a few details but in general. The compositions in both pediments are now presented in a compressed form, dependent on both post-installation ancient events and modern interpretations. And what Pausanias saw was certainly not what the sculptures looked like at their installation 630 years earlier.

To help guide the reader on our journey, we begin this study with some basic principles of architectural and sculptural execution in order to understand the installation of the sculptures in their unfinished state and their original composition, before moving on to explore aspects of their post-installation history that determined what Pausanias was looking at.

2. We follow the conventional system of lettering the pedimental figures, but to facilitate their identification we also use conventional names (e.g., east Hippodameia K, west Peirithoos K). Since the early modern accounts (Curtius, Adler, and Hirschfeld 1876–1881; Treu 1882, 1897), there has been little disagreement about the arrangement of most of the figures in the pediments. For summaries of proposed arrangements, see Säflund 1970, pp. 14–15, 50–59, figs. 3, 4; Herrmann 1972, fig. 76; and Trianti 2002. Ashmole, Yalouris, and Frantz (1967, pp. 171, 180) and Säflund (1970, p. 160) convey the difficulty of identifying the pedimental sculptures according to findspot.

Some figures received different early identifications: Studniczka (1887, p. 56) identifies west Apollo as Herakles, and Kardara (1971) sees the figure as the young Zeus. We are not primar-

ily interested in these issues, although we support the arrangements of the central figures in both pediments in the Old Museum at Olympia (see Figs. 13, 46, below). and argue below for the separation of the horse blocks in the east pediment. Pausanias, not seeing Paionios’s akroteria (by his time these had been replaced by gilded cauldrons, *lebedes*, 5.10.4), apparently misunderstood the inscription on the Nike base to mean Paionios sculpted the east pediment (5.10.8); Pausanias names Alkamenes as the sculptor of the west pediment. Since then there have been numerous attempts at *Meisterforschungen* (Brunn 1876; Förster 1883; Six 1889; Schröder 1921; Buschor and Hamann 1926; Studniczka 1926; Walston 1926; Ashmole, Yalouris, and Frantz 1967, p. 9; Ridgway 1981, pp. 174–178; Barron 1984; Dörig 1987)—contrast Carpenter’s caution (1960, pp. 136–137).

3. “Object biography” is the study of the uses of objects over time and the concomitant changes in their cultural reception (Langdon 2001; Lima and Crawford 2007).

4. Cf. Ridgway 1970, p. 23. Palagia, in her discussion of models (2006, pp. 262–266), conjectures (p. 265) that clay models “might account for the peculiar appearance of drapery folds.” This explanation would assume, however, that the sculptors would have translated into marble the appearance of clay.

5. Trianti (2002, pp. 281–282) notes that it was the designers’ intention to install the pedimental sculptures in the New Museum far enough from the wall to allow scholars access to their reverses; we are grateful.

6. Younger and Rehak 1994, 1995, and 1996.

7. See, e.g., the spirited discussion in *Jdl* 6: Furtwängler 1891; Sauer 1891a, 1891b; Treu 1891a, 1891b, 1891c.

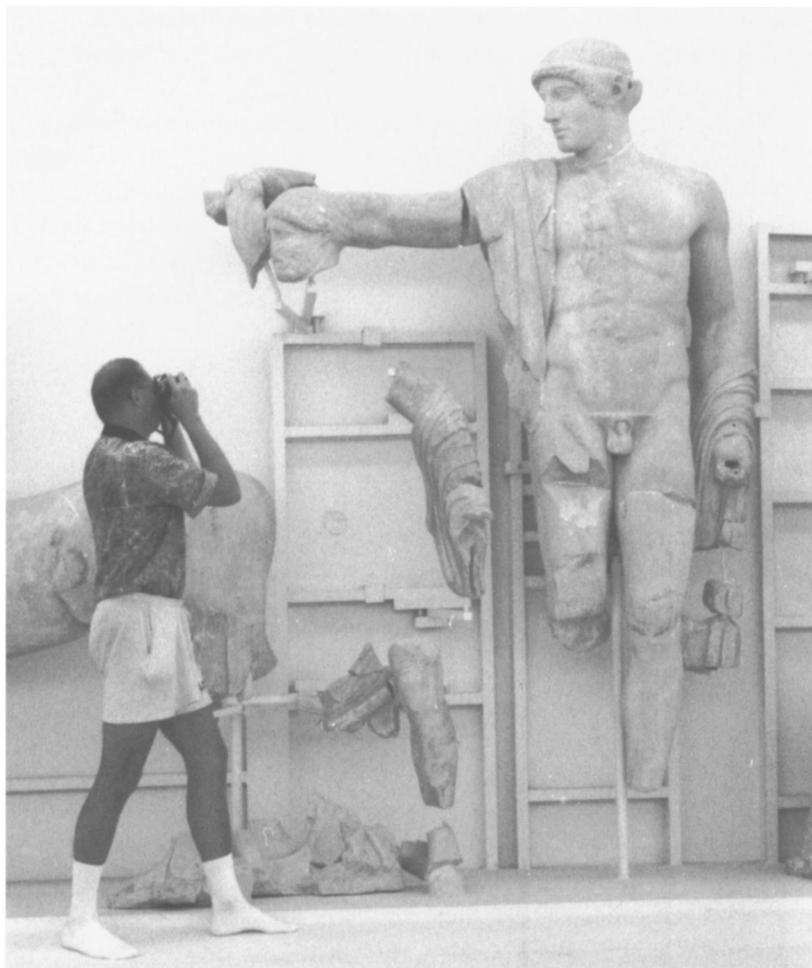


Figure 2. Paul Rehak photographs Peirithoos (K) and Apollo (L) from the west pediment

PHASES OF TEMPLE CONSTRUCTION

The process of building a Greek temple is well known mainly from observations of the architecture itself (especially of unfinished temples) and from surviving building accounts. A temple of moderate size (like the Hephaisteion, 13.50 × 31.10 m on the stylobate) took a conventional five years for its basic construction.⁸ The building inscriptions for the Temple of Asklepios at Epidauros (375–370 or 371–366 b.c.) give us detailed information for a similar temple (11.76 × 23.06 m);⁹ they list almost 70 separate contracts and the money awarded to each, and they arrange these contracts in the chronological order of the building process. From these we can chart that process (Table 1).

After the foundations for the colonnade are laid (year 1; phase 1), the colonnade itself is constructed (year 2; phase 2); the work then moves inside the temple for the construction of the cella (year 3; phase 3).¹⁰ It may seem odd that the temple is built from the outside in, but there is good reason for this. The colonnade and its entablature are so complex, with the various parts in stipulated ratios, that they needed to be erected first in order to know precisely to what height the cella wall should be built—and this wall is conversely so simple, just a stack of blocks, that, once the precise height to which it was to be built was known, it was easy to reach it. To build the

8. Dinsmoor (1950, pp. 179–182) dates the Hephaisteion to 449–444 b.c., and the Temple of Poseidon at Sounion to 444–440, the Temple of Ares (originally perhaps at Pallene, east of Athens, but later removed to the Agora) to 440–436, and the Temple of Nemesis at Rhamnous to 436–432, all as five-year (inclusive) projects.

9. Burford 1969.

10. Camp and Dinsmoor 1984; Younger 1993.

TABLE 1. TEMPLE OF ASKLEPIOS, EPIDAUROS: BUILDING PHASES AND SCULPTURAL PROCESSES

<i>Date</i>	<i>Phase</i>	<i>Activity</i>	<i>Sculptural Process</i>
375 or 371	1	quarrying lay colonnade foundations	
374 or 370	2	construct colonnade lay cella foundations	
373 or 369	3	construct cella smooth columns procure wood (for ceiling/roof?)	set up sculpture workshop
372 or 368	4	construct ceiling and roof install doors install pavement paint decoration	sculpt reliefs
371 or 367	5	flute columns lay roof tiles finish doors paint moldings dress foundations	pay sculptors (west pediment; half of east pediment; both sets of akroteria)
370 or 366 (6 months)	—	flute one column install and paint lion-head spouts install grilles	pay sculptor (half of east pediment)

cella, however, required that there be a gap in the colonnade through which workers and material passed. There is some physical evidence for this gap. The Temple of Aphaia, Aigina, has monolithic columns except for the three at the east end of the north flank—these consist of drums, presumably to facilitate filling in the gap once the cella was completed.¹¹

Once the colonnade and cella are built, the stone ceilings over the surrounding walkway and porches can be installed (year 4; phase 4), and as they are being laid in place, the horizontal cornices and pediments are constructed; then the wood rafters of the cella can be built to support the timbers of the roof. At this point, more wood is brought in to be used in the construction of a workshop for the final sculpting of the pedimental sculptures on site. In the first eight months of the last year (year 5; phase 5), the Epidauros sculptors are paid for the pediments and akroteria, the roof is tiled, columns receive their final fluting, and floors and wall surfaces are smoothed and polished. Thereafter, the inscriptions mention tidying-up details: one sculptor receives his pay for his remaining half of the pedimental sculptures, the temple is cleaned, lion-head rainspouts are painted, locks are installed on the doors, and grilles are inserted into the porches.

There is similar information from other buildings, so we can assume that this process was standardized.¹² For the Parthenon, because of its larger size (30.9 × 69.5 m on the stylobate, five times the size of the Hephaisteion), construction took longer, and, in the 5th century, instead of contracting the work out to various companies (men and their crews), a separate board of supervisors was appointed each year to pay for the work that was negotiated with day laborers and individuals paid by the job. This greater control by the state is also seen in the accounts pertaining to the resumption of work on the Erechtheion in 409 B.C.¹³

11. The unfinished temple at Segesta has the colonnade built up to the pediments and interior foundations laid for the cella, but there is no gap in the colonnade; Burford (1961) interprets the temple as a sham to impress the Athenian envoys in 416 B.C. when they were renewing the treaty of 458.

12. E.g., the Temple of Asklepios on Delos (297 B.C.): *IDelos* I, pp. 303–324, nos. 500–508; Davis 1937; and the Propylaia in Athens (which also apparently took five years to build, 437/6–432/1: Dinsmoor 1913c).

13. Dinsmoor 1913b; Paton 1927; Randall 1953.

TABLE 2. PARTHENON: BUILDING PHASES AND SCULPTURAL PROCESSES

<i>Year</i>	<i>Phase</i>	<i>Activity</i>	<i>Sculptural Process</i>
year 1 (447/6)	1	quarrying	[sculpt metopes]
year 2 (446/5)*		—	
year 3 (445/4)		lay colonnade foundations	
year 4 (444/3)	2	construct colonnade lay cella foundations	[metopes in place]
year 5 (443/2)	3	construct cella	construct sculpture workshop
year 6 (442/1)		smooth cella walls smooth columns procure wood (for ceiling/roof?)	[sculpt north, south, and east friezes in situ]
year 7 (441/0)	4	construct ceiling and roof smooth and flute columns install doors lay roof tiles lay pavement paint decorations	finish sculpture workshop [for west frieze and pediments] [create Parthenos statue]
year 8 (440/439)	5	flute columns	[west frieze in place]
year 9 (439/8)		smooth cella walls lay coffers and roof tiles dress pavement dress foundations dedication of Parthenos statue	[create Parthenos statue] quarry, cart stone for pediments
year 10 (438/7)	6	finish doors	quarry, cart stone for pediments [sculpt pediments]
years 11–15 (437/6–433/2)	7	finish doors lay roof tiles install lion-head spouts install antefixes	quarry, cart stone for pediments (years 11–14) pay pediment sculptors (years 13, 14) [install pediments]

* No work recorded.

Fragments of the building accounts for the Parthenon have survived; they begin in 447/6 and end in 433/2, but the bulk of the work began in 445/4 and was finished by the end of 439/8, when we know that the Parthenos statue was dedicated during the Greater Panathenaia (in mid-August). In other words, it took not five but seven to nine years to build the Parthenon. In other respects, though, the construction of the Parthenon (Table 2) parallels that of the Asklepios temple at Epidauros. The initial period (years 1–3; phase 1) involved quarrying for the foundations.¹⁴ Then the colonnade was erected (year 4; phase 2). In years 5 and 6 (phase 3) the cella was erected, which would have entailed putting the north, south, and east frieze blocks in place.¹⁵ During this latter time and in year 7 (phase 4), when the ceilings were installed, the frieze would have been sculpted.¹⁶

14. No work is recorded for 446/5, the year of the campaign against Euboea and the subsequent negotiations with Sparta for the 30 Years Treaty. During the first phase, workers presumably cleared the site and prepared the foundations of the earlier Parthenon for use.

15. In the Parthenon, the gap in the colonnade for workers and material may have occurred at the west end, whose frieze was sculpted on the ground (Younger 2004, p. 84, n. 9). For the Temple of Zeus, the gap is not detectable: all columns are made of drums, and the porch metopes could

have been inserted anytime before the ceilings were installed.

16. This would also have been the time when the gap in the west end had to be closed and the west frieze installed (already sculpted); its jumbled composition may betray haste.

TABLE 3. TEMPLE OF ZEUS: PROPOSED BUILDING PHASES AND SCULPTURAL PROCESSES

<i>Date</i>	<i>Phase</i>	<i>Activity</i>	<i>Sculptural Process</i>
472 or 468	decision to build	quarrying	quarrying on Paros begin sculptures on Paros
470 or 466	1	lay colonnade foundations	
468 or 464	2	erect colonnade	[ship sculptures to site]
466 or 462	3	erect cella	install porch metopes
464 or 460	4	install ceiling, roof	install pediments
462 or 458	5	fluting, lay roof tiles	install pediments
460 or 456	—	dedication	pediments in place

Years 8 and 9 (phase 5) represent the final years in getting the building ready for the statue's dedication: fluting the columns, laying the roof tiles, and smoothing and polishing the wall and floor surfaces. It is in these last two years, too, that we first hear of quarrying and carting the marble for the pedimental statues, an operation that must have occurred at Epidauros in phase 4. For the Parthenon, however, it was apparently decided early to complete the pedimental sculptures after dedication. After the building was finished and the Parthenos was dedicated in 438, the doors were installed the next year, but thereafter work on the building was minor (lion-head rainspouts were painted and the roof tiles finished). Finally the pedimental sculptures were installed, presumably starting in 435/4, when the sculptors were paid, and ending in 433/2 (year 15).

The Temple of Zeus at Olympia was the largest Doric temple of its day (see below, p. 53, for full dimensions). It was begun sometime after 470 when Elis conquered Pisa and had the temple built from the spoils; their own countryman Libon was the architect (Paus. 5.10.2–3). It was presumably finished and dedicated close to the time Sparta, after defeating Athens at Tanagra in 457, dedicated a Nike as the central akroterion over the east pediment; the inscribed base, which survives, supported a gold shield.¹⁷ If, for argument's sake, we hypothesize that the Temple of Zeus was dedicated in time for a celebration of the Olympic games (anticipating the decision to dedicate the Parthenos statue at the Greater Panathenaia), and if the building took a similar length of time as did the Parthenon, say seven to nine years (Table 3), we might expect the Olympic *boule* to have decided to erect the temple in the late 470s or early 460s (say, in 472, Olympiad 77, or 468, Oly. 78, when the games were reorganized) and its construction to have begun no later than 470 or 466 to end 10 years later, in time for the Olympic games of 460 (Oly. 80) or 456 (Oly. 81).¹⁸ The latter date coincides nicely with the Spartan dedication.¹⁹

17. The inscription is on display in the Olympia New Museum: "The temple has a golden 'phiale,' from Tanagra; | the Lakedaimonians and their allies dedicated it, | a 'gift' from the Argives, Athenians, and Ionians, | a tithe for victory in war" (Paus. 5.10.4, our translation; Ashmole, Yalouris, and Frantz 1967, p. 31).

18. The games were extended from

three to five days, and the order of events was fixed, perhaps following an enlargement of the stadium (Knell 1990, pp. 79–80; Sinn 1991, p. 50). In 477 the establishment of the Delian League would have signaled a loss of Sparta's power; Elis defeats Pisa and synoikizes in 469 (Ashmole, Yalouris, and Frantz 1967, p. 7), and Argos captures Tiryns in 468 and Mycenae in

462. Sparta's slow recovery began with an alliance with Athens in 464 to recapture her Helots and culminated in the battle of Tanagra in 457; her dedication of the Nike and gold shield sealed her resumed ascendancy in the Peloponnese and claimed, as it were, the Zeus temple for herself.

19. Ashmole, Yalouris, and Frantz 1967, p. 7.

THE SCULPTURAL PROCESS

For the sculptural process, almost all our evidence is derived from observations of tool marks and sculptures left unfinished in stages.²⁰ In general, freestanding sculptures started out like architectural blocks, hewn in the quarry and given a preliminary stage of dressing (“quarry dressing,” vague shaping through pointing); this preliminary dressing was designed to determine flaws and to trim excess marble.²¹ Sixth-century sculptures abandoned in the quarry (like those in the Naxos quarries) give eloquent testimony to this stage of work.²²

If the quarry-dressed piece passed muster, it was then taken to the workshop in town to be given a penultimate dressing (“workshop finish”), which consisted of taking the surface down another centimeter or so to a penultimate surface, the “mantle,” from which all major details would be carved (Fig. 3). Much of this workshop finish included actually finishing small sections of work near areas intentionally left blank, as “templates” to show what details were to go where (Fig. 4).²³ Much of the detailing (“final finish”), however, was usually done near the time and place of installation, where sculpture workshops would be set up in simple woodsheds. Such woodsheds were erected near the Temple of Asklepios at Epidauros and near the Parthenon, as their building accounts specify.²⁴ A workshop area has also been identified in the southeast area of the Altis, where thousands of marble chips, including Parian, have been excavated from the *Steinzeilen* layer that also contained unfinished statuettes and fragments of drapery and roof tiles; the pottery from this layer is contemporary with the construction of the Temple of Zeus, and it is possible that some of the temple’s sculptures and roof tiles may have been worked there prior to installation.²⁵

How long did it take one sculptor to sculpt one life-size figure? The answer is nearly a year.²⁶ We know this because we have evidence for some costs associated with the sculptures. Since the average wage during the Classical period was one drachma (dr) per day, regardless of the work,²⁷ we know how many days the sculptors worked. For the two figures “man and scribe” in the Erechtheion frieze (Acr. 1073), one sculptor was paid 120 dr (or 60 dr per figure, or two months’ worth of work);²⁸ since the two figures are roughly half life-size and in relief, we can calculate that a single life-size work in the round (i.e., double the height and double the depth of the Erechtheion figures) would have taken four times as long, or eight

20. Casson 1933; Adam 1966; Bluemel 1969; Rockwell 1993; Younger 2004.

21. On quarrying procedures, see Kozelj 1988; Waelkens, Paepe, and Moens 1988. The finished statue weighs half (Ashmole, Yalouris, and Frantz 1967, p. 9) to a third of the quarried block (Herrmann 2000, pp. 381–384).

22. In the Classical period architectural blocks were preliminarily shaped in the quarry and occasionally aban-

doned there (e.g., column drums in the Agrileza quarries, Goette 1992; cf. Korres 1995, pp. 12–37). Sculptural blocks were undoubtedly given at least an oblong shape in the quarry, but they were apparently not further articulated there (Palagia 2006, p. 247).

23. Bluemel 1969, p. 28.

24. The Parthenon building accounts mention workshops in year 7, 441/0 (Dinsmoor 1913a, pp. 67–68, line 27; cf. years 11 [437/6], line 11; 12 [436/5], line 60). The Epidauros accounts record

them in year 3, before sculpture is mentioned (Burford 1969, p. 213, lines 22–27, contracts 11–13).

25. Moustaka 1999; Herrmann 2000, p. 384.

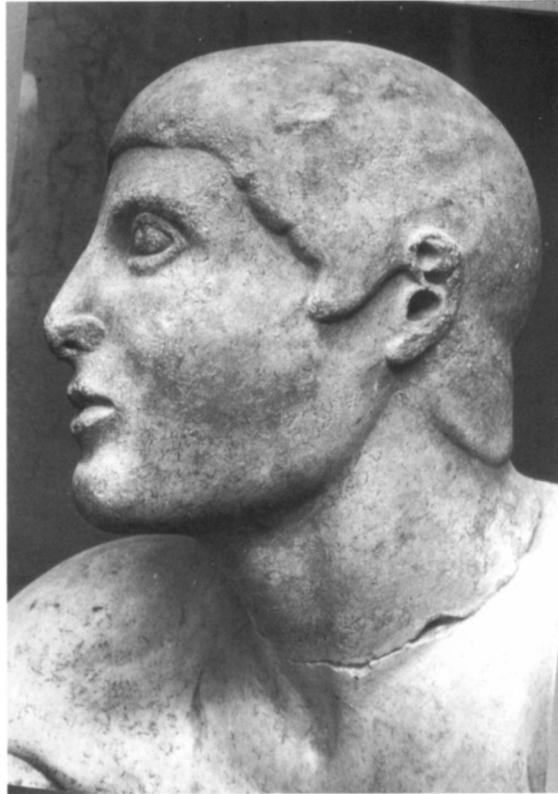
26. Ashmole, Yalouris, and Frantz 1967, p. 9; Boardman and Finn 1985, p. 229.

27. See Randall 1953, pp. 207–210; Stewart 1990, p. 66.

28. Paton 1927, pp. 259 (no. 66), 388–389 (inscription XVI, col. 1.1–2); Boulter 1970, pp. 13–14, pl. 19.

Figure 3 (*right*). East pediment, head of Kladeos (P). Photo courtesy Deutsches Archäologisches Institut, Athens (neg. 311)

Figure 4 (*below*). West pediment, Deidameia (H) with mantle head and Eurytion (J) with template beard



months, and would have cost 240 dr. The Asklepios building accounts seem to concur.²⁹ Each pediment cost 3,010 dr. The number of figures in both pediments is approximately the same: probably 14 figures in each, thus costing 215 dr apiece. Though the Asklepios pedimental figures are under life-size, they are in the round, and we may imagine that a life-size work would cost more than 215 dr, and thus would have taken longer than 215 days to complete.

For the Parthenon, there are distinct stylistic differences between the early sculpted metopes, the frieze, and the late pediments.³⁰ These stylistic differences parallel both the amount of time it took to sculpt the pieces (some 15 years) and the phasing of architectural construction. No such major stylistic differences exist between the Olympia metopes and pediments—stylistically, they are the same, even the original lion-head rainspouts.³¹

To be sure, part of this sameness depends on the fact that the sculptures were not uniformly brought to their final finish. Since all of the sculptures are made of Parian marble (except for the Pentelic women in the corners of the west pediment), we assume they were quarried in Paros and given a workshop finish there,³² before being shipped to Olympia where some, but not all, final finish was applied before installation.

How long would it have taken to sculpt the metopes and pedimental figures? Probably some six years (see Table 3).³³ Based on our estimates above of time and cost, we can imagine that each of the 12 metopes took a worker-year (of eight months or more) to sculpt, and the 17–21 figures in each pediment (most over life-size) took some 20 worker-years (40 therefore for both), the whole requiring some 50 worker-years to sculpt. If this project took only a total of five to six full years, then the Paros workshop must have employed some eight to 10 sculptors.³⁴ If it took some 10 sculptors roughly six worker-years (240 days/year) to sculpt the sculptures, then at 1 dr/day/sculptor, the cost would presumably have been something like 14,400 dr (2.40 talents).

What would it cost to build and decorate the Temple of Zeus? Stanier, in considering the figures for the Parthenon's cost (470 talents),³⁵ postulates that almost half of it went to quarrying the marble and another quarter

29. Burford 1969, pp. 212–217.

30. Ridgway 1981, pp. 16–17, 42, 79–80. It is conventional to point to a lingering Severe-style quality in the metopes (e.g., Carpenter 1970), to typify the frieze as Classical (e.g., Neils 2001), and to see the pediments as introducing High Classical transparent drapery (e.g., Ridgway 1981, p. 52; Stewart 1990, p. 153).

31. Carpenter (1960, p. 136) notes stylistic “vagaries” but attributes them to the differing skills of the artists.

32. Korres 1995, pp. 120–121.

33. Ashmole, Yalouris, and Frantz (1967, p. 9) reconstruct 40 worker-years

divided among eight workers over five years. Different sculptors were responsible for the small, individual sculptures of the Erechtheion, but for larger pieces and for the frieze of the Parthenon, groups of sculptors, with varying skills and interests, could cooperate: Younger 2004.

34. Sculpture workshops may have routinely hired 10 workers. Cicero (*Leg.* 2.64–65) mentions Demetrios of Phaleron's sumptuary decree (317/6 B.C.), which specifies *ne quis sepulcrum faceret operosius quam quod decem homines effecerint triduo* (“let no one make a tomb monument that takes more than 10

men three days to produce”); this translates as a monument that would take one worker-month to produce.

35. Stanier 1953: quarrying, 217.50 talents (T); transporting, T 48; sculpting, T 38.50 (metopes, T 15; frieze, T 11; pediments, T 9; akroteria, T 3.50); miscellaneous costs for erecting and polishing blocks, fluting the columns, and installing the roof, ceiling, and doors. The Parthenon contains some 7,273 m³ marble (Korres 1995, p. 100); Stanier (1953) estimates 11,000 m³. Pentelic marble has a specific gravity of 2.73 (i.e., 2.73 gr/cm³); thus, the Parthenon's marble would weigh 19,855.29

to carting and polishing the blocks, fluting the columns, and carving the sculpture. Since the Temple of Zeus is made of a soft, shelly, local limestone, we can imagine that most of the money for stone went to Paros (the quarry workers and sculptors). According to Herrmann, some 1,600 tons of marble had to be quarried on Paros to produce 533 tons of sculpture and roof tiles that then needed transportation;³⁶ if we take Stanier's figure of 40 dr/ton for quarrying, the cost would have been T 10.67. If we take the estimated cost of 26.1 dr/ton for quarrying the raw material, the cost would have been some T 7.³⁷

But we can also imagine that the single most expensive item in the budget was for the transportation of the marble sculptures from Paros to Olympia. The first stage of their transportation would be by sea to the Isthmus of Corinth (215 km as the crow flies; cf. the similar shipments of Parian sculpture to Delphi and Athens in the late 6th century).³⁸ But the Olympia sculptures went farther, carted along the Diolkos across the Isthmus, reloaded on a ship, and sailed through the Corinthian Gulf (105 km) to Kyllene in Elis (70 km).³⁹ From there they may have gone by land to the city of Elis (20 km) and thence to Olympia (37 km), or they may have gone by sea around Cape Khelonatas to the Kyparissas Gulf (50 km) and up the Alpheios River by barge to the sanctuary (17 km). Either way involves a journey, mostly by sea, of more than 450 km (280 miles).⁴⁰

Our estimate for transporting the Parthenon's pre-final marble blocks (2 dr/ton/km) was for land transport; transport by sea was apparently easier (though more prone to disaster) and thus less expensive.⁴¹ Nonetheless, if we apply this figure to a journey of 450 km, it may give an idea of the transportation costs, some T 80.⁴² Even half this figure, T 40, is a considerable sum.

With costs such as these, it seems reasonable to imagine that all the sculptures (metopes, pediments, rainspouts) would have been shipped at one time to preclude excessive costs in organizing multiple shipments. A single shipment would also help to explain why there are no discernible stylistic differences among the sculptures and why all were brought to more or less

metric tons, or roughly 20,000 tons. Since quarry workers needed to quarry two to three times the amount of finished stone (see n. 21, above), we may estimate 40,000 to 60,000 tons of quarried stone (say, 50,000). Since it cost T 217.50 to quarry the Parthenon's raw material (50,000 tons) and T 48 to transport the pre-final blocks (say, 10,000 tons), we may estimate something like 26.1 dr/ton for quarrying, and 28.8 dr/ton for transporting the quarried stone (or 2 dr/ton/km for the 14.4 km distance from the Pentele quarries to the Acropolis [Korres 1995, p. 66]). These estimates are probably too low: see Meiggs and Lewis 1969, pp. 162–165, no. 59; Younger 1993.

36. Herrmann 2000, pp. 381–384: pediment sculptures, 230 quarried metric tons to produce 85 tons of finished sculpture; metopes, 36 tons to produce 13.2 tons of sculpture; and roof tiles, 1,300 tons to produce 435 tons of tiles.

37. For the figure of 26.1 dr/ton, see n. 35, above. Raw material, 1,600 tons \times 26.1 dr/ton = 6,000 dr/T.

38. For the Alkmaionid east pediment of the Temple of Apollo, see Stewart 1990, pp. 86–89; Childs 1993; Ridgway 1993, pp. 206–209. For the Peisistratid "Hekatompedon," see Stähler 1972, 1978; Stewart 1990, pp. 129–130, 343 (bibliography); Croissant 1993; Ridgway 1993, pp. 205–206.

39. MacDonald 1986.

40. Orlandos (1976, vol. 2, pp. 28–29, 30–31, fig. 14) mentions an inscription from Didyma about marble shipments that were crated and suspended between two parallel ships, ἀμφίπρωμ-voι. A Hellenistic shipwreck off Kızılburun, Turkey, contains tomb stelai, basins, and a Doric column of eight drums and a capital, all neatly packed together possibly on deck (Carlson 2007). Caligula used a special ship to transport an obelisk for the Vatican Circus (Plin. *HN* 16.201; cf. Suet. *Claud.* 20.3).

41. Orlandos 1976, vol. 2, pp. 30–31.

42. Sculpted marble, 533 tons \times 2 dr/ton/km \times 450 km = 6,000 dr/T.

the same degree of finish. If they were all to be shipped in one shipment, this would have to occur before or just after phase 2 began (say, in 468/7 or 464/3), when the cella was being constructed and the metopes had to be installed. The pedimental sculptures and the rainspouts, therefore, would wait on site another four years before being installed in phases 4 and 5 (464–461 or 460–457).

One final consideration (to anticipate ourselves here): why were the sculptures not finished? If the metopes were installed soon after arrival, this may have set the stage, as it were, for leaving the pedimental sculptures in approximately the same state. Of course, it is likely that the incomplete finish was not disturbing (it has hardly ever been noticed since the sculptures' discovery); or that the builders ran out of money; or that completion was rushed in order to dedicate the temple in an Olympiad; or that the Parian workshop was otherwise engaged and could not send sculptors in 461/0 or 457/6 to finish the work they had shipped out some six to seven years earlier.

This last explanation is attractive, since the only other temple to be built soon after the Persian invasions (that we know of) is the Great Temple of Apollo on Delos; this was begun sometime after the formation of the Delian League in 477 but was left unfinished when the League's treasury was transferred to Athens in 454. If that moderately sized temple had been planned to take five years, as normal, and therefore was begun four years earlier, in 458/7, and if it were to have Parian pedimental sculpture,⁴³ then we might expect the commission for that sculpture to have been accepted by the Parian workshops ca. 460, just as the Temple of Zeus was nearing completion. Such a scenario would reinforce the later series of dates for the actual construction of the Zeus temple, 468–457/6.

THE INSTALLATION PROCESS

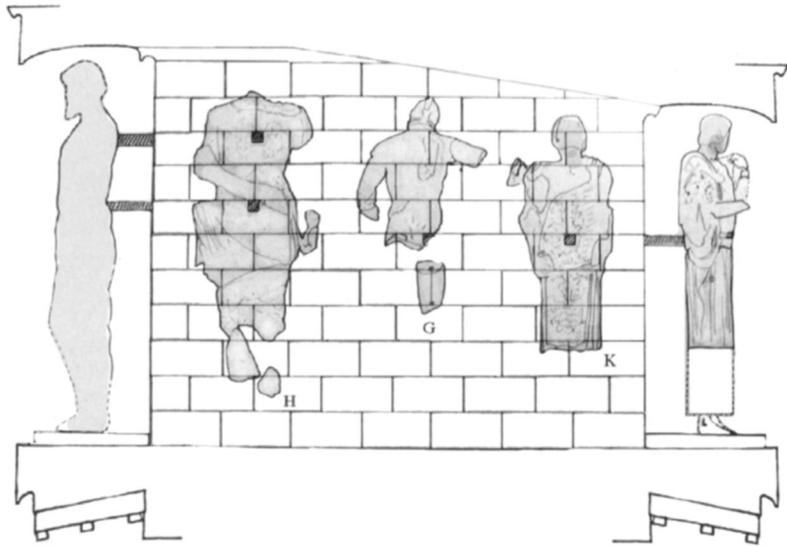
By phase 3, both the colonnade and the cella wall had been erected; the gap that must have existed in both would now necessarily have been filled in and the metopes put in place before the ceilings and roof were installed in phase 4.

Since the ceiling rafters over the porches abut the backs of the exterior mutule blocks (i.e., the pediment floor), we can assume that these were also installed at the beginning of phase 4. Once the pediment floor is installed the pediment sculptures can be lifted into position with cranes. The tympanon would not have been constructed nor the raking geison installed beforehand as they would have interfered with lowering the sculptures onto the pediment floor and maneuvering them into place. As almost all the Olympia pedimental sculptures were fixed to the tympanon wall by means of iron tenons or dowels (Fig. 5), we can assume that the wall was constructed as the sculptures were installed because the precise height of the mortises in the figures and their placement in the courses of the tympanon wall would have to have been considered together. Since the figures stood no more than 10 cm in front of the tympanon, there would have been no room for workers to affix the tenons unless the tympanon wall was built as the statues were being installed.⁴⁴ Only the lowest figures, those in the angles of the pediments (the river gods in the east, and reclining women A

43. The stylobate of the temple is of Delian marble, which is not suited for large sculpture. Some of the sculpture assigned to the Temple of Apollo Medicus ("Sosianus") in Rome may have derived from this temple in Delos; see Younger 2003.

44. Bulle 1939, pp. 141–144, fig. 2; Trianti 2002, pp. 290–292.

Figure 5. Drawing of Zeus (H), Pelops (G), and Hippodameia (K) from the east pediment, from the back, tenoned to a hypothetical tympanon. Composite drawing based on Treu 1897, pp. 45–46, 51–52, figs. 55, 57, 69, 71



and V in the west), were not tenoned, and thus we can assume that the pedimental figures were installed from the corners toward the center like blocks in wall courses,⁴⁵ with Zeus and Apollo being the last figures to be installed. These are the figures with the highest mortises, so the courses into which their tenons were mortised would also have been the last and highest courses of the tympanon wall to be laid.

THE TEMPLE OF ZEUS: DIMENSIONS AND GENERAL HISTORY

The Temple of Zeus is Doric, made of local shelly limestone; it is the earliest-known hexastyle temple (6 × 13 columns) and measures 27.7 × 64.1 m on the stylobate with a column height of 10.4 m. It sits on a high podium (H. ca. 4 m) with a deep pronaos and a shallow opisthodomos. The interior height of the cella has been calculated at 14.3 m.⁴⁶

Over each porch are six metopes portraying, in all, the Twelve Labors of Herakles, which now assume their canonical themes. Pausanias describes both sets of metopes from south to north; he says in his introduction (5.10.9) that “most of the labors” are depicted, and he does omit one, the capture of Kerberos.⁴⁷ The east pediment contained a quiet scene depicting the harnessing of the chariots of Pelops and Oinomaos who, with their women, flank a central Zeus. The west pediment contained the Centauro-machy with Apollo in the center demanding order.

Of the architectural members of the pediments, few blocks have survived on site: two blocks of the raking geison and several mutule blocks whose upper surface preserves the floor. More frustrating, none of the tympanon wall blocks have been identified, which makes it difficult to determine the interior length of the pediment and its height.⁴⁸

Georg Treu and Wilhelm Dörpfeld used several formulas for calculating the internal length of the pediment at 26.40 m.⁴⁹ Their calculation, however, is only approximate. The southwest corner block of the raking cornice still lies on the ground where it fell. From this block Dörpfeld

45. Reclining women B and U are mortised, but they are not part of the original installation (see below, pp. 91–93). For the laying of wall courses, see Hodge 1975.

46. Pfeiffer (1941) gives the dimensions for Pheidias’s statue: H. ca. 12.4 m, including a 1 m base.

47. Ashmole, Yalouris, and Frantz 1967, pp. 24–25: the findspots confirm Pausanias’s order.

48. Dinsmoor (1950) illustrates some intact tympana: pls. XXV, top (Temple of Poseidon, Paestum), XXVI (Temple of Concord, Akragas), XXVII (Segesta), XLII (the Hephaisteion), and XLVIII (the Propylaia). Concerning the Old Temple of Athena, he mentions (p. 90) that it would have been “cheaper to construct the tympanon . . . in local limestone.”

49. Treu 1897, p. 116, n. 1.

measured the rake of the angle between its horizontal bedding (where it sat on the horizontal cornice) and its continuation as the beginning of the raking cornice, and he determined a pitch at 1:4;⁵⁰ if, therefore, the internal length of the pediment was 26.40 m, then Dörpfeld's calculations indicate a height of the pediment at 3.30 m in the center, making a neat translation into Pheidonian feet (1 Pheidonian ft = 0.327 m; therefore, H. = 10 and L. = 80 Pheidonian ft). A surviving fragment of the apex of the raking cornice, however, indicates a slightly more acute angle than Dörpfeld supposed and thus a greater height of 3.47 m in the center, an increase of 17 cm, with a corresponding shorter length of the pediment floor, 26.38 m.⁵¹

Since Apollo and Zeus stand about 3.00 m tall, we can imagine them fitting into the apex of the pediment with some space to spare so they do not seem wedged into it. Many of the figures stand on their own plinth; in addition, several figures in the east pediment (but not in the west) also preserve cuttings for clamps that would have secured them to a floor.⁵² None of the surviving pediment floor blocks, however, preserve similar cuttings. It has been hypothesized, therefore, that the east figures stood on, and were clamped to, a separate plinth (H. 10 cm, to decrease the gap above the central figures), one that spanned the entire length and depth of the pediment.⁵³ This is an interesting idea, but it is difficult to imagine what use such floor clamps would have served—they would have provided no protection against an earthquake. Even odder are the clamps in attendants E and O, whose centers of gravity are too low to have needed clamping. We wonder whether the clamps might not have been more useful in the workshop where they could have secured the statues during work.⁵⁴

Because the tympanon wall probably rose directly above the triglyph-metope frieze,⁵⁵ the depth of the pediment should correspond to the depth of the intervening mutule blocks. The conventional depth of the pediment has been taken at approximately 1.0 m, but Dörpfeld calculated the depth of the overhang of the mutules as no less than 0.84 m.⁵⁶

These dimensions for the pediment (L. 26.38, H. 3.47, D. >0.84 m) are important as we consider the arrangement of the pedimental sculptures. In the New Museum, the pedimental statues are placed on large benches that are shorter than the actual length of the pediment (L. east bench 23.57,

50. The angle at the corner of the pediment would therefore be about 15°; the comparable angle for the pediment of the Parthenon is 14° 45' and that of the Temple of Apollo at Bassai is 15° 14' (*Bassai* I, pp. 246, 251).

51. Grunauer 1974.

52. Plinths: Alpheios A, Zeus H, Pelops G, Oinomaos J, horse sets D and M, sitting attendant E, mantled attendant C, chitonized attendant O, and Kladeos P (patched); slight plinth, north seer N; plinth cut away, south seer L; plinth not preserved, nude attendant B and Hippodameia K. Clamp cuttings: Zeus (one clamp), Pelops (one), Oino-

maos (three), and seated attendants E (three) and chitonized O (one).

53. Dörpfeld 1892, p. 7; Treu 1897, pp. 116–117, fig. 166; Säflund 1970, p. 24; Grunauer 1974, p. 8, fig. 7; Trianti 2002, p. 290. The sculptures in the north pediment of the Hieron at Samothrace stood on a similar plinth (Lehmann 1969, pp. 106–107, pl. LXXIII:1, 2); we thank one of the anonymous *Hesperia* reviewers for pointing this out.

54. See n. 136, below.

55. The second Athena Pronaia temple at Delphi, and later the Parthenon, had pediments recessed behind

the entablature 9.5 and 20.3 cm, respectively (Dinsmoor 1950, pp. 92, 162).

56. Treu 1897, pp. 116–117: the extant raking geison block does not preserve the width of its undersurface (the ceiling of the pediment). Of the dimensions of the Parthenon's pediment (internal L. 28.80, central H. 3.40, D. 0.91 m), the Olympia pediment's dimensions can be expressed as percentages (L. 26.38, 92%; H. 3.47, 102%). With an average 97%, the depth of the Olympia pediment would be 0.88 m, close to Dörpfeld's minimum (0.84 m).



Figure 6. Lion-head rainspouts:
 (a) original (early 5th century B.C.);
 (b) Late Roman (4th century A.D.)

L. west bench 23.20 m). Moreover, the tops of both benches are deeper than they should be (1.20 m). Thus, the benches are about 3 m shorter but about 35 cm deeper than the actual pediment.

Lion-head rainspouts decorated the lateral simas (Fig. 6), 51 on a side (one at each corner, one over each of the 13 columns, and three over each of the 12 intercolumniations). Of the original 102 spouts, Willemssen has identified 74, which he divides into two formal groups, lion heads with rounded ears (35 examples plus fragments) and lion heads with pointed ears (39 examples plus fragments), the latter dependent on the former.⁵⁷ The two formal groups of lion heads, each with approximately the same number of survivors, perhaps imply that the total number of rainspouts consisted of more or less equal numbers of these two formal groups and that two groups of sculptors may have been involved. Even if these sculptors were different from those executing the metopes and pedimental figures, and even if contracted separately from them, their relationship to the latter sculptors must have been close—stylistically, the lion heads and their manes are similar to those of the lion in the Lion metope and to the drapery folds.

Both the original series (*U[r]*) of lion-head rainspouts and the nine replacement series (*E[rneuerungen]*) parallel the installation of the sculptures and their subsequent repairs.⁵⁸ While the original spouts and the 4th-century replacements are of Parian marble, the rest of the replacements (Hellenistic and Roman) are of Pentelic.⁵⁹ The reclining women in

57. Willemssen 1959, pp. 18–33; see also Buschor and Hamann 1926.

58. Willemssen 1959: E1 (Parian) dates to the mid-4th century B.C. (pp. 20–62); E2 (and the rest, Pentelic) to about 160 B.C. (pp. 62–74); E3 to the Early Augustan period (38–36 B.C.; pp. 74–90); E4 to perhaps the late 1st century A.D. (pp. 91–93, 105, 122); E5 to about 140 (pp. 93–94, 105, 122);

E6 to about 190 (pp. 94–95, 122); E7 and E8 to the 3rd century (pp. 95–97, 122–123); and E9 to A.D. 303 or shortly thereafter (pp. 97–100, 124).

59. Ashmole, Yalouris, and Frantz 1967, figs. 7, 8 (original), 9 (4th century B.C.), and 10 (1st-century B.C. replacement). Bluemel 1969, pp. 66–67, figs. 52 (original), 53 (“Roman imperial”).



Figure 7. West pediment, reclining women A (young) and B (old)



Figure 8. West pediment, reclining woman V (young)

the west pediment probably follow suit (Figs. 7, 8): Parian V and the original of A were either 5th-century originals or 4th-century replacements, while the Pentelic replacement for A, and Pentelic B and U, are later additions (Hellenistic and/or Early Roman).

By the time of its final collapse in the early to mid-6th century A.D., the Temple of Zeus had stood for a millennium. In those 1,000 years, the temple saw losses, replacements, additions, and repairs. These changes allowed Ashmole and Yalouris to postulate, after the initial phase of construction and installation (phase I, ca. 470–456 B.C.), four subsequent phases of post-installation history; we follow these and flesh them out in more detail.

PHASE II (456–LATE 4TH CENTURY B.C.)

As noted above, after their victory at Tanagra in 457 B.C., the Spartans dedicated a Nike as the central akroterion over the east pediment on a base that supported a gold shield. The cult statue was added next, a chryselephantine colossal seated statue made by Pheidias sometime in the mid- to late 430s. Philochoros dates Pheidias's trial for sacrilege in Athens to 438 B.C. (for having included his own portrait in the Amazonomachy on the Parthenos shield), and the sculptor is said to have fled to Olympia where he made the Zeus statue; the Eleans then killed him. The pottery found in "Pheidias's Workshop" supports this date.⁶⁰

In the early to mid-4th century, the temple suffered damage; new Parian marble lion-head rainspouts (E1) replaced damaged originals, and fragments of the raking cornice were found built under the late 4th-century Leonidaion (if these belonged to the west raking cornice, then it might be at this time that the west pediment lost figures and the reclining women V and the original A were installed as additions; see Figs. 7, 8).⁶¹ The damage may have occurred in 364 B.C. during the "Battle in the Altis" between Elis and the Arkadian League. Though much of the battle took place to the south and west of the temple, it seems to have raged generally (cf. Pausanias's account [5.20.4–5] of the soldier who hid, and died, in the attic of the Heraion).

PHASE III (LATE 4TH CENTURY–MID-2ND CENTURY B.C.)

In the Hellenistic period, a probable earthquake caused massive damage to the temple in the early 2nd century (Fig. 9).⁶² Since Damophon of Messene was in charge of the repairs to the cult statue (Paus. 4.31.6), he may also have been in charge of repairing the damage to the temple. Damophon may be dated ca. 180–160 or, according to a recent appraisal, to 214–182; a convenient date for these repairs would be ca. 188 when Philopoemen had captured Sparta, and Elis was again in the ascendant.⁶³ We may date the second series of restored lion-head rainspouts (E2) to the same project.

The repairs must have been finished by 167 when Antiochos IV Epiphanes of Syria (ruled 175–164) dedicated "a wool curtain, a product of Assyrian looms and dyed in Phoenician purple" (Paus. 5.12.4) to hang behind the cult statue; it may have come from the Temple of Solomon at Jerusalem (cf. II Macc. 6.2). Antiochos may therefore have financed the repairs; he gave 100 talents to be distributed among the cities of Greece, and he rebuilt the walls of Megalopolis and the theater at Tegea. He also had a copy of the Zeus statue made in the same materials at Antioch—no doubt Damophon's repairs would have included the kind of intense technical study of the statue that the Antioch copy would have required.

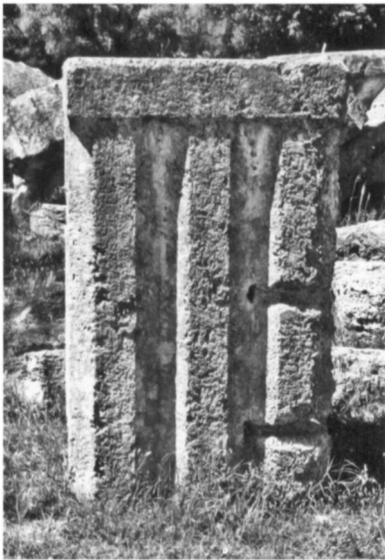


Figure 9. Southwest corner triglyph, south side, with repair-clamp cuttings

60. Ashmole, Yalouris, and Frantz 1967, p. 30 (citing Pheidias's death in 432 B.C.). A slightly later date of ca. 425 B.C. is given in *OCD*³, p. 1158, s.v. Phidias (A. F. Stewart). For the pottery, see Mallwitz and Schiering 1964, pp. 135–277, esp. p. 272: 440–430 and,

more likely, 435–430.

61. Ashmole, Yalouris, and Frantz 1967, p. 179. Trianti (2002, p. 292) cites some of these repairs.

62. Dinsmoor 1941. Georgalas (1962) notes volcanic activity in the Aegean that could have produced

appropriate earthquakes; for instance, in 197 or 194 B.C. (or in A.D. 46) Palaia Kaimeni, Thera, appeared.

63. Themelis 1996, p. 168. Ashmole, Yalouris, and Frantz 1967, pp. 5, 22, 179.

PHASE IV (MID-2ND CENTURY B.C.–A.D. 174)

Further embellishment occurred in 142 B.C. when Mummius dedicated 21 gilded shields to commemorate his destruction of Corinth the previous year; these decorated the east front.⁶⁴

In 56 B.C., lightning struck the temple so severely that it damaged the cult statue (Euseb. *Praep. evang.* 2.136); repairs may have been finished by 38–36 B.C.⁶⁵ It is at this time that Herod I (king of Judaea, 40–4 B.C.) was made *agonothetes* for his benefactions to the sanctuary (see Joseph. *AJ* 16.5.3 and *BJ* 1.21.12). It is also to this Early Augustan period that the extensive third series of restored lion-head rainspouts (E3) should be dated.

We know little about the later history of the temple. It is reported that Caligula wanted the Zeus statue brought to Rome in A.D. 40 so that he could put his own portrait on it, but the ship that was sent to remove the statue was destroyed by lightning and laughter was heard pealing from the statue when anyone came near to seize it (Suet. *Calig.* 22; Cass. Dio 59.28.3; Joseph. *AJ* 19.1).⁶⁶ Pausanias visited the site in A.D. 174.

PHASE V (LATE 2ND CENTURY–MID-6TH CENTURY A.D.)

In the later Roman period, marble tiles had been removed and used as stelai for inscriptions listing officials; this series stops short of the Herulean raid of A.D. 267, and it is likely that lion-head rainspouts E7 and E8 date to this late period.⁶⁷ Prior to the raid, the local inhabitants converted the temple area into a walled fortress reusing material from various Classical buildings. After the raid, the last series of rainspouts (E9) was installed (see Fig. 6:b).

The edicts of Theodosius I in the early 390s curtailed pagan activity in the empire. Around this time, a Byzantine village began to grow up in the eastern Altis, Pheidias's workshop was converted into a church, and the Zeus temple was left to deteriorate. In the early 5th century, in anticipation of a Vandal raid, the occupants of the Byzantine village renewed the fortification wall, again reusing Classical material, but the Vandals burnt the Altis anyway in 426, the same year Theodosius II ordered the destruction or conversion of all pagan temples in the eastern empire. The Zeus statue was transferred to Constantinople probably about this time; we hear of its existence in the Palace of Lausos after A.D. 395,⁶⁸ and the palace was eventually destroyed by fire in 475. Earthquakes in 522 and 551 completed the final destruction of the temple. Soon after, the Alpheios River flooded and covered the entire site with some 3–4 m of silt.

64. Tzifopoulos 1993. As mortises in the east facade demonstrate, 10 shields decorated the metopes and 11 shields decorated the epistyle below the triglyphs (Treu 1897, pl. XXXV; *pace* Barber 1995, p. 376).

65. Willemsen 1959, p. 88.

66. See Willemsen 1959, p. 105.

67. For a history of the sanctuary's last years, see Säffund 1970, pp. 151–162, 183–185; see also Willemsen 1959, p. 123 (the last inscribed tile dates to A.D. 265).

68. Kedrinos, *Historiarum Compendium* I, p. 564; Bassett 2004, pp. 99, 101.

In 1829, the French *Expédition scientifique de Morée* partially excavated the temple for six weeks and removed fragments of metopes.⁶⁹ The German Archaeological Institute carried out the first substantial excavations in 1875–1881, then again in 1936–1941, and has continued work at the site since 1952.

The Old Museum at Olympia was built in 1888/1889 according to plans by Dörpfeld based on the temple's dimensions and arrangement of the cella.⁷⁰ This museum was closed in 1975 while the New Museum was being constructed, and was refurbished in time for a grand opening in 2004, the summer of the Olympic Games; the New Museum opened in 1982.⁷¹

THE STATE OF THE SCULPTURES AT INSTALLATION

When the sculpted metopes, pediments, and rainspouts arrived from Paros, in one batch we think, the individual pieces would have been almost fully modeled on their fronts, facing the viewer, while the pedimental figures would have been only roughly shaped on their backs (unseen by the viewer) with a “quarry” or “workshop” finish (see p. 48, above). Zeus in the east pediment (Fig. 10) provides a typical example of the pedimental sculptures at installation.

Few of the pieces were fully finished, as Bluemel pointed out years ago.⁷² In the Kerberos metope (Fig. 11), for example, Herakles wears a garment whose folds are carefully depicted at his hips and thighs but nowhere else on his body.⁷³ More often, Herakles is depicted as nude in the metopes (see Fig. 30, below).⁷⁴ While the rest of his garment in the Kerberos metope could have been indicated in paint,⁷⁵ Herakles' upper body is sufficiently undetailed in its modeling that it might retain a thin mantle of stone from which the garment could have been carved.

Several groups in the west pediment are unusually complex. The south group RST (Fig. 12:a) consists of two blocks, RS and T. Centaur S's right

69. Blouet and Ravoisie 1831, vol. 1; Treu (1897, pp. 140–144) gives specific references.

70. Ashmole, Yalouris, and Frantz (1967, back foldout plate) show the pedimental arrangements in the Old Museum: the central group of the east pediment (see Fig. 46, below) consisted of, left to right, Sterope F, Pelops G, Zeus H, Oinomaos J, and Hippodameia K; the central group of the west pediment (see Fig. 13:a, below) consisted of, left to right, Theseus M, centaur and Lapith woman NO, Apollo L, centaur and Lapith woman JH (Eurytion and Deidameia), and Peirithoos K.

71. Trianti 2002, pp. 282, 294, 297.

The pediment arrangements in the New Museum switch some of the central figures: in the east pediment (Fig. 1:a), left to right, Sterope F, Oinomaos J, Zeus H, Pelops G, and Hippodameia K; in the west pediment (Fig. 1:b), left to right, centaur and Lapith woman JH (Eurytion and Deidameia), Peirithoos K, Apollo L, Theseus M, and centaur and Lapith woman NO.

72. Bluemel 1969, pp. 22–23.

73. Ashmole, Yalouris, and Frantz 1967, pp. 28–29, pls. 198, 199. Compare Acropolis Museum 599, a Severestyle period archer, whose thin, lower border of a cuirass has been carved,

but whose upper edge may have been painted (Brinkmann 2003, no. 51, fig. 51:7, 8).

74. There may be a drapery fold on Herakles' right thigh in the Hind metope: Ashmole, Yalouris, and Frantz 1967, pl. 172.

75. Ridgway (1999, p. 114, citing Treu 1895) discusses the traces of paint on the Olympia sculptures: red for Apollo's mantle (also Treu 1897, pp. 71, 158) and for the background of the Hydra metope, and blue for the background of the Bull metope. Treu assumed the tympana were painted blue, as does Stewart (1990, p. 143).



a



b



c

Figure 10. East pediment, Zeus (H):
 (a) front; (b) drawing of the reverse;
 (c) oblique view of back. Drawing from
 Treu 1897, p. 45, fig. 55



Figure 11 (*right*). Herakles, Kerberos metope

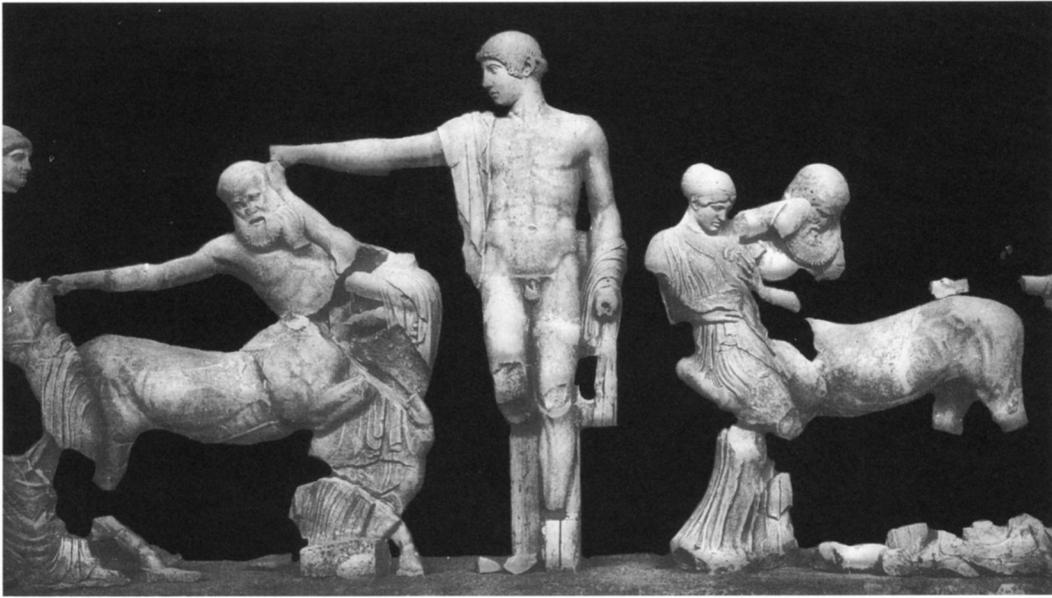


a



b

Figure 12. (a) West blocks RS (Lapith woman and centaur) and T (Lapith man); (b) detail of the joint



a

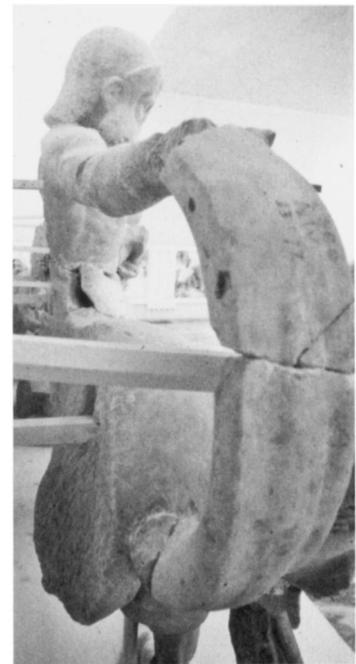
hind leg fits into a notch in the plinth of the Lapith youth (“Curly”) Q.⁷⁶ Lapith T’s lower right arm is actually a part of block RS and the two blocks join at T’s elbow (Fig. 12:b). We argue for a similar complex join between their counterparts C and block DE (see below, p. 81). It is certain that Apollo’s right arm had to be supported (Figs. 2, 13:a), and it is likely that the necessary prop was the top of the centaur’s head N (as in the Old Museum installation), based on the parallel within block N itself, where the centaur’s outstretched right arm is one piece with his uplifted tail (Fig. 13:b; see also Figs. 28:b, 33:a, below).⁷⁷ The installation of these complex groups would have needed extreme care as the individual blocks were hoisted into the pediments.

UNFINISHED AREAS

HAIR

In 1998, Paul Rehak published a separate study of the unfinished hair on the pedimental sculptures, so a summary here will suffice. Four different degrees of finishing can be identified, ranging from fully carved (group I; Fig. 14) to workshop finish (group IV; Fig. 3). There are, however, two intermediate degrees of finish: heads that are nearly complete (group II), and “template” heads (group III; Fig. 4), on which a small area of hair has been carved to serve as a guide for the completion of the rest. Unfinished heads (groups II–IV) far outnumber finished ones (group I).

Figures in group I, with their hair completely finished, are Sterope F and Hippodameia K in the east pediment, and, in the west, centaurs D, G, and S, Lapith woman E, Curly Q (Fig. 14), and Apollo L (on the visible left side of the head; Fig. 15:a). In these fully carved heads the individual



b

76. Treu 1897, p. 131, fig. 169.

77. With the centaur’s hand connected to his tail, placing one of the heroes in front of this area would demand that his tenon be much longer

(over 0.40 m) than any other and that it pass through this join; this seems doubtful. Consequently, the heroes should have stood in back of the centaur-woman groups.

Figure 13 (*opposite*). Display of west pedimental sculpture in the Old Museum at Olympia: (a) central group; (b) centaur (N), reverse

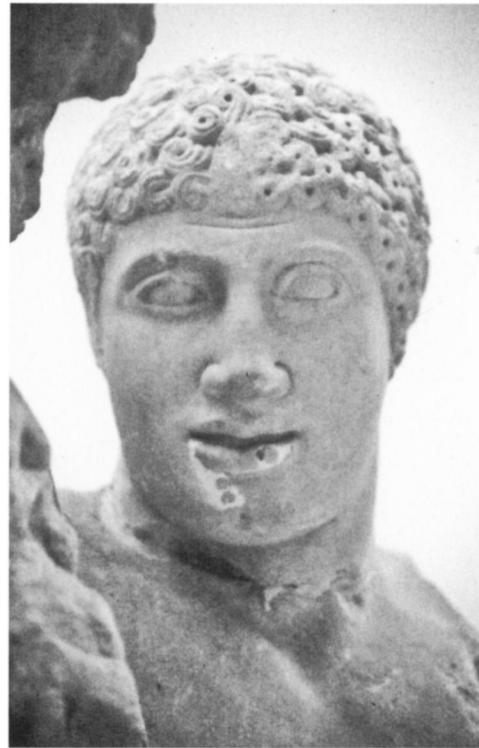


Figure 14 (*right*). West pediment, face of Lapith youth Curly (Q)



a



b

Figure 15. West pediment, head of Apollo (L): (a) finished left side; (b) unfinished right side. Photo (b) courtesy Deutsches Archäologisches Institut, Athens (neg. 85/231)



Figure 16. West pediment, face of centaur (D), and hands placed above his head

locks of hair are rendered in high relief, and their surfaces are detailed with lightly engraved lines to indicate separate strands. Many completed locks end in curls with drilled centers. Apollo's long hair is rolled at the back (and pinned) and presumably braided around the front (under the fringe of curls).⁷⁸ But even Apollo's "finished" head was not completed on its right side (Fig. 15:b), which was turned toward the tympanon wall and thus not visible. Apollo's right ear has been cut from the mantle of hair, however, and roughed out with the point, and while the right side of the head has been smoothed, the strands of hair are carved only as far as the right temple, where they stop abruptly.⁷⁹

Figures D and E, a centaur grappling with a Lapith girl, also have finished hair.⁸⁰ The centaur's head (Fig. 16), however, is anomalous in several respects. The wrinkles in his snarling face are crisply carved, and the eyelids are sharply profiled, lacking the doughy contours found on all other Olympia heads. Likewise, each upper lid has an engraved line that appears on no other preserved head.⁸¹ The facial features, as well as the metallic crispness of the hair, carved as flat, short comma locks, are reminiscent of Polykleitan style. This head comes from a heavily damaged

78. Treu 1897, pp. 69–72, pls. XXII, XXIII; Lullies and Hirmer 1960, pls. 122, 123; Ashmole, Yalouris, and Frantz 1967, pls. 101–109, esp. 106–109; Herrmann 1972, pls. 2, 3; Yalouris and Yalouris 1987, p. 121, color fig.; Rehak 2002.

79. Cf. the head of west Lapith woman R: Ashmole, Yalouris, and Frantz 1967, pl. 128.

80. Ashmole, Yalouris, and Frantz 1967, pls. 73, 74, 76–79, 81; for figure E, see Herrmann 1972, pls. 14, 16, 18; Yalouris and Yalouris 1987,

p. 126, color fig.

81. Wegner 1989. Evelyn Harrison pointed out to us that the wrinkled eyelids and flat locks are similar to those of the portrait of Pindar (who died in 438 b.c. at age 80): this is an old centaur. See Stewart 1990, pl. 299.

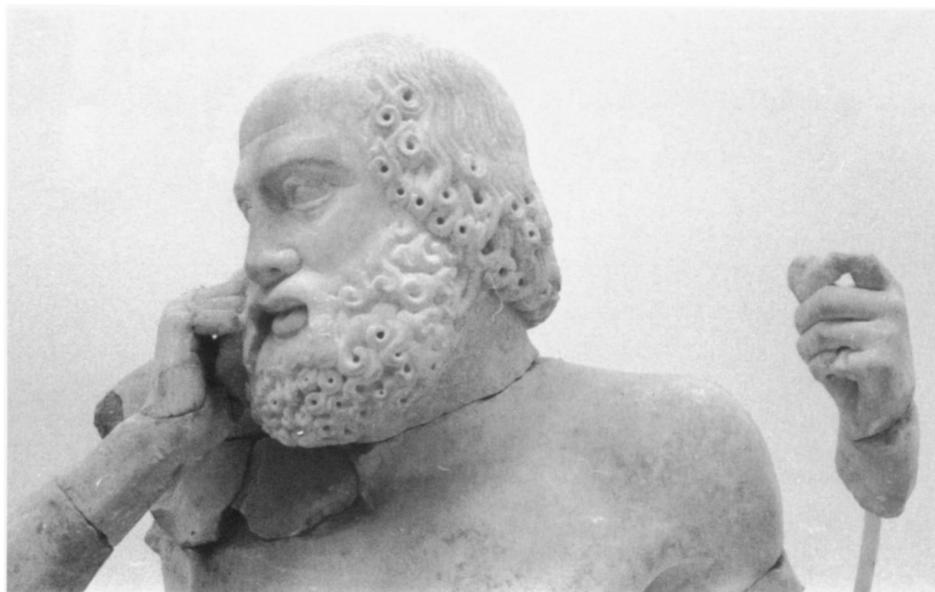


Figure 17. East pediment, north seer (N), head, left side

group, perhaps a replacement figure made no earlier than the end of the 5th century; the facial expression, however, imitates that of centaur P who bites the Lapith youth Curly Q.⁸²

A few heads have most of the hair completed, with only a few areas left unfinished (group II). Seer N, at the north end of the east pediment, is represented as an aging individual (Fig. 17).⁸³ His hair consists of fully carved, wavy strands ending in curls with drilled centers. The mustache and a band under the lower lip, however, remain as blank mantles of stone that were to be carved into individual strands—the preliminary incisions for two of these are visible beneath the lower lip.⁸⁴ Much of the beard is also unfinished, which in general receives none of the individual strands that delineate the hair, and whose curls on the cheek are undrilled.

Centaur Biter P (Fig. 18) and Lapith Curly Q (Figs. 14, 18) present impressively finished hair.⁸⁵ The only unfinished part of the centaur's hair is the corner of the beard against the right cheek. Two unusual features of this centaur's head are the ruff of hair surrounding the face and the pair of deep cuttings at the left and right temples for unique equine ears.⁸⁶ Since these cuttings interrupt the carved locks of hair, they must represent a later modification, of uncertain date. Curly, Lapith Q, has a full head of short, tight curly locks, many with incised lines and drilled centers.⁸⁷ Over the center of the forehead, however, there is a small, deeply carved patch, where

82. For Polykleitos, see, e.g., Ridgway 1981, pp. 201–220; Kreikenbom 1990; Beck and Bol 1993; Moon 1995; Borbein 1996. We thank Aileen Ajoonian for noting the Polykleitan style of the head.

83. Treu 1897, pp. 64–66, pl. XV:1; Lullies and Hirmer 1960, pls. 114, 115; Ashmole, Yalouris, and Frantz 1967, pls. 31–38; Ashmole 1972,

pp. 38–39, figs. 38, 40–44; Herrmann 1972, pl. 26; Yalouris and Yalouris 1987, p. 115, color fig.

84. Ashmole, Yalouris, and Frantz 1967, pls. 33, 34.

85. Treu 1897, pp. 83–84, pl. XXVIII:2; Ashmole, Yalouris, and Frantz 1967, pls. 82–91; Herrmann 1972, pl. 11; Yalouris and Yalouris 1987, p. 124, color fig.

86. Treu 1897, p. 82, fig. 135 (drawing); Ashmole, Yalouris, and Frantz 1967, pls. 82, 87. The right ear (Daux 1966, p. 820, fig. 16) is now in place.

87. Treu 1897, p. 83, fig. 136 (drawing); for details, see Ashmole, Yalouris, and Frantz 1967, pls. 86, 88, 90; Ashmole 1972, p. 53, fig. 62.



Figure 18. West pediment, centaur Biter (P) and Lapith youth Curly (Q), heads and hands

a plumb-line boss has been removed (Fig. 14),⁸⁸ too deeply and too early, while the hair was still in mantle stage, for curls begin from this patch, obviously sculpted after its removal.

Several individuals in both pediments and in the metopes have heads on which one small area of the hair has been fully carved to serve as a template for the completion of the remainder (group III: east Pelops G, the chitoned attendant O; west Peirithoos K and centaurs J [Fig. 4] and N [Fig. 19]; and some metope heads).⁸⁹ Pelops G shows signs of several re-workings, including the addition of a metal cuirass over a torso that had been fully carved.⁹⁰ He wears a helmet, with added cheek flaps in metal.⁹¹ Below the edge of the helmet, at the sides and back of his head, an ovolo band of stone with preliminary short locks probably represents the exposed edge of his hair (cf. Athena in the Augeias metope).⁹² West centaur Eurytion J (Fig. 4) has a beard that, over the left shoulder and chest, ends in a row of distinct template curls, but the surface is otherwise plain.⁹³

West centaur N presents one of the best examples of a head with template hair (Fig. 19).⁹⁴ A flat, raised mantle of stone runs across the forehead, descending over the temples into the beard.⁹⁵ The fingers of the Lapith maiden O sink into the unfinished mantle on the centaur's left cheek. Of his beard, only the lower edge has been fully carved as individual curls and

88. Ashmole, Yalouris, and Frantz 1967, p. 20, pl. 90; Bluemel 1969, pp. 49–50, fig. 38.

89. The head of Athena in the Lion metope (Ashmole, Yalouris, and Frantz 1967, pls. 144–146, 149) has curls over her right forehead that stop abruptly at a barely erased plumb-line boss. Others in this group include the Amazon's head (Ashmole, Yalouris, and Frantz 1967, pls. 173, 175) and Eurystheus's head in

the Boar metope (pls. 174, 176).

90. Treu 1897, pp. 46–49, 53, figs. 56–61, pls. IX:2, XI:1; Ashmole, Yalouris, and Frantz 1967, pls. 46, 47, 49.

91. Similar metal cheek flaps were added to some of the Aigina pedimental heads (e.g., head of warrior, Munich 0.IXa: Buitron-Oliver 1992, pp. 82–83, no. 3; the figure may also have had added strands of hair at the nape below

the edge of the helmet).

92. Ashmole, Yalouris, and Frantz 1967, pls. 202, 203, 206, 211; Trianti 2002, p. 294, fig. 51.

93. Treu 1897, pp. 72–76, pls. XXIV, XXV; Ashmole, Yalouris, and Frantz 1967, pls. 110–117.

94. Ashmole, Yalouris, and Frantz 1967, pls. 98, 99, esp. pl. 99.

95. Also see Treu 1897, p. 78, fig. 121 (drawing).

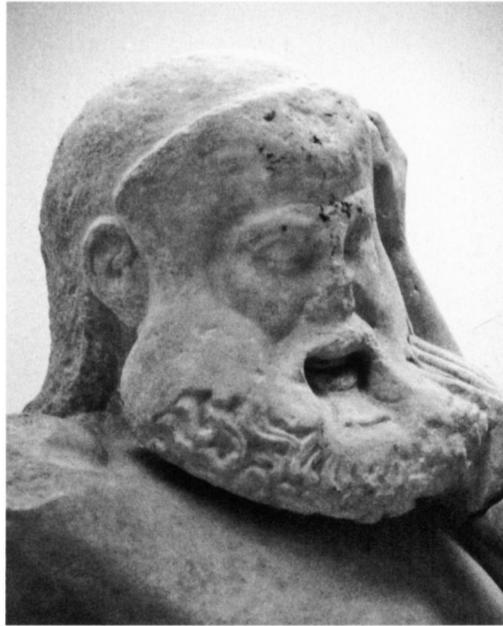


Figure 19. West pediment, centaur (N), face, template beard, and shelf on head

tendrils of hair. It is difficult to know how the top of centaur N's head was meant to look; the broad mantle across the forehead might have been meant for hair, but it breaks sharply at the head, leaving a shelf. This shelf is unique in the pediments—we argue below that Apollo's hand rested on it.

Most of the heads in both pediments and metopes, however, have hair left as a blank mantle of marble (group IV); some evidence survives that the intention may have been to paint the hair.⁹⁶ Among these mantled heads are those of east B, a kneeling attendant, and Kladeos P (Fig. 3).⁹⁷ Theseus M has hair that has been left as a smooth, rounded bowl that matches in surface texture the roll of marble over the forehead.⁹⁸ At the back of the head, however, the mantle is extremely rough and has been cut crudely away around his right ear, freeing it from the large mass of hair around his head.⁹⁹

East L, the south seer (Figs. 20, 25), presents an odd combination of a mantled coiffure with a beard that was evidently finished.¹⁰⁰ Some carving has begun on the mantled hair (the large mass over the right ear has been partly chiseled, and there are small, shallow drill holes above). The smooth surface of the head, carved into three concentric undulating bands that encircle the cranium, led Säflund to identify it as a "headdress."¹⁰¹ Instead, these undulating bands probably represent the first stage of work

96. Treu (1897, pp. 71, 158) mentions the red painted head of Herakles in the Lion metope. The Herakles figure in the Bull metope also has red painted hair. This red paint may be the undercoat for more finished painted hair in brown, perhaps with some individual strands delineated (Brinkmann 2003, p. 47).

97. For east B, see Treu 1897,

pp. 62–63, pl. XIV:4; Ashmole, Yalouris, and Frantz 1967, pls. 50, 51; Yalouris and Yalouris 1987, p. 112, color fig. For Kladeos, see Treu 1897, pp. 67–68, pl. XV:3; Lullies and Hirmer 1960, pl. 116; Ashmole, Yalouris, and Frantz 1967, pls. 1, 4, 6–9; Herrmann 1972, pls. 33, 35; Yalouris and Yalouris 1987, p. 116, color fig.

98. Treu 1897, pp. 76–79, pls. XXVI,

XXVII; Herrmann 1972, pls. 6, 7:a; Ashmole, Yalouris, and Frantz 1967, pls. 92–97.

99. Ashmole, Yalouris, and Frantz 1967, pls. 95–97, esp. pl. 96.

100. Treu 1897, pp. 60–61, pl. XIV:2; Ashmole, Yalouris, and Frantz 1967, pls. 58–61.

101. Säflund 1970, p. 63.



Figure 20. East pediment, south seer (L)

for a coiffure of wavy strands as on the Apollo figure, whose similar bands are still visible (cf. Fig. 15).¹⁰²

Within groups of figures, different stages of finish to the hair are sometimes seen. Lapith woman Deidameia H, with mantle hair, struggles against centaur Eurytion J with a template beard (Fig. 4).¹⁰³ Centaur S, whose head must have been completely finished (to judge from the surviving beard), attacks Lapith woman R (Fig. 12), who is shown with a mantled head and cutout ear similar to Apollo's right ear.¹⁰⁴ In the Atlas metope,¹⁰⁵ the coiffure and facial hair of Herakles are left as a soft, smooth, unfinished mantle of marble. At the left side of Atlas's head, two curls only have been separated, but not further articulated, while Athena's hair over the brow and right temple has been carved into thick, zigzag strands with no further interior articulation; the hair on the crown and at the back of the head has been left as a smooth mass.

PLUMB-LINE BOSSES

On several figures, plumb-line bosses either still remain (e.g., east L, south seer; Fig. 20) or their traces can be detected in the upper center of the foreheads (e.g., west Deidameia H and Curly Q; Figs. 4, 14).¹⁰⁶ In strictly

102. For finished strands of female hair in Severe-style work, see the stele "Girl with Doves" in New York, Metropolitan Museum of Art 27.45 (Buitron-Oliver 1992, pp. 140–141, no. 28, with color figs.), and the Pharsalos stele in Paris, Musée du Louvre MA 701 (Hampe 1951, pp. 191–197).

103. Lullies and Hirmer 1960, pls. 120, 121; Ashmole, Yalouris, and Frantz 1967, pp. 18–19, pls. 110–114;

Herrmann 1972, pls. 8, 9.

104. Ashmole, Yalouris, and Frantz 1967, pls. 127–139. The Lapith woman's head is broken away from the neck and may not belong; cf. Kunze 1944; Herrmann 1972, pl. 15.

105. Lullies and Hirmer 1960, pl. 107; Ashmole, Yalouris, and Frantz 1967, pls. 186, 188–193.

106. Bluemel 1969, pp. 40–54. For plumb-line bosses still remain-

ing, see Ashmole, Yalouris, and Frantz 1967, pls. 58–61 (east L, south seer); for examples recarved into hair (west centaur D), see pl. 77; partially erased (Athena in the Lion metope, and Herakles in the Birds and Bull metopes), pls. 146, 161, 163; fully erased (Herakles in the Kerberos metope), pl. 197; and too deeply erased (west Lapiths Q and R), pls. 90, 130 131.

vertical statues that face forward, a plumb line could be suspended from the boss in order to maintain symmetry when carving the body. But the Olympia sculptures that display surviving plumb-line bosses or their traces are not strictly vertical or frontal, so lines suspended from them must have been used for another purpose, perhaps to measure off distances. While erased or transformed forehead bosses are common, even in the Olympia sculptures, unerased bosses are uncommon in Greek sculpture, and their presence here betrays a lack of finish that would have been noticeable.

OTHER AREAS

It is probable that vague drapery (i.e., drapery that does not articulate the limbs beneath) is also not fully finished. For instance, the left arm of east E, the seated attendant (see Fig. 26:a, below), and the left leg of west Lapith Curly Q are swathed in amorphous drapery that could have received further articulation.¹⁰⁷ It is difficult, however, to know how much further one should go in this direction without seeming too critical of what are generally taken to be stylistic struggles toward the Classical style: does the right knee of west Lapith woman R (Fig. 12) seem unnecessarily truncated? To whom does all the drapery belong that is revealed behind Lapith Q Curly's missing right leg? And why does Eurytion J's forehoof have drapery lines carved on it?¹⁰⁸

Far more interesting for our analysis are the various stages of finish to the backs of the pedimental sculptures. The blocks of horses have their backs completely flat and pointed so they can fit flush against the tympanon, slightly back from the human figures (see Figs. 37, 38, below).¹⁰⁹ Both women in the east pediment receive the same treatment, although Sterope F has a rim neatly carved around her otherwise flat and recessed back (Fig. 21:b, c).¹¹⁰ The women, too, were apparently meant to stand like the horses, flush against the tympanon, facing forward, their men standing out from them.

Other pedimental figures have their backs preliminarily modeled with rasped areas where they were to touch the tympanon wall. The reverse of Zeus (Fig. 10:b, c) has his drapery and upper torso preliminarily modeled (but not his buttocks) with rasped areas at the shoulder blades, drapery, buttocks, and calves; he probably stood slightly forward at installation, but perhaps was pushed back against the tympanon wall at a later stage.¹¹¹ The two heroes were placed to either side of Zeus and forward of the tympanon wall (Fig. 22). Pelops has rasped areas at his right shoulder blade, which has been cut flat to rest against the tympanon; he was therefore turned slightly to his right, which would have made the shield on his left arm prominent.¹¹² The drapery over Oinomaos's right shoulder is completely finished in back, but the drapery over his left shoulder is only preliminarily

107. For figure Q, see Ashmole, Yalouris, and Frantz 1967, pl. 86.

108. Ashmole, Yalouris, and Frantz 1967, pls. 98, 105.

109. Treu 1897: D, p. 54, fig. 74; and M, pp. 57–58, figs. 80, 82.

110. Treu 1897: Sterope, p. 51, fig. 67 (“Hippodameia”); cf. Hippoda-

meia, p. 52, fig. 71 (“Sterope”). Two horses in the Parthenon pediments also have carefully chiseled rims surrounding a pointed underside and reverse (respectively): Palagia 1998, pls. 53 (east Selene's horse head O), 101 (west Poseidon's horse leg).

111. Treu 1897, p. 45, fig. 55.

112. Treu 1891a, p. 66, fig. 3; 1897, p. 46, fig. 57. Trianti (2002, p. 297) puts Pelops to our right of Zeus so that his shield does not obstruct him. The Aigina pediments, however, display shield-bearing figures flanking Athena (who also carries a shield); see Stewart 1990, pl. 240.

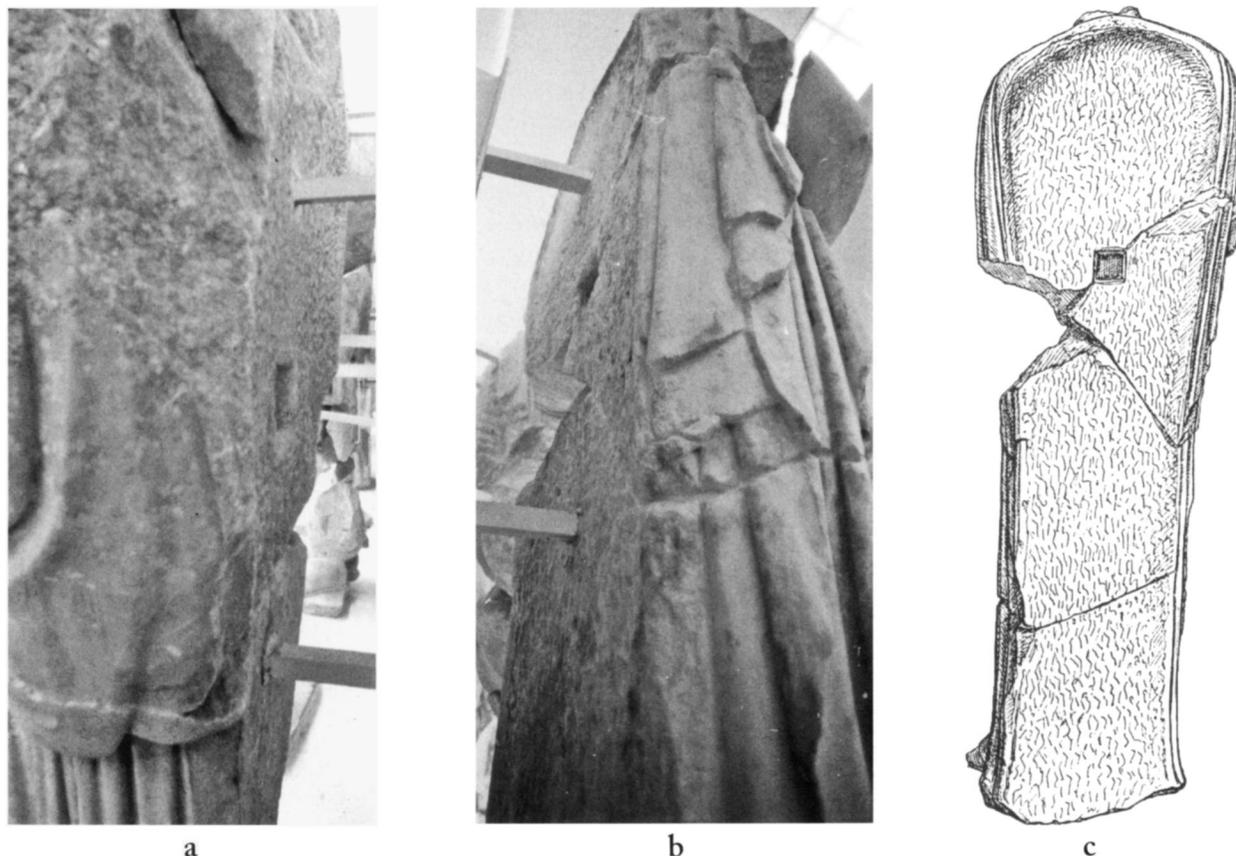


Figure 21. East pediment, women:
 (a) Hippodameia (K), reverse;
 (b, c) Sterope (F), reverse. Drawing
 from Treu 1897, p. 51, fig. 67

modeled; his left buttock has been cut flat around the mortise that would have secured him to the tympanon wall. He probably should be turned to his left with his right flank visible.¹¹³

On the east pediment, the river gods Alpheios A (Fig. 23) and Kladeos P (Fig. 3), and north seer N (Figs. 17, 24), have considerable portions of their reverse finished: their torsos and Alpheios's drapery over his legs. At the lower back part of their reverses, however, is a ledge that has been pointed flat to lie flush against the tympanon wall, as if to suggest that their torsos angled forward (cf. Fig. 8). It is possible that the other seated old man, seer L in the south (Fig. 25; cf. Fig. 20),¹¹⁴ may once have resembled the north seer N, but he was then drastically recut, his plinth removed, the lower part of his legs cut back, and the top of his head cut down; he may have been trimmed to be pushed farther into the south angle of the pediment. It is possible that this trimming was done at installation, since the figure's plumb-line boss was not removed.

This mix of reverse textures may also shed some light on how the four attendants were arranged. The seated boy E (Fig. 26:a) has his reverse flat and rough with no preliminary modeling, and a rough area over most of his back;¹¹⁵ it is clear that he was meant to face forward. His draped

113. As drawn by Treu (1891a, p. 66, fig. 4). See also Ashmole, Yalouris, and Frantz 1967, pls. 18, 20.

114. Treu 1897, p. 60, fig. 90;

Ashmole, Yalouris, and Frantz 1967, pls. 59–61; Bluemel 1969, p. 49, fig. 37; Säffund 1970, p. 92, fig. 50.

115. Treu 1897, p. 59, figs. 85–87.

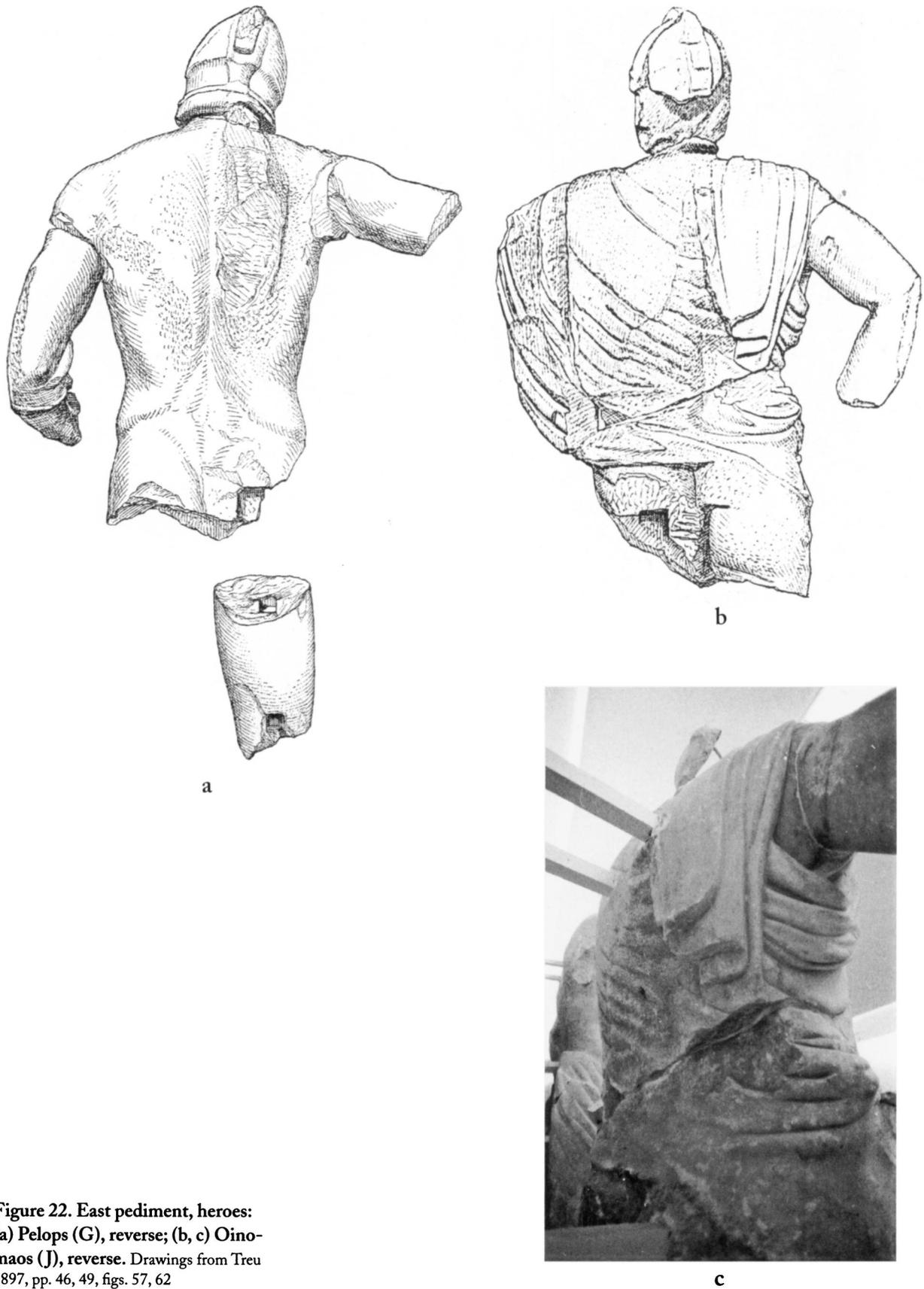


Figure 22. East pediment, heroes:
 (a) Pelops (G), reverse; (b, c) Oino-
 maos (J), reverse. Drawings from Treu
 1897, pp. 46, 49, figs. 57, 62



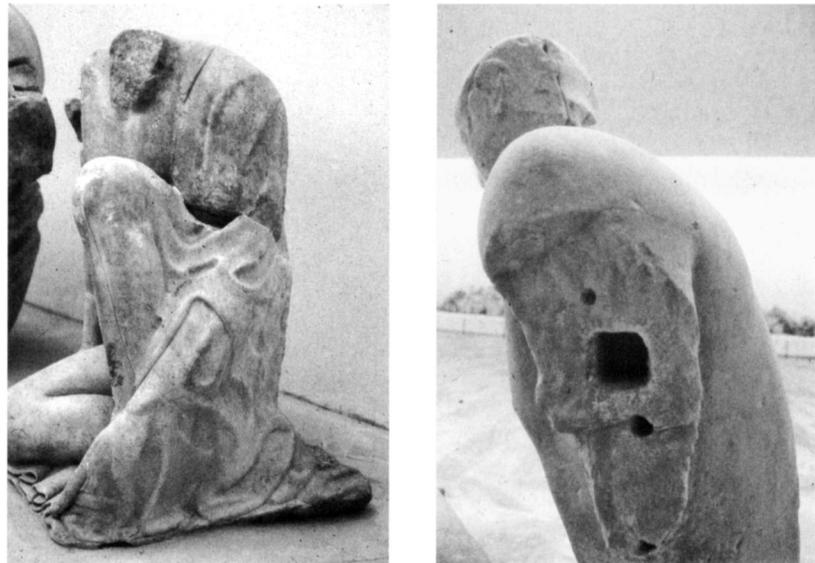
Figure 23. East pediment, Alpheios (A), reverse



Figure 24. East pediment, north seer (N). Treu 1897, p. 65, fig. 103



Figure 25. East pediment, south seer (L), front; at right, kneeling attendant (C)



a

b



c

Figure 26. East pediment, attendants: (a) E (sitting); (b) B (nude), left side; (c) O (chitoned), right side. Drawing from Treu 1897, p. 63, fig. 99

116. Treu 1897, p. 62, figs. 96, 97; Ashmole, Yalouris, and Frantz 1967, pls. 55–57.

117. Treu 1897, p. 62, fig. 98; Ashmole, Yalouris, and Frantz 1967, pls. 50–52.

118. Treu 1897, p. 63, fig. 99; Ashmole, Yalouris, and Frantz 1967, pls. 22–27; Säflund 1970, pp. 72–73, 93, 107.

left arm may imply that he was turned slightly to his left or that another figure was positioned close to his left side. The kneeling attendant C, cloaked in a mantle, has his left side preliminarily modeled but left rough (Fig. 25, right);¹¹⁶ a similar treatment was given to his back, except for the undraped right upper portions. He too was meant to face forward, although some of his left side could have faced the tympanon wall. The nude kneeling attendant B is not only finished all around but his left side was repaired (Fig. 26:b)—he may face right today (to hide his damaged arm), but he probably faced left at installation.¹¹⁷ Finally, the kneeling attendant O, draped in a chiton, has the right side preliminarily modeled, but left rough especially on the reverse of the raised right knee (Fig. 26:c);¹¹⁸ this figure also faced left.

SECURING THE FIGURES

In arranging the figures within the east pediment, it is clear that their relative size and pose determine their approximate position. The square mortises in the backs of the standing figures and the horses can also help to determine their horizontal and vertical position (see Fig. 5, above).¹¹⁹

The two mortises in the back of Zeus (Figs. 5, 10:b, c) are placed on a central axis, one 60 cm above the other. Their presence implies that he was fastened by iron tenons or dowels¹²⁰ to the tympanon wall.

Since no block of the tympanon wall has been identified, it is difficult to imagine what it looked like. The tympana of the Parthenon and Hephaisteion were constructed in isodomic courses of ashlar blocks set well back from the line of the triglyph-metope frieze and masked by thin orthostats.¹²¹ The tympanon of the Temple of Apollo at Bassai was also constructed of ashlar blocks (H. 0.30, L. ca. 1.30 m) in six horizontal courses with the blocks at the ends of their course angled up to lock the course above it.¹²²

If the tympanon wall of the Temple of Zeus at Olympia had also been constructed in ashlar courses, we can imagine that the tenons for Zeus sat in blocks of alternate courses, each 30 cm high (like Bassai's), with an intervening course separating them (see Fig. 5). Each of the two male figures, Pelops and Oinomaos, has one mortise in the buttock of his free leg as he turns outward, in Pelops's right buttock (Fig. 22:a) and in Oinomaos's left buttock (Fig. 22:b, c).¹²³

According to the scale of the figures, it seems correct to place the hips of the larger figures on line with the waists of the smaller ones (Fig. 5); thus, the men's waists are on line with Zeus's hips, and the women's waists on line with the men's hips. This arrangement makes the mortises in the women's backs line up with the mortises in the men's buttocks, with Zeus's mortises 30 and 90 cm higher. Ideally, therefore, we can imagine the tympanon wall as a grid of ashlar masonry in 30 cm high courses.

In the west pediment, most mortises seem to align at specific heights from the pediment floor. The reclining woman B (Fig. 7, right) has a mortise in her left hip 30 cm from the floor (lower edge of the mortise to the floor), while her south counterpart U (Fig. 42, below) has one in her right shoulder 40 cm from the floor (10 cm higher; Fig. 27:a). Lunging Lapith C has a mortise in his hip 60 cm from the floor (Fig. 27:b), while his south counterpart, Lapith T, has a mortise in his hip 70 cm from the floor (again, 10 cm higher; Fig. 27:c). No mortises survive from group DE (centaur and Lapith woman), but their south counterparts, RS (Lapith woman and centaur) have mortises in the small of the centaur's back at 65 cm from the floor and in his raised hindquarters (supporting the Lapith woman) at 1.10 m from the floor (Fig. 27:c). The height of the mortise in group FG (boy and centaur) is not known since the figures are so fragmentary,¹²⁴ but it probably was 1.20 m, corresponding to the surviving mortise in the counterpart group PQ (Biter and Curly) at 1.30 m from the floor (Fig. 27:d).

From these mortise heights in the west pediment (Table 4), it seems that there were conventional vertical alignments for the mortises at 30 cm intervals but starting at 30 cm above the floor in the northern half of the

119. For the mortises in these figures, see Trianti 2002, pp. 286, 288, 290.

120. Trianti (2002, p. 286) cites Treu 1897, p. 45.

121. Orlandos 1976, vol. 1, pls. 15, 69, 70; vol. 3, pp. 418–439, figs. 339, 343. For an illustration of the Hephaisteion tympanon, see Dinsmoor 1950, pl. 42.

122. *Bassai* IV, pls. 20:1, 2; 36; 37.

123. Trianti 2002, pp. 286, 288.

124. Treu 1897, p. 80, fig. 124.

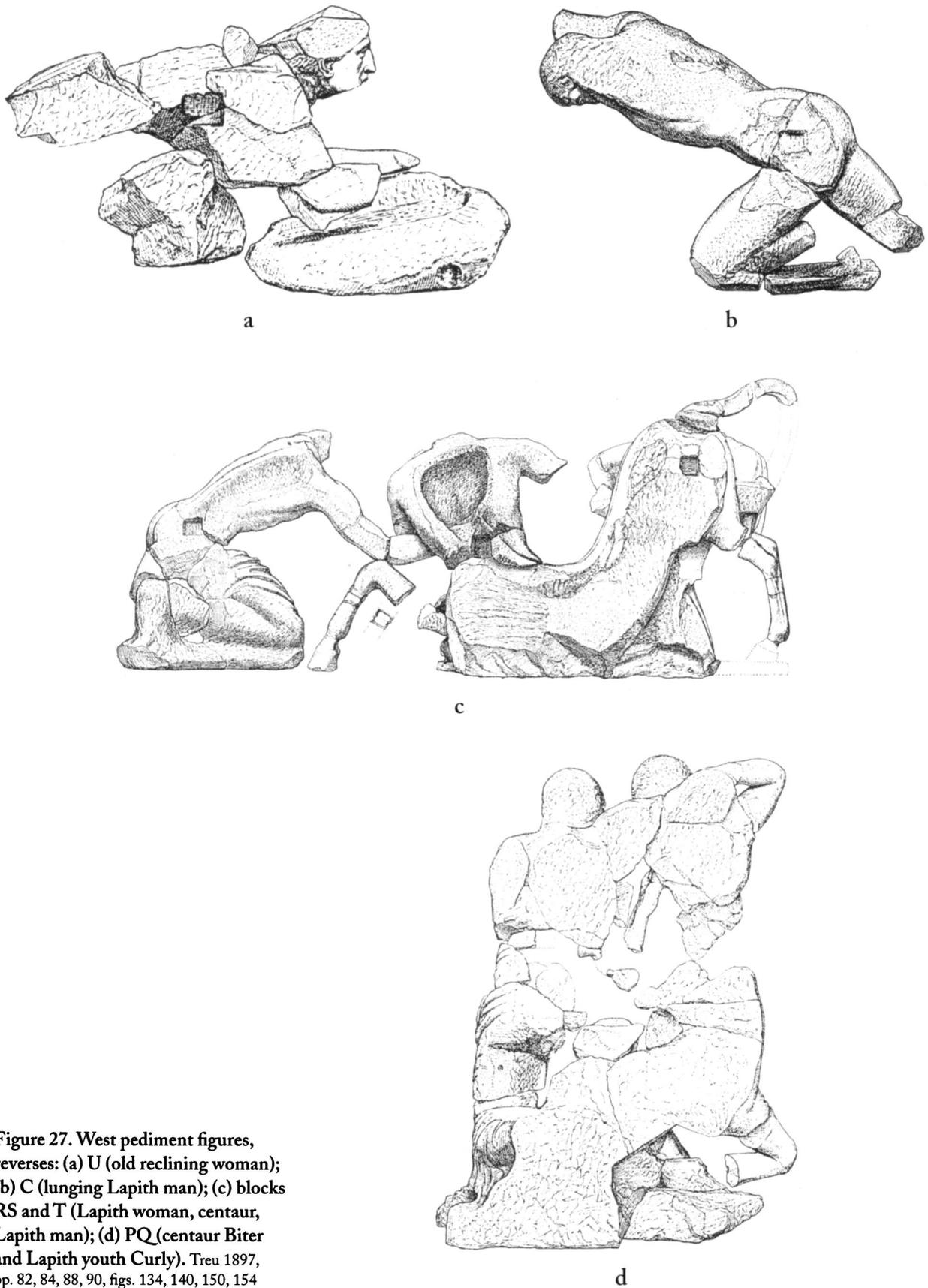


Figure 27. West pediment figures, reverses: (a) U (old reclining woman); (b) C (lunging Lapith man); (c) blocks RS and T (Lapith woman, centaur, Lapith man); (d) PQ (centaur Biter and Lapith youth Curly). Treu 1897, pp. 82, 84, 88, 90, figs. 134, 140, 150, 154

TABLE 4. WEST PEDIMENT: HEIGHTS OF MORTISES ABOVE THE FLOOR

Height	North End				Center					South End				Height
	B	C	DE	FG	M	NO	L	JH	K	PQ	RS	T	U	
150					150		160		—					160
120			—	120*		120 110*		130		130		110		130
90														100
60		60	—								65	70		70
30	30												40	40

Heights are given in centimeters. A dash indicates that a mortise does not survive. Letters refer to figures in the pediment.
*Conjectured height.

pediment (with mortises therefore at 30, 60, 90, 120, and 150 cm) and, in the southern half of the pediment, starting at 40 cm above the floor (with mortises at 40, 70, 110, 130, and 160 cm). The height of the mortise for Theseus M, at 1.50 m from the floor, implies that he was installed in the northern part of the pediment, to our left of Apollo L and facing him. The mortises in the hip and hindquarters of centaur J (Eurytion; Fig. 28:a) lie at 1.30 m above the floor, implying a southern position for this group, in back of Apollo. The other centaur group, NO, also has mortises in the small of the Lapith woman's back and in the centaur's hindquarters (Fig. 28:b; see also Fig. 13:b), but these are raked, with the bottom of the Lapith's mortise aligned with the top of the hindquarters mortise. The bottom of the hindquarters mortise lies slightly lower than expected, at 1.10 m above the floor, but when the mortises are aligned horizontally (lifting the forequarters of the centaur and Lapith woman up an additional 10 cm), the one in the hip is 1.20 m above the floor, implying a northern position for this group, to our left of Apollo.

Since Apollo in the center has two mortises in his buttocks (Fig. 29), both at 1.60 m from the floor, he corresponds to the southern system. Perhaps there was a vertical break in the isodomic masonry just to the north of Apollo (corresponding to the two mortises at different heights in block NO), with higher courses in the south half of the pediment and lower courses in the north half.

In the east pediment, the only figure that preserves the height of its mortise from the floor is Sterope (Table 5; Fig. 21:b, c), in the small of her back at 1.60 m. If this mortise corresponds to those in the buttocks of the taller male figures Pelops and Oinomaos (Fig. 22), and to a point 30 cm below the mortise in the small of Zeus's back (Fig. 10:b, c), then Zeus's mortises could rest at 1.90 and 2.50 m above the floor. Zeus's upper mortise lies between his shoulders; such a position on the Apollo figure is some 75 cm below the top of his head. If similar, Zeus and Apollo should be the same height, about 3.25 m.

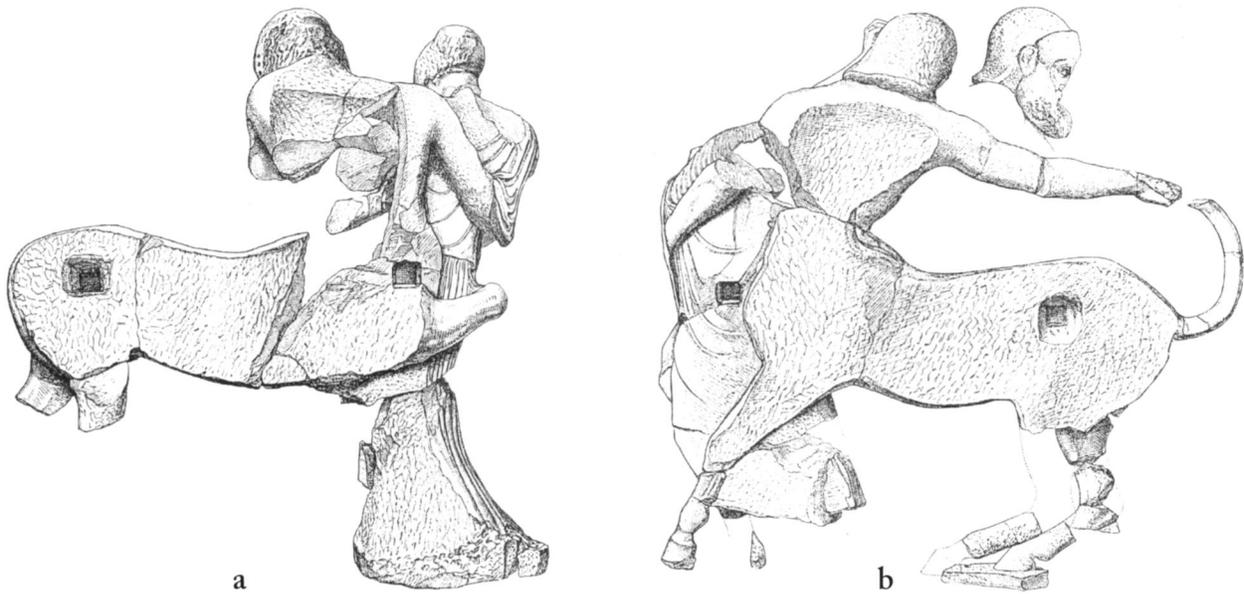


Figure 28. West pediment, centaurs and Lapith women, reverses:
(a) Eurytion and Deidameia (JH);
(b) centaur and Lapith woman (NO).
 Treu 1897, pp. 73, 78, figs. 116, 121

A comparison of the sets of mortise heights in the west and east pediments makes it clear that the east pediment matches the upper range of the southern half of the west pediment, and that its simpler composition (no complex joining of figures or *tour-de-force* sculpting) and overall higher centers of gravity allowed for a simpler system of attaching them to the tympanon—and fewer mortises.

From the freshness of most of the mortise cuttings, it is obvious that most date to the period of installation. Apollo is unusual in that he has two mortises, one in each buttock, aligned approximately horizontally (Fig. 29:a). The mortise in the right buttock is cut clean, but the mortise in the left buttock is sunk in an elliptical depression, much like the square mortises in the hindquarters of centaurs Eurytion J and N (Figs. 13:b, 28).¹²⁵ It is possible that the elliptical cuttings around the square mortises accommodated more lead around the tenon and therefore a more secure seat for it, but whether this elliptical cutting occurred at installation or later is difficult to determine: the clean elliptical cuttings in the centaur hindquarters suggest they are original (cf. the east team horses with raised square bosses and countersunk square mortises [Fig. 37:a, below]), but the damaged state of the Apollo figure suggests that its elliptical cutting was later.

Another indication that the elliptical cuttings around the square mortises are original (at least in the centaurs) is that the deepest mortises occur in the centaur groups: centaur J (18 cm) and Lapith H (17 cm); centaur N (19 cm) and Lapith O (17 cm); and centaur G (16.5 cm). The shallower mortises belong to the simpler human figures—T (15 cm) and V (13 cm)—and to centaur S (10 cm), who is well supported by Lapith woman R (Fig. 27:c). There was a different system for supporting the (non-centaur) horse bodies in the east pediment: traces of rectangular, pillarlike supports are preserved under the chest of all four horse blocks (W. 11–14, D. 16–17 cm; see Fig. 37:a, below; dashed lines below chest).¹²⁶

There has been no systematic study of mortises in Greek architectural sculpture, but they are fairly common. Since almost all freestanding

125. Trianti 2002, p. 288.

126. Treu 1897, pp. 53–54, fig. 74, “b”; Säflund 1970, pp. 67–68, 70.

TABLE 5. EAST PEDIMENT: HEIGHTS OF MORTISES ABOVE THE FLOOR

<i>Horses</i> (D)	<i>Hippodameia</i> (K)	<i>Pelops</i> (G)	<i>Zeus</i> (H)	<i>Oinomaos</i> (J)	<i>Sterope</i> (F)	<i>Horses</i> (M)
			250*			
			190*			
	160*	160*		160*	160	
130*						130*

Heights are given in centimeters.

*Conjectured height.

sculpture in Late Archaic and Classical pediments exhibit mortises, at least for the central groups, they are probably a regular feature of installation. Major exceptions include the Gigantomachy from the Old Temple of Athena on the Athenian Acropolis.¹²⁷

We give here a summary of pedimental mortises from the Late Archaic to the Late Classical period. From the Temple of Apollo at Delphi (ca. 525 B.C.), kouros 7 from the Alkmaionid east pediment has a large mortise that still retains a broken marble tenon secured with lead.¹²⁸ From the west pediment of the Temple of Apollo Daphnephoros in Eretria (built after 507/6, and destroyed by the Persians 481/0) come three figures that have mortises in their backs: a crouching Amazon archer (now in the Montemartini Museum, Rome) and both central figures (Eretria Museum), Athena and the group of Theseus and Antiope, whose mortise also preserves some lead in the two side pour-channels.¹²⁹

The Early–Middle Classical pedimental figures later installed in the Temple of Apollo Sosianus in Rome (Montemartini Museum) have mortises: Herakles, “Theseus,” and Amazons A and B (Amazon B has a small original mortise in the left hip and a larger, later one in the right hip, implying a change in direction).¹³⁰ There are also a few original mortises in the Parthenon pedimental sculptures: in the neck of both west Athena L (according to cuttings in the tympanon) and east Hera (Acr. 2381); east K (the sitting “Leto”); west E, a boy (in the back of the two joining fragments of his torso, although there are no corresponding mortises in the tympanon).¹³¹ From the Temple of Hera at the Argive Heraion (420–410 B.C.) comes the fragment of a woman (ANM 1578), either an akroterion or pedimental figure.¹³²

127. Bookidis 1967, pp. 49–51, no. P12. The figures in the Gigantomachy were doweled through their plinths into the floor.

128. See La Coste-Messelière 1931, pp. 44–45, fig. 15; Bookidis 1967, pp. 68–72, no. P19.

129. For the pediment, see Bookidis 1967, pp. 113–116, no. P31; Touloupa 1983, pp. 32, 36, 70, pls. 2, 10; 1986.

Trianti (2002, p. 288) compares the mortise in the crouching Amazon to those in centaurs J (Eurytion) and N. For the central figures, see Touloupa 1986, pls. 63:2, 59:3, and 49:2, respectively.

130. La Rocca (1985, 1988) dates these pieces to ca. 430 on historical grounds; Younger (2003) compares their drapery with that of the Olym-

pia sculptures and raises the date to the second quarter of the 5th century.

131. Palagia 1998, pp. 21, 23, 44, 46, figs. 43, 82, 94.

132. Waldstein 1902–1905, vol. I, p. 153, fig. 80; vol. II, pl. 39; Eichler 1919, pp. 23–24, no. A2; Wood 1952; Kaltsas 2002, p. 116, no. 206.

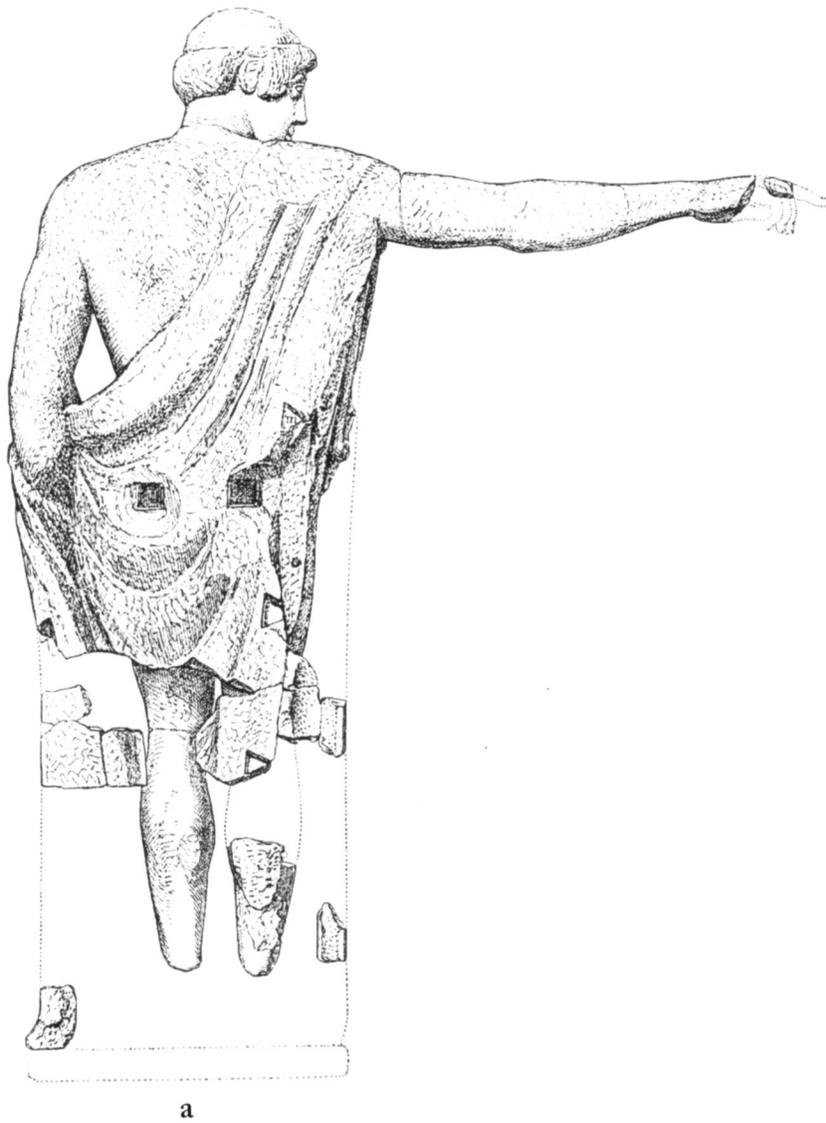


Figure 29. West pediment, Apollo (L), reverse: views of mortises in left and right buttocks. Drawing from Treu 1897, p. 69, fig. 110



Figure 30. Metope of Herakles and the Cretan bull, with ear-shaped hole visible in center of left side

From the early-4th-century temple at Mazi-Bozaitika come a male figure with a mortise lined in lead, and a female (called an akroterion) with a deep mortise, pour channel, and an iron nail or peg still in situ.¹³³ Most of the pedimental sculptures from the Temple of Asklepios at Epidauros (probably 375–370 or 371–366) also exhibit mortises of various sizes.¹³⁴

At Olympia, ear-shaped lifting holes (W. 5, L. 13 cm) are still noticeable in the center of the sides of five metopes (east 4 Atlas and 6 Augeias; and west 3 Birds, 4 Bull [Fig. 30], and 6 Amazon); the central side areas have not survived in the rest of the metopes.¹³⁵ Such ear-shaped lifting holes are, as far as we know, unique.¹³⁶ Their purpose, however, seems clear: to facilitate lifting the blocks with ropes and placing them into position. Since the holes would not have been completely covered by the flanges of the flanking triglyphs, the ropes could have been pulled out when the metopes had been lowered into place.

133. Patras Museum 100 and 108: Trianti 1986, pls. 76, upper right; 80, lower left; Ridgway 1997, pp. 30–34.

134. Yalouris (1992, p. 63) lists four figures with mortises, and we note mortises in three more figures: west figures 30, 31, and 35.

135. There may be traces of such a hole behind Geryon's shield.

136. If the holes also seemed ear-

shaped to the Greeks, they might have considered them like the lifting handles (*ἄτρα*, “ears”) of pots. Small circular lifting holes (Diam. ca. 2.5 cm) occur in the frieze from the Temple of Apollo at Bassai (*Bassai* II, pp. 52–57), in a metope from the Argive Heraion (Waldstein 1902–1905, vol. I, fig. 63; vol. II, pl. 30; Kaltsas 2002, p. 116, no. 207), and in a Greek metope now

in Rome (Dinsmoor 1956, pp. 411, 419; 1960; Broneer 1971, pp. 182–183). These holes might have secured the slab while it was being sculpted (Jenkins and Williams 1993, p. 67), much as we suggested that the clamps in the Olympia sculptures secured them in the workshop (see p. 54, above).

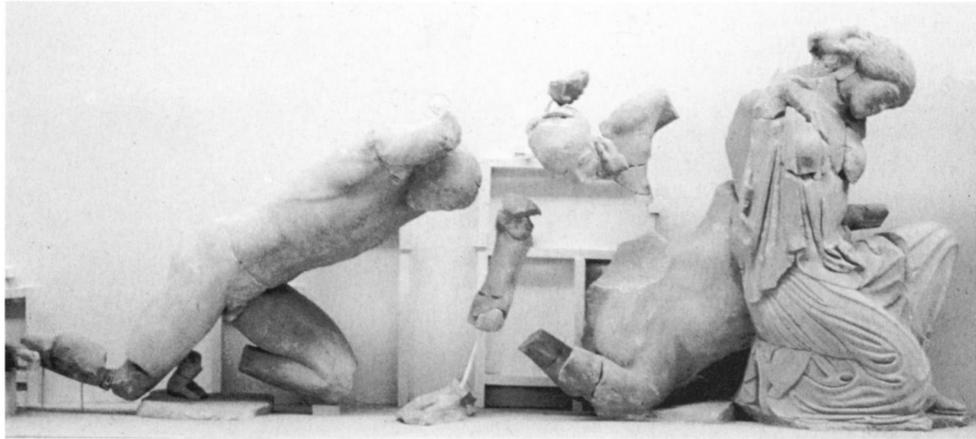


Figure 31. West pediment, blocks C (Lapith man) and DE (centaur and Lapith woman)

COMPOSITION AND PLACEMENT AT INSTALLATION

Both pediments of the Temple of Zeus are dominated by symmetry (see Fig. 1). It is obvious that whatever change is made in one half of either composition, another must also be made in the other half.

THE WEST PEDIMENT: A MISSING CENTAUR GROUP

The ingenious interlocking scheme for blocks RS and T (Figs. 12, 27:c) in the west pediment may have been duplicated for their counterpart, C and DE in the north angle (Fig. 31); like T, the Lapith man C is carved from a separate block¹³⁷ while centaur D and Lapith woman E are carved from one block, as are R and S. The present museum arrangement has placed a pair of clasped hands above the head of centaur D (Fig. 16),¹³⁸ and from the way the man C lunges forward, it is obvious that he must have stretched his arms toward the centaur, as does T. The museum's placement of these clasped hands implies, however, that C is stretching forth both his arms to bring his clasped hands down on the centaur's head—but these hands cannot be his. A right hand holds another hand fingers down, palm to palm. Experiments suggest that if these two hands belonged to Lapith C, his outstretched arms would have made this clasp too uncomfortable to maintain (Fig. 32:a). Instead, the position of these two hands makes better sense if two figures clench hands (Fig. 32:b), similar to the way in which centaur P (Biter) reaches up with his left hand to hold fast the right hand of Curly Q, who has encircled his right arm about the centaur's neck (Fig. 18).¹³⁹

If the two clenched hands above D belong to the west pediment but not to Lapith C, they imply the original presence of one more centaur-Lapith

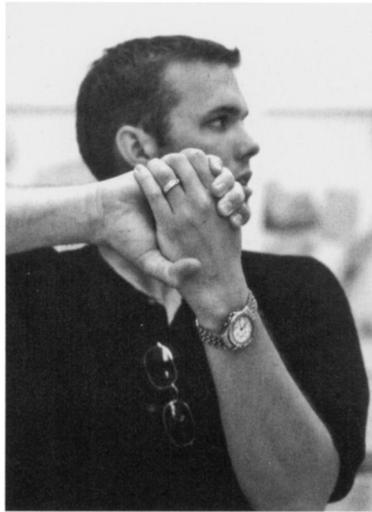
137. Lapith youth C is nude, but the display in the New Museum has restored a fragment of plinth with drapery and foot under C's broken left ankle (it does not join). Since there are no other signs of C having been draped, scholars have had to postulate a thor-

ough later recarving of the figure (Ridgway 1970, p. 22; Trianti 2002, p. 284; Trianti says she sees some folds lightly modeled on the reverse of his left leg; we do not see these). Since the plinth does not join and must be set at a different angle than that implied by

the surviving plinth under C's left knee (Ashmole, Yalouris, and Frantz 1967, pl. 72), we do not think it belongs to this figure.

138. Treu 1897, p. 84, fig. 139.

139. Ashmole, Yalouris, and Frantz 1967, p. 19, pl. 83.



a



b

Figure 32. (a) John Lazar demonstrates how one person would clasp both hands; (b) Kristen Stenvall and Laura Brett demonstrate how two people would clasp hands



a



b

Figure 33. (a) West pediment, Theseus (M) and block NO (centaur and Lapith woman); (b) mortise and cannibalized limb fragment in Lapith woman's shoulder



Figure 34. West pediment, chest of centaur (D). Treu 1897, p. 86, fig. 146

group, since most hands of the other figures in the west pediment are accounted for.¹⁴⁰ This in turn implies not only one lost group but also a second because of the principle of pedimental symmetry. It is possible that another piece of these lost groups is located now in the large mortise in Lapith woman O's shoulder (Fig. 33:b).¹⁴¹ This piece consists of the rounded and draped part of a limb, probably an arm from its relatively small size. The deep mortise was drilled twice to insert this piece of cannibalized sculpture, and the patch must therefore postdate the original installation.

If Lapith man C did not clasp his hands to bring them down onto centaur D's head, then he was probably doing what T is doing, stretching forth his right arm to stab down at the centaur and stretching forth his left arm to grasp the centaur (probably his head; T's left hand grabbed some lower part of the centaur). Lapith man C has, at the moment, no left arm at all (Fig. 27:b); perhaps he never did, or perhaps it was removed in a post-installation repair and the surface pointed at the armpit. The right side of centaur D's torso, however, survives (Fig. 34), but it has not been included in any of the museum reconstructions.¹⁴² In the armpit is a large drilled hole (Diam. ca. 5 cm), which Treu suggests supported a metal attachment. If C were stabbing him in his right armpit, then centaur D's upper body has currently been restored too low.

THE WEST PEDIMENT: APOLLO AND THE FLANKING CENTAURS

Another ingenious compositional device in the west pediment involves Apollo, his right arm, and centaur N. On technical grounds, Apollo is a tour de force since this standing figure with outstretched right arm was carved out of a single block of marble (Figs. 2, 13:a, 29:a).¹⁴³ When Apollo was installed in the pediment, the outstretched arm could not have been left

140. Extant are Q's left hand, M's left and right, K's left and right, T's left.

141. An extant clenched right fist (a Lapith's?) may also belong (as documented in the photographs in the archives of the Deutsches Archäologisches

Institut, Athens, negs. 2112, 2113); its reverse is unfinished, perhaps implying a location in the south half of the pediment.

142. Treu 1897, p. 86, fig. 146.

143. Present dimensions: H. ca.

3.10, W. 2.20, and D. 0.30 m; the quarried block must have been even larger, over 4 m³. Herrmann (2000, pp. 381, 389) estimates that it must have weighed 11 metric tons.

unsupported; if a solid cylinder, it would weigh about 55 kg (120 lb).¹⁴⁴ As noted above (p. 67), Apollo's hand therefore had to have rested on another figure, and the only candidates, at that height (2.40 m), would be either the head of figure K (Peirithoos), who would then seem to be lending his head for this purpose (Fig. 2), or, better, the head of centaur N (Fig. 13:a).¹⁴⁵ This centaur imitates Apollo's pose by stretching his own right arm back over his horse body to join his upraised tail and be supported by it (Figs. 13:b, 33:a).¹⁴⁶ If N is brought up next to Apollo's right side and has his left forehoof raised on the ledge of Apollo's altar (cf. Figs. 28:b, 29:a), as the slight difference in the heights of the centaur's mortises implies (see above, p. 76), and as the absence of a plinth below the hoof suggests, that would raise the statue group NO enough (10 cm) to provide a ledge on which Apollo's right hand might rest. His hand would then rest on the cupped right hand of Lapith woman O and the shelf at the top of the head of centaur N (see the Old Museum installation, Fig. 13:a).¹⁴⁷

If this reconstruction is correct, then Apollo's gesture is best read both as indicating that the centaur should get off his altar and as helping the Lapith woman push the centaur away.¹⁴⁸

THE EAST PEDIMENT: HORSES

There are two sets of horses, D in the south half of the east pediment (Figs. 35, 39) and M in the north (Figs. 37, 38). Each set is composed of two blocks (see Fig. 35), one depicting a single horse and the other presenting a conflation of three horses with a single body, but with three heads that fan out separately.

The four horses of the Greek quadriga divide into two pairs, each harnessed differently (Fig. 36).¹⁴⁹ On the interior, two "pole" horses flank the draft pole and are yoked to it; on the outside, two "outrigger" horses flank the pole horses and are loosely attached to them. The charioteer has four separate sets of reins, two for the pole horses that convey forward and backward commands as well as speed, and two trace reins that lead to the outriggers to convey direction and turning. In the Olympia sculptures, each large block depicting the three conflated horses therefore should depict the two interior pole horses and one outrigger, while the single horse block should depict the second outrigger. For convenience, we shall term these two blocks the "team" block and the "outrigger" block, respectively.¹⁵⁰

For the two team blocks Treu estimates a total height, from plinth to head, of 2.30 m, and, to the withers, 1.75 m; the two outrigger blocks are

144. The arm is a full meter long from armpit to palm and has an approximate mean radius of 8 cm, thus a volume ($\pi r^2 h$: $3.14159 \times 8^2 \times 100$ cm) of 20,106 cc³, and, with an approximate specific gravity of 2.73 gr/cc³ for marble, a weight of almost 55 kg (120 lb).

145. Treu 1897, pp. 69, 75, 78, figs. 110, 119, 121.

146. Trianti 2002, p. 289, fig. 30.

147. Ashmole, Yalouris, and Frantz

1967, pl. 101.

148. For other interpretations, see Brendel 1943, pp. 48–49; Cahen (1937) relates the pose of Peirithoos on the column krater Florence 3997 (*ARV*² 541.1, no. 1648) by the Florence Painter (460s b.c.) to Apollo, and Woodward (1974) reconstructs the Theseion painting with an Apollo-like figure off to the side (her E, pl. XV).

149. For our discussion of quadriga

harnessing, we rely on Crowel 1992, esp. pp. 43–45; we are grateful for his permission to reproduce his fig. 1.

150. Team blocks, preserved dimensions: D (L. chest to base of tail, ca. 2.20; H. chest to withers, 0.70; Th. 0.60 m); M (L. ca. 2.00; H. 0.70; Th. 0.60 m). Outrigger blocks, preserved dimensions: D (L. est. 1.76; H. 0.70; Th. average 0.44 m); M (L. ca. 1.88+; H. 0.70; Th. 0.45 m).

Figure 35. East pediment, attendant (B) sits in front of south horses (D), outrigger at left, team block at right



slightly smaller. There are multiple cuttings and small mortises on the team blocks for various metal attachments, mostly for bridles and chest straps.¹⁵¹ The reverse of each block of horses was pointed flat and received two square mortises (each ca. 10 × 10, D. ca. 13–15 cm). In the outrigger blocks (Figs. 37:b, 38:a), the mortises lie flush with the pointed surface and are placed 84 and 90 cm apart (D and M, respectively);¹⁵² in the team blocks (Figs. 37:a, 38:b), the mortises are placed 1.20 and 1.01 m apart, and are countersunk in raised square bosses (ca. 32 × 32 cm; H. 2 cm).¹⁵³

To anticipate ourselves, we believe that the traditional arrangement is wrong: the separate outrigger block should not be displayed before (i.e., on the near side of) the team block, thus obscuring it, but should be separated and go in back of the team block (i.e., to the left [south] or right [north] of the team block).

Treu felt the dimensions of the pediment were too small (L. 26.40, H. 3.30 now corrected to L. 26.38 and H. 3.47 m) to allow the two blocks of horses in each set to be separated, and thus he felt compelled to combine them, the outrigger block before (i.e., obscuring) the team block.¹⁵⁴ Since Treu's publication, most interpretations have accepted this arrangement (including the Old and New Museum installations). In this interpretation, the two blocks thus present each team as completely harnessed, to which the German excavators supplied a now-lost chariot, presumably of bronze, in back of each.¹⁵⁵ To secure the outrigger block tightly against the flank of the team block, Treu envisioned (but did not illustrate) an iron bracket that led from the tympanon wall to the mortise in the reverse of the outriggers' hindquarters, curving over the back of the team block and resting there in a bedding near their tail.¹⁵⁶

151. Treu 1897, pp. 54–58, figs. 74 (also Six 1889, p. 114), 76, 77, 79, 81–83.

152. Treu 1897, p. 54, fig. 73 (D); p. 57, fig. 80 (M).

153. Treu 1897, p. 54, fig. 74 (D); p. 58, fig. 82 (M).

154. Treu 1897, pp. 115–118.

155. Treu 1897, pl. IB. Säflund (1970, p. 25) claims that Curtius (1897) does not include chariots, but he does consider them (see pl. IB), only to reject them. Ashmole, Yalouris, and

Frantz (1967) do not include chariots.

156. Treu 1897, p. 53 (bedding identified at "e" in figs. 74 and 82). Treu's reconstruction provides no function for the mortises in the outriggers' shoulder.

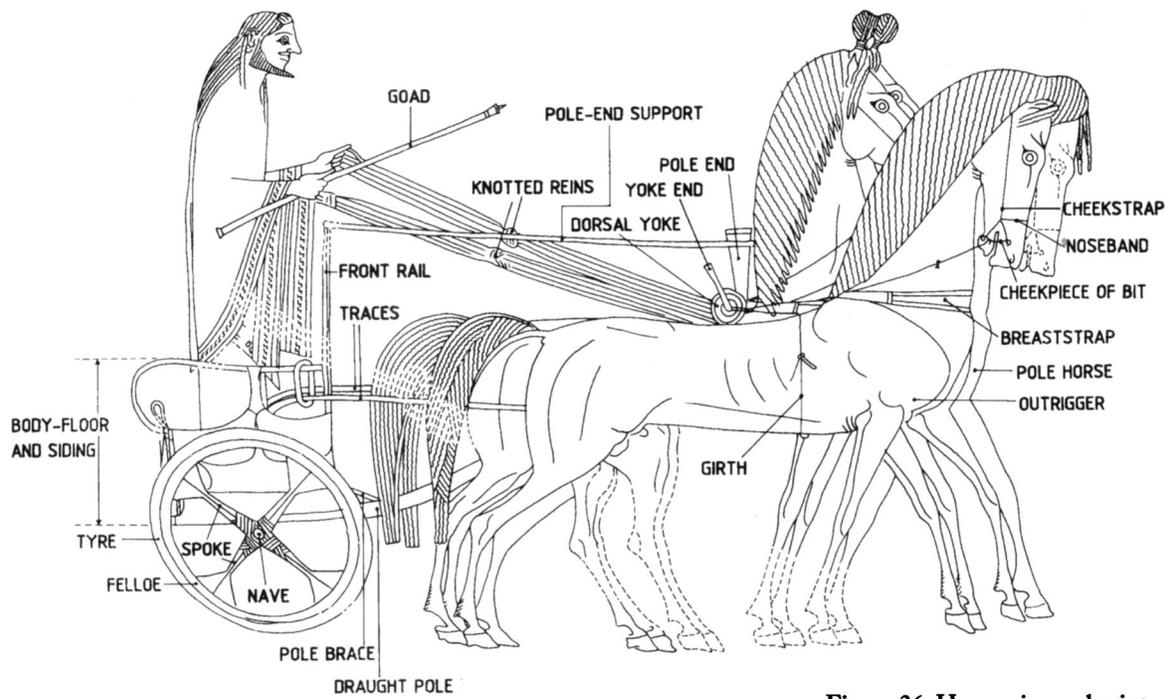


Figure 36. Harnessing a chariot.
Crouwel 1992, p. 14, fig. 1

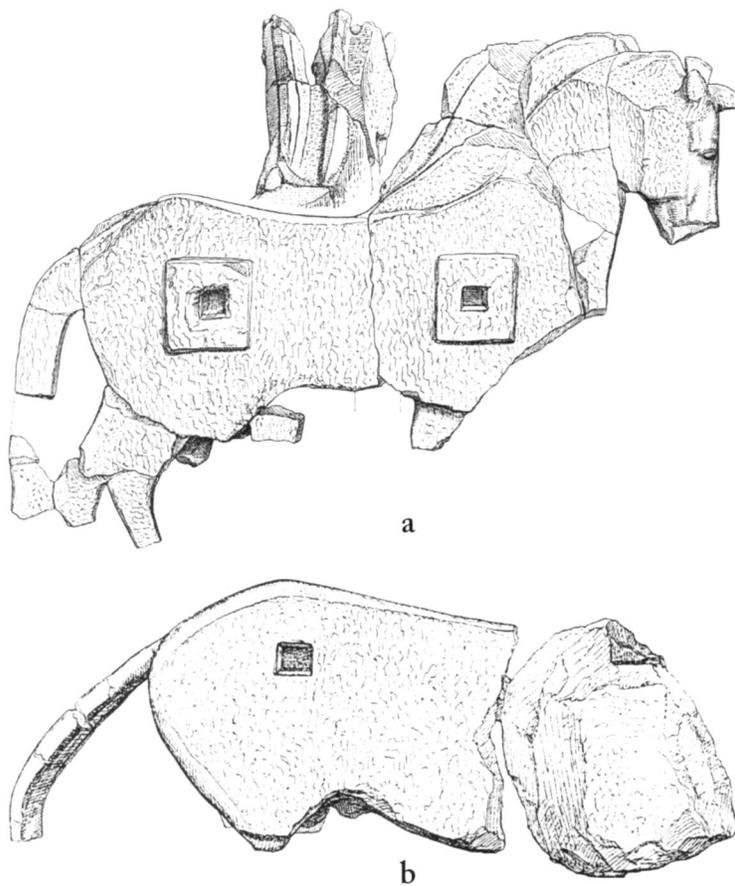


Figure 37. East pediment, north horses (M), reverses: (a) team; (b) outrigger. Treu 1897, pp. 57, 58, figs. 80, 82

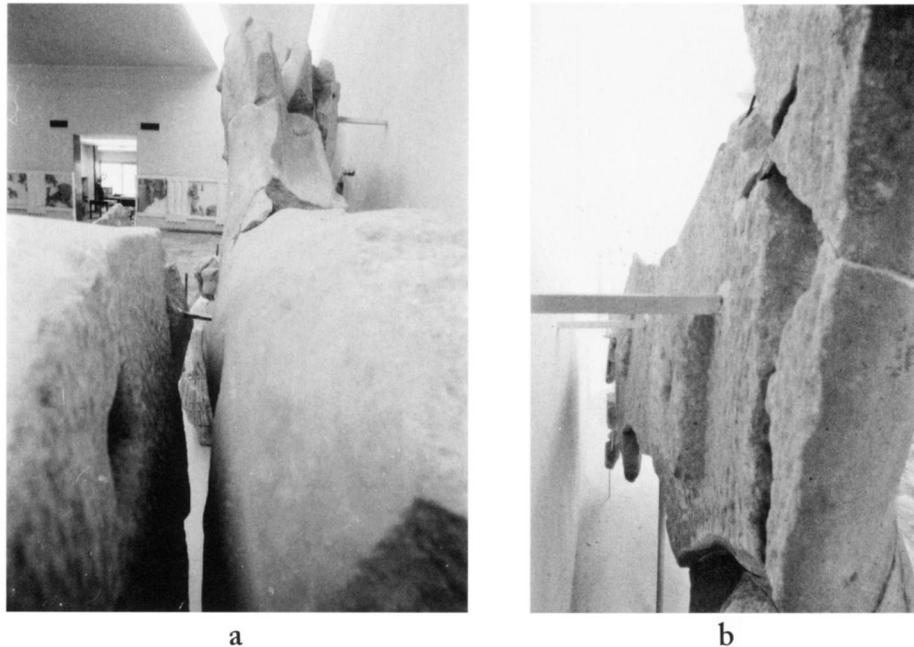


Figure 38. East pediment, north horses (M): (a) outrigger reverse at left (team obverse at right); (b) team reverse

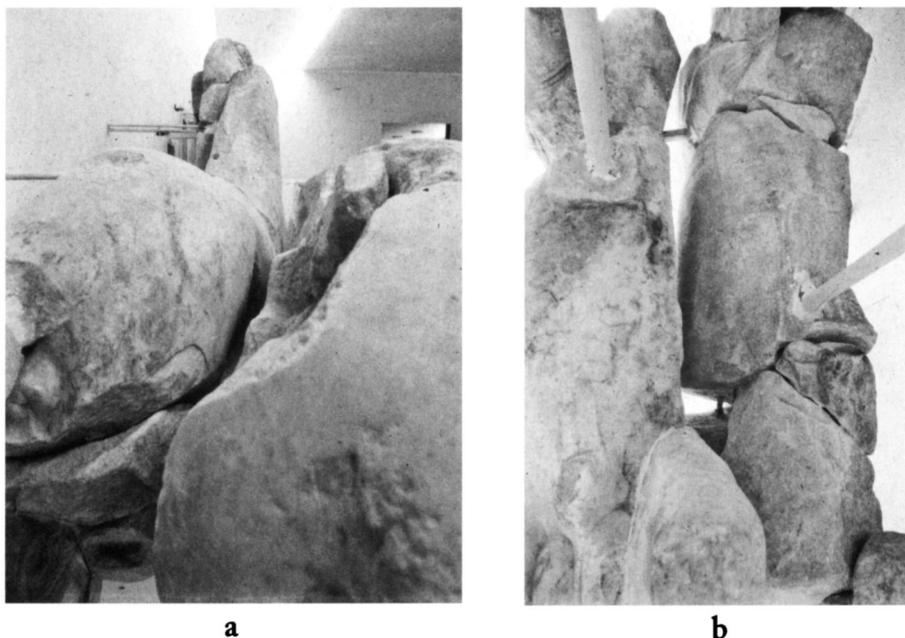
We dispute this arrangement. First, if the two horse blocks are put side by side, their combined thickness is greater than 1.05 m.¹⁵⁷ Even with a conventional depth of the pedimental shelf calculated at 1.00 m, the weight of the horses would be spread over the entire width of the unsupported pediment floor; no other group does this. With Dörpfeld's calculated depth of the pedimental shelf as no less than 0.84 m, the total thickness of the horses could overhang the pediment shelf by as much as 0.20 m, half the thickness of the outrigger blocks.¹⁵⁸ Second, the entire weight of the outrigger block would then be supported in front by the support pillar under the chest and in back by the bracket over the team block; these supports seem insufficient. Third, finding no purchase against the modeled flank of the team block, the flat, pointed reverse of the outrigger block would have to have rubbed against the team block's flank, and we saw no evidence of any such abrasion. And fourth, such an arrangement would have obviated the need for a mortise carved in the outriggers' reverse at their shoulder.

But even if weight, overhang, abrasion, and a superfluous mortise of this double horse block were not problematic, there is another, and more compelling, reason for separating the horse blocks. In the Olympia New Museum visitors can appreciate the full modeling of the obverse of the outrigger blocks since these confront the spectator, but what most visitors do not see is the full modeling of the team blocks on their obverse (Fig. 39)

157. Säffund (1970) does not comment on this problem; her reconstruction drawing (p. 94, fig. 54) derives from Bulle 1939, pp. 141–142, fig. 2. It contains several errors: the team block is thinner than the outrigger block, the width of the pediment is the same as the combined thickness of the horses,

and it omits the iron braces supporting the outrigger block.

158. South horses D: outrigger Th. 0.46 m (Treu 1897, p. 54), team Th. 0.60 m (p. 56). North horses M: outrigger Th. 0.45 m (Treu 1897, p. 57), team Th. 0.60 m (p. 59).



because the outriggers block these from view. This full modeling is clear, however, in the original publication's photographs,¹⁵⁹ and visitors to the museum can also appreciate some of this modeling but only if they crouch low and look under the bellies of the outrigger horses to the obscured obverse flanks of the team horses.

Over a century ago, Jan Six noted the finished modeling of the team blocks, and he also felt this finish indicated that these flanks were meant to be seen.¹⁶⁰ Treu counters his argument.¹⁶¹ While he notes the detailed modeling, he still believes the outriggers hid the team horses, and he explains the finished modeling of their flanks thus: "Die künstlerische Freude an dem Begonnenen mag dann den Bildhauer dazu verlockt haben, weiter zu gehen als der unmittelbare Zweck erforderte" ("An artistic joy at the beginning may have driven the sculptor on further than his immediate goal warranted"). Considering that it takes a sculptor nearly a year to complete a life-size figure, finishing the modeling of one horse flank may have taken several months; finishing two flanks may have taken a half-year. We doubt an "artistic joy" could have been sustained so long, especially since no other Olympia sculpture (except for the nude attendant B in the east pediment) presents a surface hidden from view that is fully modeled.¹⁶²

Instead, all other finished surfaces were displayed as visible; thus, we interpret the fully modeled obverse surfaces of the team blocks as also being visible, and we propose, like Six, to place the outrigger blocks in back of

Figure 39. East pediment, south horses (D): (a) team obverse (outrigger at right); (b) bodies as seen from below (outrigger at left, team at right)

159. Curtius, Adler, and Hirschfeld 1876–1881, vol. II, pl. VIII.

160. Six 1889, pp. 102–104, followed by Sauer 1891a, p. 10, fig. 1.

161. Treu 1897, p. 55. Bulle (1939, pp. 161–164, esp. 162) claimed that the modeling of the team blocks was a

pentimento, an abandoned study, thus explaining why it should be hidden.

162. There are architectural sculptures elsewhere, however, that do present hidden but finished work: the Aigina and Parthenon sculptures (Treu 1897, p. 55), and the Gigantomachy

from the Old Temple of Athena on the Athenian Acropolis (Ridgway 1993, pp. 205–210). The modern visitor to the Acropolis Museum can even see the scales painted on the back of Athena's aegis (Brinkmann 2003, no. 68, fig. 68:1).



Figure 40. Black-figure amphora by the Antimenes Painter. British Museum B304. Beazley 1927, pl. XIII

the team (see Fig. 41). Several vase paintings indicate this moment, when the pole horses have been yoked and harnessed and when the far outrigger is being brought up to finish the yoking (e.g., Fig. 40).¹⁶³ Another monument that depicts this moment is the Delphi Charioteer, which has been reconstructed as presenting Polyzelos in the quadriga with his attendant and outrigger in front.¹⁶⁴

Greek horses were smaller than the modern Arabian, less than 1.45 m at their withers,¹⁶⁵ approximately level with a man's chest, as is depicted in several vase paintings. If the team horse block is thus placed so that the withers are approximately level with the torsos of Oinomaos and Pelops, their mortises then align horizontally with those in the men's buttocks and the women's backs. Such an alignment makes the heads of the team blocks about level with the heads of the women in front of them. Horizontally, the heads should be near the women's outside shoulders, making their mortises at least 1.50 m apart. For the outrigger blocks, it is probable too that their mortises aligned horizontally with those of the team horses (30 cm higher and they would have been above the raking cornice, and if 30 cm lower, they would have been too close to the pediment floor).

With the four blocks of horses now separated, it makes sense that each of the four attendants was in charge of one set of horses. Since the sitting youth E probably faced forward and the kneeling nude youth B is completely finished all around and could, therefore, have faced forward, it

163. Wrede 1916, esp. pp. 335–354, pls. 28–34; Moore 1986, p. 361. Several vase paintings, especially black-figure, show this separate harnessing: e.g., British Museum B304 by the Antimenes Painter (Fig. 40; *ABV* 266,

no. 4; *Paralipomena* 117, no. 4) and B305 (*CVA*, British Museum 6 [Great Britain 8], pl. 76:1, 2); Boston, Museum of Fine Arts 98.919 by the Rycroft Painter (*CVA*, Boston 14 [USA 14], pl. 14:1, 2); and Berlin 1897 by

Psiax (*ABV* 293, no. 8; Crowel 1992, pl. 13:1).

164. Hampe 1941, pp. 180–190, figs. 62, 64, 65.

165. Crowel 1992, p. 24.

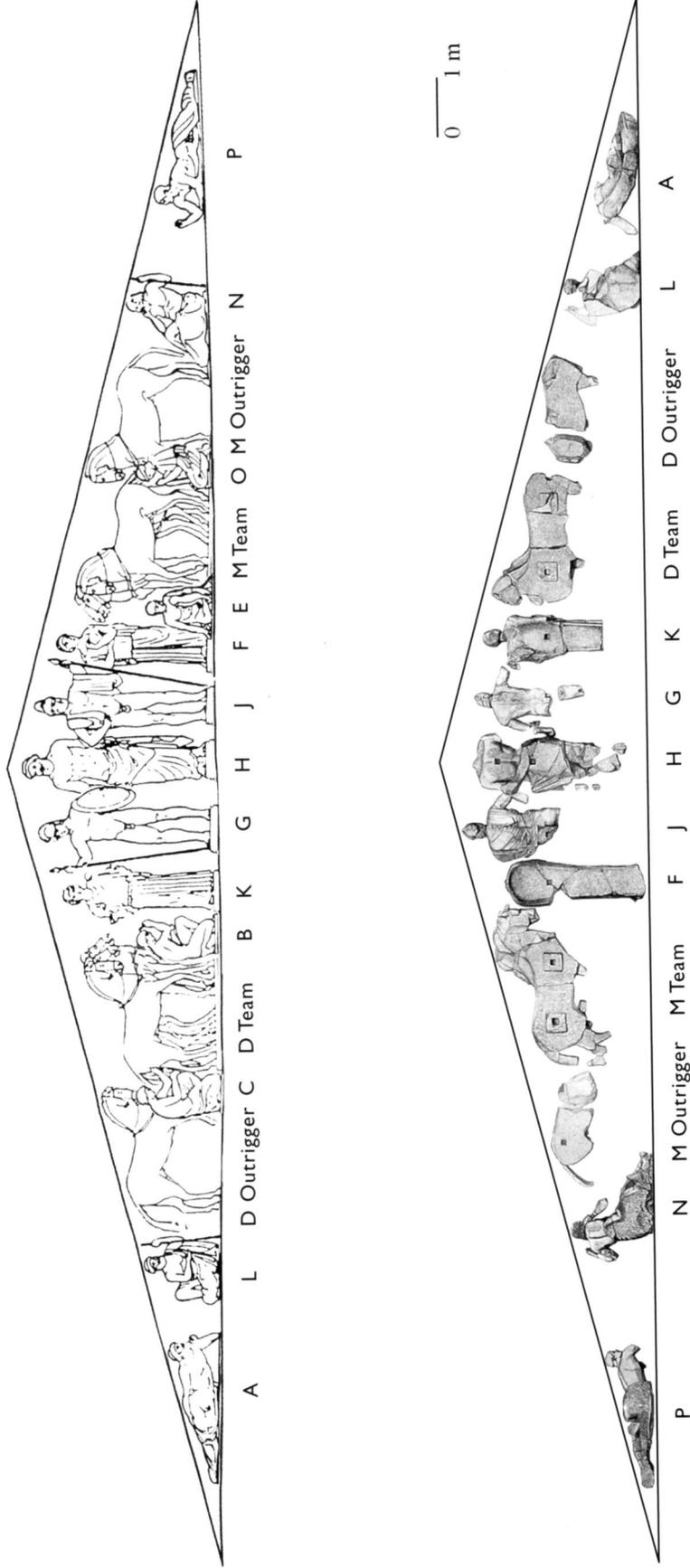


Figure 41. East pediment, front and back, authors' reconstruction. Based on drawings from Treu 1897, pls. XVIII-XXI, and after Stewart 1990, p. 262

is tempting to place these figures in charge of the two team blocks, between them and the women. Since the right side of the chitonized attendant (O) and the left side of the kneeling attendant in a mantle (C) are unfinished, the two figures probably kneeled in front of the outriggers facing in to the center, C in the south half of the pediment and O in the north half.¹⁶⁶

Our reconstruction of the east pediment (Fig. 41) may make it seem fairly crowded, but the west pediment is similarly crowded. Pediments on other early temples were also full of figures, including many horses, as if responding to the standard notion that horses indicated elite status.¹⁶⁷

POST-INSTALLATION ISSUES

THE RECLINING WOMEN OF THE WEST PEDIMENT

The four reclining women of the west pediment have perplexed many scholars (Figs. 7, 8, 27:a, 42). Figures A and V, and B and U, were sculpted as pendants; it is generally agreed that V is of Parian marble, and therefore Classical, but A is a later and Pentelic copy of a presumed original Parian version. Figures B and U are also made of Pentelic marble and are also post-Classical.¹⁶⁸ There are two additional minor issues: V's right arm was shattered in antiquity and replaced with a Pentelic arm (although the Parian hand was reattached), and a Parian "cushion" (Figs. 27:a, 42) was restored to U (and a modern one is therefore restored to B) to raise them higher so they could be seen; these two figures are also mortised in back (Table 4).¹⁶⁹

The outer two women are probably young: A certainly is, and presumably V also (her head is lost). The inner two women B and U seem older.¹⁷⁰ Woman A wears a snood that covers her entire head (perhaps misunderstanding the unfinished hair in the rest of the pediment),¹⁷¹ while wisps of hair escape in front of the ears. B and U's hair is more detailed, B having flat but sharply defined curls, while U's curls are only vaguely defined.

166. Stewart 1990, pl. 262 (O is illustrated as Oinomaos's charioteer), p. 145 (O is called a "maid"). Traditionally, O has been identified as a girl attendant on Hippodameia, tying her *nymphides* (Säflund 1970, pp. 104–107, 145). This interpretation usually assumes another: that Pelops and Hippodameia are on our right of Zeus and that, as in the mythological accounts, Pelops does not need a charioteer; he drives the chariot with Hippodameia as his passenger.

167. For other pediments and friezes featuring horses, see Prinias, temple A: continuous frieze of equestrians; Selinus, temple C: chariot of Apollo in a metope; Delphi, Siphnian Treasury: east frieze, north half; Delphi, Temple of Apollo: frontal quadriga in

center; and the Athenian Acropolis: small Archaic pediment with frontal quadriga in center; Old Temple of Athena pediment with frontal quadriga in center; and, of course, the Parthenon: west pediment with rearing horses flanking Athena and Poseidon, east pediment with chariots of Sun and Moon, most of the frieze, and the horse bodies in the south Centauro-machy metopes.

168. The marble of the pedimental sculptures has never been tested scientifically, to our knowledge. Moreover, the German excavators came to their conclusion slowly. At first, only figure B's marble was identified as Pentelic (Curtius, Adler, and Hirschfeld 1876–1881, vol. II, p. 11). Soon, however, both B and U were identified as the

only figures of Pentelic marble, the rest (including A and V) being considered Parian (Curtius, Adler, and Hirschfeld 1876–1881, vol. III, p. 22; the identification was made with the help of an Athenian marble worker). Furtwängler (1880, p. 41), however, thought A, B, and U were Pentelic, and it is his identification that prevails (Treu 1897, p. 93).

169. Curtius, Adler, and Hirschfeld 1876–1881, vol. III, p. 21.

170. Ashmole, Yalouris, and Frantz 1967, pls. 62–70.

171. West Lapith woman A: Ashmole, Yalouris, and Frantz 1967, pls. 62, 63; Herrmann 1972, pl. 20; Yalouris and Yalouris 1987, p. 128, color fig.



Figure 42. West pediment, south reclining women (U, V)

Ashmole's elaborate reconstruction of the chronology and purpose of these four reclining women starts with Parian figure V, whom he identifies as a "serving woman."¹⁷² Ashmole says nothing about its date (he notes the lack of her head, which may imply that he is in doubt). The pendant figure, Pentelic A, must be a replacement for an original "so much damaged that it could not be repaired" (presumably in the 4th or 2nd century B.C.; Ashmole identifies U's Parian "cushion" as a recut fragment of the original Parian figure A). He states that Pentelic B "certainly seems to hark back" to the original Early Classical style, but U is Hellenistic (2nd century B.C.). Hellenistic also is the Pentelic repair to V's right arm, added at the same time as the bronze additions to the east pediment (e.g., Pelops's cuirass and helmet). Dinsmoor argues for a 2nd-century date for all four figures.¹⁷³

Yalouris's chronology of these figures differs.¹⁷⁴ Figure A is 4th century, and he gives details to support that date, including stylistic comparisons with the Parian replacement lion-head rainspouts. Since V's right arm "was shattered, probably by the collapse of the raking cornice" in the 4th century and repaired with the Pentelic replacement, it too should be dated to the 4th century.¹⁷⁵ Figures B and U, "apparently contemporary with one another but by different hands, were made at a later time," in the 1st century, contemporary with lion-head rainspouts E3 or E4.¹⁷⁶ Yalouris's chronology is easier to follow than Ashmole's, but Ashmole's idea that a later Pentelic A replaced a lost Parian A may also be correct.

To us it seems possible that V and, therefore, the original for A could be early-5th-century originals or 4th-century figures that copied the originals closely.¹⁷⁷ Compare A's flat ribbons of drapery with those of figures in the east pediment (e.g., Hippodameia K, attendant O), and the odd flip of drapery at the hip of both A and V with that of Alpheios.¹⁷⁸

Since the raking line of C's body follows closely the line of the raking cornice, the angle of the pediment could not have been very far away; in fact, the original of A would have to have overlapped C's lower legs.

172. Ashmole, Yalouris, and Frantz 1967, pp. 21–22. Iconographically, the reclining women should be guests at the wedding, but their inferior status has a long history. Loeschke (1887) gives interpretations that were then being considered: slaves (Treu) or forest women come to search for their pillows taken by young nymphs (Curtius). Brunn (1876) thought the older women B and U exhibited Semitic features.

173. Dinsmoor 1941, pp. 399–401.

174. See Ashmole, Yalouris, and Frantz 1967, p. 179, for the passages quoted below.

175. But if Parian marble is being used to replace the rainspouts, why would Pentelic be used to replace V's right arm at this time?

176. Ashmole, Yalouris, and Frantz 1967, fig. 10.

177. Trianti 2002, p. 292, fig. 46, notes the careful finish to V's underside; replacement A's underside (fig. 47) is carelessly finished.

178. Ashmole, Yalouris, and Frantz 1967, pls. 2 (Alpheios), 19 (K), 22–24 (O), 63 (A), 65 (V).

If B and U are later additions, they must have made up for lost figures or groups (centaurs attacking Lapiths) that today may be represented by the clasped hands now associated with C and the draped marble insert in Lapith O's shoulder. If A (original) and V are Classical (original or classicizing replacements), the additions of B and U might have occurred in the 2nd century.

Since U's "cushion" (Figs. 27:a, 42) is of Parian marble and U is of Pentelic marble, and since U's forearms do not fit in the cushion's trough (W. across the arms 50 cm; W. cushion interior trough 36 cm, exterior 40 cm), it is unlikely that the object is a cushion or that it even belongs to the pediment. Without a cushion for U, there should be no cushion for B, and consequently neither woman was artificially raised higher than their outstretched arms would have allowed (30 or 40 cm, according to the mortises). Consequently, both pairs of women, A and V, and B and U, are approximately the same height (H. A 80 cm, and to V's shoulder 56 cm; B 70 cm and U 80 cm) and in the same pose.

This observation raises the possibility that the two pairs were not in the pediment at the same time. Since A was found in the west water channel along with the fresh heads (see below, pp. 95–96), and V's torso was also found in or alongside the west water channel but farther to the south, it is likely that A and V were removed from the pediment in the Late Hellenistic or Early Roman period (when the west water channel went out of use), and this implies that B and U replaced A and V at this time.¹⁷⁹

The history of A/V and B/U thus becomes more complicated: A (original) and V are created no later than the mid-4th century, perhaps to make up for two lost figures in the west pediment. Later, A (original) is lost and replaced by A, and V is damaged and repaired; they are both lost in the Late Hellenistic or Early Roman period, deposited in the west water channel, and replaced by B and U.

THE 2ND-CENTURY B.C. EARTHQUAKE

Dinsmoor noted extensive repairs to the fabric of the temple and identified them as the result of a devastating earthquake in the 2nd century B.C.¹⁸⁰ The repairs include the southwest corner triglyph, clamped on its south side (Fig. 9), and lewis holes in roughly half the column drums of the facades (Fig. 43). In the triglyph there were two clamps, one above the other, that secured it to the adjacent metope on the east (not, however, the one set up next to it on site).

The lewis holes imply a late maneuvering of the column drums, presumably to dismantle them and place them into position. From the diameter of the column drums with lewis holes, Dinsmoor could determine the position of these drums within the columns, and he came to the conclusion that both facade colonnades had been partly dismantled: most, if not all, drums in the first three columns at the north end of the east front and at the south end of the west front were removed, and the columns next to them were dismantled in a stepwise fashion.

If the northeast and southwest columns and parts of the adjacent columns were dismantled, the roof and ceilings there, Paionios's original

179. Fragments of figures B and U were found scattered in front of the west facade of the temple (Treu 1897, pp. 107, 113, foldout plan after p. 136).

180. Dinsmoor 1941.



Figure 43. Column drums with lewis holes

akroteria (Pausanias [5.10.4] saw only gilded cauldrons), the pedimental sculptures, and probably the metopes would all have had to be removed. The pedimental sculptures at the northeast would be at least Kladeos P, which shows little damage, and at the southwest figures V, RS, and T. We have discussed V, whose right arm was shattered; and the front leg of centaur S was broken and received a butterfly clamp (Fig. 12:b). The southwest metopes would be the highly fragmentary Lion and Hydra metopes. A butterfly clamp in the hindquarters of the lion once joined the Olympia fragment to the larger piece now in the Louvre; the lion itself may have completely broken off the metope (it is a separate piece now).

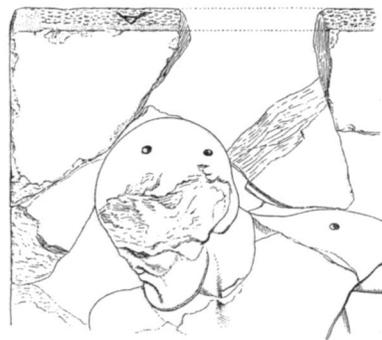
It was probably at this time, therefore, that the three northern metopes on the east side received letters on their top edge to ensure their proper replacement.¹⁸¹ Incised into the top of the Augeias metope (Fig. 44:a) is an A near its left edge (above Herakles' head) while a Γ was incised on the top of the Atlas metope (Fig. 44:b) near its right edge (above Atlas's head).¹⁸² While the style of the letter forms looks Hellenistic, the letters must refer to the replacing of these metopes in the first (Augeias) and third (Atlas) positions from the north end, while the placement of the letters (near their inner edges, near the right edge of the Atlas metope and near the left edge of the Augeias metope) implies something peculiar about the metope between them. This was the Kerberos metope (Fig. 11), which Pausanias omits from his description. Fragments of the metope (Herakles' feet, Kerberos's muzzle) were found fallen in front of the porch;¹⁸³ Herakles' head and arms were found farther out, built into Byzantine structures to the east.

Since other fragments of metopes that Pausanias describes were found in front of the porch where they had fallen, the Kerberos metope probably had also been replaced, though the fact that only the lower parts of the metope were found in front of the porch may imply that only the lower part of the metope was replaced. If so, the position of the inscribed letters on the flanking metopes, toward their inner edges and not in the center, may indicate that there was no top edge of the Kerberos metope to receive an incised B. If only the lower part of the metope had been replaced, that may explain why Pausanias omitted it: the dog head was too low for him to recognize the subject.

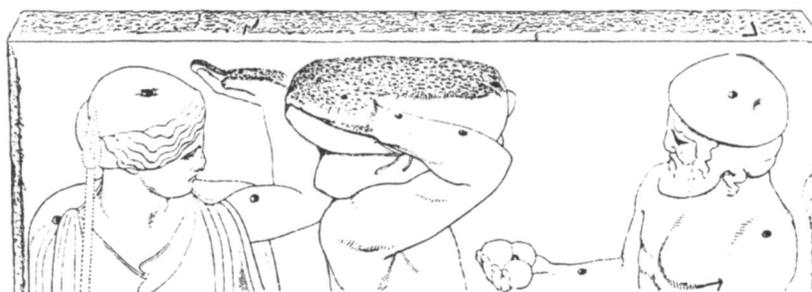
181. See also the rectangular mortise near the top of the Augeias metope: Treu 1897, p. 178, fig. 209. Treu also reports traces of lead to secure a tenon.

182. Treu 1897, p. 175, fig. 205 (Atlas) and p. 177, fig. 207 (Augeias).

183. Treu 1897, pp. 147–148, fig. 172.



a



b

Figure 44. Metope tops: (a) Augeias; (b) Atlas. Treu 1897, pp. 174, 177, figs. 205, 207

It may also be at this time that the figures in the metopes received drilled holes in their upper surfaces to support “meniskoi” (Fig. 44), metal attachments designed to keep birds from perching there and soiling the sculptures.¹⁸⁴ Since one of these holes occurs in the rasped area of Herakles’ hand in the Atlas metope, it must postdate installation, for the upper surface of his hand, of Athena’s helping hand, and of the cushion he holds above his head are all rasped flat to provide a ledge (L. 30 cm, plus Athena’s hand, a further L. 10 cm; W. 12 cm, plus Herakles’ hand, a further W. 8 cm) for an additional marble piece representing the “cosmos” that Herakles supports.¹⁸⁵

FRESH HEADS

While several heads, especially those from the west pediment, are battered,¹⁸⁶ as if they had rolled around on the ground for some time before being buried, others are fresh. The heads of Deidameia H (Fig. 4) and the old reclining woman B (Fig. 7, right) were found just in front of the central intercolumniation where they undoubtedly fell in the final collapse of the building; similarly, B’s head was found “towards the top of the lowest stratum of remains.”¹⁸⁷ It may also have fallen there late.

184. Maxmin 1975; Ridgway 1990. See Treu 1897, pp. 154, 162, 165, 166, 169, 174, 177, 178, figs. 176 (Lion), 185 (Birds), 186 (Bull), 189 and 190 (Amazon), 196 (Mares), 205 (Atlas), and 207 and 209 (Augeias).

185. For how this cosmos might

have looked and functioned, see the computer restoration by Bryant (2006), who restores a star-studded blue globe resting in a nest of clouds. (West U’s cushion is too large, however, to be this nest.)

186. From the west pediment, the

heads of the lunging Lapith C, centaur J, Peirithoos K, Lapith woman R (see n. 104, above), and the old reclining woman U; and from the east pediment, the head of L (south seer, especially battered).

187. Treu 1897, p. 107.



Figure 45. West water channel (A)

The fresh heads of the young reclining woman A (Fig. 7, left), Apollo L (Fig. 15), Theseus M (Fig. 33:a), and Curly Q (Figs. 14, 18) were found together,¹⁸⁸ strung out alongside, or possibly in, the west water channel, perhaps along with A's body (i.e., the entire figure A might have been there) and the right calf of the lunging Lapith C. This can be no coincidence; there exists no other similar concentration of sculptural body parts on the site. It is likely, therefore, that they have some sort of relationship with this water channel.¹⁸⁹ V's torso was also found in or alongside the west water channel, but farther to the south.

West water channel A was probably built in the late 4th century (Fig. 45); it begins northwest of the Altis, skirts the Philippeion (begun in 338 and finished by Alexander), and terminates in collecting basins that tied in with the Leonidaion.¹⁹⁰ Middle water channel B begins at the southeast foot of Kronos Hill and runs from the northwest corner of the Heraion straight south (and over water channel A) to a collecting basin at the South Terrace wall. East water channel C is Roman in date; it drains the Treasury Terrace, runs west past the Herodes Atticus nymphaeum (A.D. 157–160), hugs the west end of the Heraion, and drops straight south and east to the South Hall.

The deposition of the fresh heads and reclining women A and V in or along water channel A should date, therefore, to the period when channel B put the west channel out of use, and this probably occurred sometime in the Hellenistic or Early Roman period. It would be simplistic, though convenient, to date that deposit more precisely to the cleanup after the 2nd-century B.C. earthquake.

188. Ashmole, Yalouris, and Frantz 1967: A (pl. 62); L (pls. 106–109); M (pls. 96, 97); and Q (pls. 86, 88, 90).

189. Curtius, Adler, and Hirschfeld 1876–1881, vol. V, pls. XXXI, XXXII; see also the plan of findspots in Treu 1897, foldout plan after p. 136.

190. Curtius, Adler, and Hirschfeld 1876–1881, vol. V, pls. XXXI, XXXII.

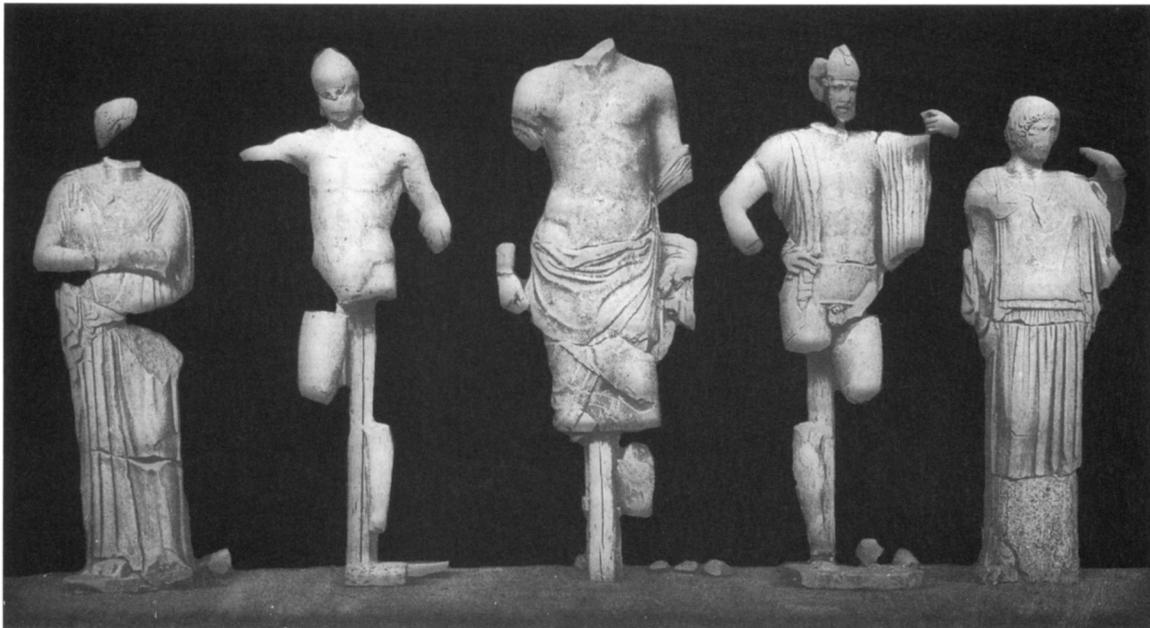


Figure 46. Arrangement of the east pediment, central group, in the Old Museum

DAMAGE AND LOSS

The sections above concern damage and repairs that can be more or less dated. Most damage and repair, however, cannot be dated, though we can characterize them.

Several figures have their reverses slightly modeled and then shaved and rasped; this could have occurred prior to installation: east Zeus (Fig. 10:b, c), Pelops (Fig. 22:a) and Oinomaos (Fig. 22:b, c), and seer N (Fig. 24), perhaps Alpheios (Fig. 23) and Kladeos; west figures C (Fig. 25, right), DE, Theseus M, NO (Fig. 28:b), and all of RS and T (Fig. 27:c). East attendant E seems also to have had his entire reverse shaved and rasped, and east attendant O had its right side partially shaved and rasped (Fig. 26:c).

Metal bits were probably also added during installation: certainly the bridles and harnessing for the horses in the east pediment. Since Pelops's armor obscures a finished torso, it may be a later addition.¹⁹¹

Several figures exhibit local damage and repair (usually with small tenons) that could have happened at any time: east Pelops's right leg (Fig. 22:a)¹⁹² and nude B's left arm (Fig. 26:b); and west PQ's lower areas in back (Fig. 27:d). We have suggested, from their position on the building, that the Lion metope and west figures V (Figs. 8, 42, right) and S (Fig. 12:b) may have been damaged in the 2nd-century earthquake; if their butterfly clamps are specific to this period of repair, then we could add Apollo's right side (Fig. 29:a, c).

Other damage is more extensive and required major repair and even alteration. The lower legs of east Zeus (Figs. 10, 46) and Hippodameia K (Fig. 46, extreme right) were lost, cut straight across, and, in Zeus's case, replaced, while those of west Peirithoos K and Apollo L (Figs. 2, 29:a) were repaired. Apollo, in particular, shows signs of at least three breaks at weak points of the body below the waist in the form of horizontal fractures at

191. Patay-Horvath (2006), however, argues that the bronze armor is original (we thank one of the anonymous *Hesperia* reviewers for supplying this reference).

192. Trianti 2002, p. 286, figs. 24, 25.

thigh level, at the knees, and at the ankles.¹⁹³ At least once—and possibly as many as three times—the figure was thrown from the pediment. And when the figure was reinstalled at one of these times, it received a second tenon in an elliptical cutting.¹⁹⁴ Certainly it was the first fall that also decapitated the figure and severed his right arm, probably in the 2nd century. West S had its back hollowed out to a depth of 16 cm (Fig. 27:c), perhaps to cut down on its weight—this may have been to facilitate installation or the reinstallation after the 2nd-century B.C. repair.

We have also identified two lost figures in the west pediment (as evidenced by the pair of clasped hands wrongly assigned to west C, and the cannibalized draped limb inserted in the large mortise in west O) and the addition of two sets of two figures at different times (A and V by the 4th century, A's replacement later, and B and U replacing A and V, in the 2nd century or later).¹⁹⁵

WHAT PAUSANIAS SAW

When Pausanias visited the site in A.D. 174, he described the temple and its sculptures in some detail, but that description has often baffled scholars, for what Pausanias describes does not correlate precisely with the reconstructions proposed on paper or in the Olympia museums.¹⁹⁶

Nor should it, for what Pausanias saw could not have corresponded to the original installation. The most obvious changes involve the loss of most of the Kerberos metope, the loss of two figures or groups in the west pediment, and the mutilation of statues especially in the centers of both pediments.

Pausanias's description of the pedimental sculptures begins with the east (5.10.5–7; our translation, slightly abridged):

In the front pediment there is about to begin the chariot race between Pelops and Oinomaos, and the preparations they are both making for the race. There is of course an image of Zeus in the middle of the pediment, and on the right of Zeus (*ἐν δεξιῶν τοῦ Διός*) is Oinomaos wearing a helmet, and next to him his wife, Sterope. Myrtilos, Oinomaos's charioteer, sits in front of the horses (there are four). Next come two men, nameless, but they too must work for Oinomaos and attend his horses. Next reclines Kladeos in the angle. To the left of Zeus (*ἐς ἀριστερὰ ἀπὸ τοῦ Διός*) are Pelops, Hippodameia, Pelops's charioteer, his horses, and two men who are Pelops's grooms. Then where the pediment narrows, Alpheios is represented. The name of Pelops's charioteer, according to Troizen, is Sphairos, but my guide at Olympia calls him Killas.

What does Pausanias mean by “on the right” and “to the left” of Zeus? Säflund argues for placing Oinomaos on Zeus's proper right (our left), though this necessitates identifying the south river god as Kladeos and the north river god as Alpheios, contrary to expectation (the Alpheios lies to the south and the Kladeos to the west of the Altis, running north to south).¹⁹⁷ Trianti agrees, and this is the New Museum's arrangement.¹⁹⁸

The Old Museum arrangement (Fig. 46) understood Pausanias to mean that Oinomaos is to the viewer's right of Zeus.¹⁹⁹ Following this

193. Ashmole, Yalouris, and Frantz 1967, pls. 101, 105.

194. The original square mortise in centaur J's hindquarters was enlarged, apparently after installation (Treu 1897, p. 73, fig. 116).

195. The similar truncation of south seer L in the east pediment may have happened at installation when the installers realized they needed more room for south outrigger D; it may have been then, too, that L's head was shaved to move him farther into the south angle of the pediment.

196. Ashmole, Yalouris, and Frantz 1967, pp. 5, 17–18.

197. Säflund 1970, pp. 46–47, 145–147. On the identification of the river gods, see Weiss 1984, pp. 126–141.

198. Trianti 2002, pp. 282, 294, 297.

199. Kyrieleis (1997) also supports this placement (we thank one of the *Hesperia* reviewers for supplying this reference).



Figure 47. Frieze from the Temple of Apollo at Bassai, Kaineus flanked by centaurs, British Museum 530.

Photo J. G. Younger. Reproduced by permission, Trustees of the British Museum

200. Perhaps the guide Aristarchos mentioned in 5.20.4.

201. Apollo's torso was found considerably to the southwest, in the dark Byzantine level, but the chest was upright and projecting above that level to a height of 35 cm (Treu 1897, p. 110), as if on display. For depictions of Kaineus, see *LIMC V*, 1990, pp. 884–891, pls. 563–576, s.v. Kaineus (E. Lauffer); nos. 1, 3–76 show Kaineus in the ground flanked by two centaurs, except nos. 17–19, 36, and 68, where he stands on the ground; nos. 1, 3–8, where he is attacked by one centaur only; and no. 2, where he stands on the ground and is also attacked by only one centaur. Pausanias probably did not recognize that the centaurs were assaulting Lapith women: both their heads were then missing (Deidameia H now restored; O's head is still missing).

arrangement, we would understand Pausanias's statement ("Myrtilos sits in front of [Oinomaos's] horses") to mean that E (the only sitting attendant) is Myrtilos sitting in front of north horses M.

Pausanias then goes on to describe the west pediment (5.10.8); this is more problematic (our abbreviated translation): The west "pediment portray[s] the battle between Lapiths and centaurs at the marriage of Peirithoos. Peirithoos is in the center of the pediment. Next to him, on one side, is Eurytion, who has seized Peirithoos's wife, and Kaineus who is defending Peirithoos, and, on the other side, is Theseus attacking the centaurs with an ax. One centaur has seized a maiden, another a beautiful boy."

If we take Pausanias's description of the west pediment literally, we should imagine he saw Peirithoos (figure K?) in the center flanked on one side by at least one centaur group (centaur J or N) and "Kaineus"; on the other side is Theseus (figure M?) "defending himself with his ax" (i.e., attacking other centaurs). As such, it seems to match the museum installation closely—if we imagine that what we see as Apollo is what Pausanias saw as Peirithoos.

Pausanias's failure to mention Apollo in the west pediment has usually been taken as a momentary lapse on his part, or the result of misinformation on the part of his guide.²⁰⁰ We suggest instead that Pausanias omitted Apollo because Apollo was no longer recognizable as a god. By the Early Roman period, we know that Apollo's head and right arm had been lost. Also, by then, his lower legs had been broken and repaired at least once and probably broken again. If this decapitated figure had been restored to the pediment, now "standing" on the stubs of his thighs, his left arm at his side and his right arm missing, and if he were still flanked by centaurs, then he may well have resembled the conventional depictions of Kaineus (Fig. 47), beaten partway into the ground by flanking centaurs.²⁰¹

Since Pausanias describes a "Peirithoos" in the center (5.10.8), then presumably what he saw in that position was one of the heroes, perhaps our Peirithoos; Kaineus and the flanking centaurs would then have been off



Figure 48. Reconstruction drawing of what Pausanias might have seen in the west pediment of the Temple of Zeus. Drawing J. G. Younger and P. Rehak; composite based on Curtius, Adler, and Hirschfeld 1876–1881, vol. III, pl. XX

to one side. If his method of describing what he saw matches the method he used to describe the east pediment (starting at the center and describing first the figures to the north and then to the south),²⁰² we would place Peirithoos in the center (Fig. 48). To our left of center (north) would be the Kaineus group (truncated Apollo flanked by centaurs N and J) and to our right of center (south) would be Theseus and other centaur groups.

CONCLUSION

The decision to build the Temple of Zeus at Olympia was probably made in Olympiad 78 (468 b.c.), and the actual construction started two years later so that the temple could be dedicated during Olympiad 81 (456). It was the last major temple in Greece to commission sculptures of Parian marble, and this decision had immense effects, for it seems that all the sculptures (12 metopes, some 30 blocks of pedimental figures, and 102 lion-head rainspouts) were brought to the same preliminary finish in Paros and apparently transported to Olympia (ca. 450 km) in one shipment (probably in 464/3). The metopes would have been installed soon afterward, but the pedimental sculptures and lion-head rainspouts would have waited on site some four or five years before being installed—by which time the Paros workshops were probably involved in their next project (the Great Temple of Apollo in Delos?), leaving the Olympia sculptures to remain in their penultimate state of finish. Some 20 years after the temple was dedicated, the chryselephantine cult statue of Zeus was installed.

During the thousand years that the Temple of Zeus at Olympia stood, it experienced a number of cataclysmic events that changed the way the sculptures looked. For a dramatic example of these changes, compare an original rainspout (Fig. 6:a), almost Late Archaic in appearance, with a swollen-looking Late Roman rainspout (Fig. 6:b). Within a century after installation there were losses in the west pediment and replacements (reclining women A and V?). In the early 2nd century b.c., a major earthquake inflicted massive damage that necessitated dismantling approximately

202. In a sense, this is his method for describing the metopes: he takes the temple itself as the center, and describes first the metopes at his right (east front) from south to north, and then the metopes at his left (west front), also from south to north.

half the temple. Apollo, Zeus, and Hippodameia lost their lower legs; several figures lost their “pristine” heads; reclining woman A in the west pediment is replaced and V is repaired; and a second series of lion-head rain-spouts (E2) replaced damaged ones. More changes occurred in later years: Mummius added gilded shields to the exterior in 142 B.C.; lightning struck the temple and damaged the cult statue (shortly before 35 B.C.); and by the Early Augustan period, reclining women B and U replaced lost A and V in the west pediment, and a third series of lion-head rainspouts (E3) replaced damaged ones.

When Pausanias visited in A.D. 174, he curtly acknowledged that “most of the labors” of Herakles were depicted, and he omitted reference to the Kerberos metope. In his mention of Kaineus in the west pediment, he may simply have been following his guide’s reinterpretation of a truncated, decapitated Apollo figure placed between two centaurs (the headless women they attack no longer recognizable). More lion-head rainspouts were replaced.

A century later, a village had begun to grow up, especially to the east of the temple, and the villagers were using the broken bits of sculpture as building material. In anticipation of the Herulean raid (A.D. 267), they turned the temple into a fort (with a final series of rainspouts added). Following an edict of Theodosius I in 393, the games were cancelled, the temple ceased operation, and Pheidias’s workshop was transformed into a church. The fort was renewed to withstand (unsuccessfully) a Vandal raid in 426. Soon afterward, the chryselephantine statue of Zeus was removed to Constantinople, where it was destroyed by fire in 475. Earthquakes and floods in the 6th century finished the destruction of the temple; it was lost to view probably by 575.

During its millennium of existence, the Temple of Zeus at Olympia grew older and changed—like any organism—and the alterations to its sculptural decoration required its visitors to change their reactions in step. The biographical history of the building presented above makes it clear that whatever interpretation was intended by the designers of the sculptures (far away in Paros) very soon had to make way for new interpretations on site forced by the building’s successive changes. In time, of course, even the original religious function of the building yielded to more secular concerns: as a site for pillage and fortification. Modern visitors may struggle to recover the original intention of the building and its sculptural program in the mid-5th century B.C., but it is far easier to appreciate the building as a monument to history.

REFERENCES

- Adam, S. 1966. *The Technique of Greek Sculpture in the Archaic and Classical Periods*, London.
- Ashmole, B. 1972. *Architect and Sculptor in Classical Greece*, New York.
- Ashmole, B., N. Yalouris, and A. Frantz. 1967. *Olympia: The Sculptures of the Temple of Zeus*, London.
- Barber, R. L. N. 1995. *Greece*, 6th ed., (Blue Guide), London.
- Barringer, J. M. 2005. "The Temple of Zeus, Heroes, and Athletes," *Hesperia* 74, pp. 211–241.
- Barron, J. P. 1984. "Alkamenes at Olympia," *BICS* 31, pp. 199–206.
- Bassai = F. A. Cooper, ed., *The Temple of Apollo Bassitas*, Princeton
- I = F. A. Cooper, *The Architecture*, 1996.
- II = B. C. Madigan, *The Sculpture*, 1992.
- IV = F. A. Cooper, *The Temple of Apollo Bassitas: Folio Drawings*, 1992.
- Bassett, S. 2004. *The Urban Image of Late Antique Constantinople*, Cambridge.
- Beazley, J. D. 1927. "The Antimenes Painter," *JHS* 47, pp. 63–92.
- Beck, H., and P. C. Bol. 1993. *Polyklet-forschungen*, Berlin.
- Blouet, A., and A. Ravoisie. 1831–1838. *Expédition scientifique de Morée, ordonnée par le gouvernement français: Architecture, sculptures, inscriptions, et vues du Péloponèse, des Cyclades, et de l'Attique*, 3 vols., Paris.
- Bluemel, C. 1969. *Greek Sculptors at Work*, trans. L. Holland, 2nd ed., rev. B. Ross, London.
- Boardman, J., and D. Finn. 1985. *The Parthenon and Its Sculptures*, London.
- Bookidis, N. 1967. "A Study of the Use and Geographical Distribution of Architectural Sculpture in the Archaic Period (Greece, East Greece, and Magna Graecia)" (diss. Bryn Mawr College).
- Borbein, A. H. 1996. "Polykleitos," in *Personal Styles in Greek Sculpture*, ed. O. Palagia and J. J. Pollitt, Cambridge, pp. 66–90.
- Boulter, P. N. 1970. "The Frieze of the Erechtheion," *AntP* 10, pp. 7–28.
- Brendel, O. 1943. "The Teaching of Ancient Art," *College Art Journal* 2, pp. 46–50.
- Brinkmann, V. 2003. *Die Polychromie der archaischen und frühklassischen Skulptur*, Munich.
- Broneer, O. 1971. *Temple of Poseidon (Isthmia I)*, Princeton.
- Brunn, H. 1876. "Paionios und die nordgriechische Kunst," *SBMünch* 1, pp. 315–342.
- Bryant, H. 2006. "The Labors of Herakles from the Temple of Zeus at Olympia Restored," http://www.theparthenoncode.com/products/herakles_prints.htm (accessed February 5, 2009).
- Buitron-Oliver, D. 1992. *The Greek Miracle: Classical Sculpture from the Dawn of Democracy: The Fifth Century B.C.* (Exhibition catalogue, National Gallery of Art), Washington, D.C.
- Bulle, H. 1939. "Der Ostgiebel des Zeustempels zu Olympia," *JdI* 54, pp. 137–218.
- Burford, A. 1961. "Temple Building at Segesta," *CQ* 11, pp. 87–93.
- . 1969. *The Greek Temple Builders at Epidauros: A Social and Economic Study of Building in the Asklepiian Sanctuary during the Fourth and Early Third Centuries B.C.*, Liverpool.
- Buschor, E., and R. Hamann. 1926. "Die Olympiameister," *AM* 51, pp. 163–170.
- Cahen, E. 1937. "Le gest d'Apollon au fronton ouest d'Olympie," *RA* 1937, pp. 3–13.
- Camp, J. M., II, and W. B. Dinsmoor Jr. 1984. *Ancient Athenian Building Methods (Agora PicBk 21)*, Princeton.
- Carlson, D. N. 2007. "The Excavation of a *Navis Lapidaria* at Kızılburun, Turkey," *Archaeological Institute of America, 108th Annual Meeting, Abstracts* 30, p. 131.
- Carpenter, R. 1960. *Greek Sculpture: A Critical Review*, Chicago.
- . 1970. *The Architects of the Parthenon*, Harmondsworth.
- Casson, S. 1933. *The Technique of Early Greek Sculpture*, Oxford.
- Childs, W. 1993. "Herodotos, Archaic Chronology, and the Temple of Apollo at Delphi," *JdI* 108, pp. 399–491.

- Croissant, F. 1993. "Observations sur la date et le style du fronton de la gigantomachie, Acr. 631," *REA* 95, pp. 61–77.
- Crouwel, J. H. 1992. *Chariots and Other Wheeled Vehicles in Iron Age Greece*, Amsterdam.
- Curtius, E. 1897. "Nachträgliche Bemerkungen zu den Tempelgiebeln," in *Treu 1897 (Olympia III)*, pp. 280–285.
- Curtius, E., F. Adler, and G. Hirschfeld, eds. 1876–1881. *Die Ausgrabungen zu Olympia: Übersicht der Arbeiten und Funde*, 5 vols., Berlin.
- Daux, G. 1966. "Chronique des fouilles, 1965," *BCH* 90, pp. 715–1019.
- Davis, P. H. 1937. "The Delian Building Contracts," *BCH* 61, pp. 109–135.
- Dinsmoor, W. B. 1913a. "Attic Building Accounts, I: The Parthenon," *AJA* 17, pp. 53–80.
- . 1913b. "Attic Building Accounts, II: The Erechtheum," *AJA* 17, pp. 243–265.
- . 1913c. "Attic Building Accounts, III: The Propylaea," *AJA* 17, pp. 311–398.
- . 1941. "An Archaeological Earthquake at Olympia," *AJA* 45, pp. 399–427.
- . 1950. *The Architecture of Ancient Greece: An Account of Its Historic Development*, 3rd ed., New York.
- . 1956. "The Sculptured Frieze from Bassae (A Revised Sequence)," *AJA* 60, pp. 401–452.
- . 1960. "A Greek Sculpted Metope in Rome," *Hesperia* 29, pp. 304–315.
- Dörig, J. 1987. *The Olympia Master and His Collaborators*, Leiden.
- Dörpfeld, W. 1892. "Der Zeustempel," in F. Adler, R. Borrmann, W. Dörpfeld, F. Graeber, and P. Graef, *Die Baudenkmäler von Olympia (Olympia II)*, Berlin, pp. 4–22.
- Eichler, F. 1919. "Die Skulpturen des Heraion bei Argos," *ÖJb* 19–20, pp. 15–153.
- Förster, R. 1883. "Alkamenes und die Giebelkompositionen des Zeustempels in Olympia," *RbM* 38, pp. 421–449.
- Furtwängler, A. 1880. "Statue von der Akropolis," *AM* 5, pp. 20–42.
- . 1891. "Zum Ostgiebel von Olympia," *Jdl* 6, pp. 76–87; and untitled remarks, pp. 93–94.
- Georgalas, G. C. 1962. *Catalogue of the Active Volcanoes and Solfataras Fields of Greece*, Naples.
- Goette, H. R. 1992. "Die Steinbrüche von Sounion in Agrileza-Tal," *AM* 106, pp. 309–312.
- Grunauer, P. 1974. "Der Westgiebel des Zeustempels von Olympia: Die münchener Rekonstruktion-Aufbau und Ergebnisse," *Jdl* 89, pp. 1–49.
- Hampe, R. 1941. *Der Wagenlenker von Delphi I.2: Pferde: Deutung*, Munich.
- . 1951. *Die Stele aus Pharsalos im Louvre*, Berlin.
- Herrmann, H.-V. 1972. *Olympia: Heiligtum und Wettkampfstätte*, Munich.
- Herrmann, K. 2000. "Zur Verwendung des parischen Marmors im Heiligtum von Olympia," in *Paria Lithos: Parian Quarries, Marble, and Workshops of Sculpture. Proceedings of the First International Conference on the Archaeology of Paros and the Cyclades, Paros, 2–5 October 1997*, ed. D. U. Schilardi and D. Katsonopoulou, Athens, pp. 379–389.
- Hodge, A. T. 1975. "Bevelled Joints and the Direction of Laying in Greek Architecture," *AJA* 79, pp. 333–348.
- IDélos I = F. Dürrbach, *Inscriptions de Délos I: Comptes des hiéropes (nos. 290–371)*, Paris 1926.
- Jenkins, I., and D. Williams. 1993. "The Arrangement of the Sculptured Frieze from the Temple of Apollo Epikourios at Bassae," in *Sculpture from Arcadia and Laconia. Proceedings of an International Conference Held at the American School of Classical Studies at Athens, April 10–14, 1992*, ed. O. Palagia and W. Coulson, Oxford, pp. 57–77.
- Kaltsas, N. 2002. *Sculpture in the National Archaeological Museum, Athens*, Los Angeles.
- Kardara, C. P. 1971. "Olympia: Peirithoos, Apollo, or Zeus Areios?" *ArchDelt* 25 A' (1970), pp. 12–19.
- Knell, H. 1990. *Mythos und Polis: Bildprogramme griechischer Bauskulptur*, Darmstadt.
- Korres, M. 1995. *From Pentelicon to the Parthenon: The Ancient Quarries and the Story of a Half-Worked Column Capital of the First Marble Parthenon*, Athens.
- Kozelj, T. 1988. "Les carrières des époques grecque, romaine, et byzantine," in *Ancient Marble Quarrying and Trade. Papers from a Colloquium Held at the Annual Meeting of the Archaeological Institute of America, San Antonio, Texas, December 1986 (BAR-IS 453)*, ed. J. C. Fant, Oxford, pp. 3–80.
- Kreikenbom, D. 1990. *Bildwerke nach Polyklet: Kopienkritische Untersuchungen zu den männlichen statuarischen Typen nach polykletischen Vorbildern: Diskophoros, Hermes, Doryphoros, Herakles, Diadumenes*, Berlin.
- Kunze, E. 1944. "Der Kopf der Lapithen aus der 'Steckergruppe' des Westgiebels," *OIBer* 4, pp. 149–154.
- Kyrieleis, H. 1997. "Zeus and Pelops in the East Pediment of the Temple of Zeus at Olympia," in *The Interpretation of Architectural Sculpture in Greece and Rome*, ed. D. Buitron-Oliver, Washington, D.C., pp. 13–27.
- La Coste-Messelière, P. de. 1931. *Art archaïque (fin): Sculptures des temples (FdD IV.3: Monuments figurés, sculpture)*, Paris.
- Langdon, S. 2001. "Beyond the Grave: Biographies from Early Greece," *AJA* 105, pp. 579–606.
- La Rocca, E. 1985. *Amazzonomachia: Le sculpture frontonali del tempio di Apollo Sosiano*, Rome.
- . 1988. "Die Giebelskulpturen des Apollo-Sosianus-Tempels in Rom," *Gymnasium* 95, pp. 129–140.
- Lehmann, P. 1969. *The Hieron (Samothrace III)*, Princeton.
- Lima, S., and C. L. Crawford. 2007. "Material Culture in Motion: Archaeological Approaches to Object Biographies," with discussion by S. Langdon, *Archaeological Institute of America, 108th Annual Meeting, Abstracts* 30, pp. 11–12.
- Loeschke, G. 1887. "Die westliche Giebelgruppe am Zeustempel zu Olympia," *Dorpater Universitätsprogramm* 1887, pp. 1–4.
- Lullies, R., and M. Hirmer. 1960. *Greek Sculpture*, 2nd ed., London.
- MacDonald, B. R. 1986. "The Diolkos," *JHS* 106, pp. 191–195.

- Mallwitz, A., and W. Schiering. 1964. *Die Werkstatt des Pheidias in Olympia 1* (OlForsch 5), Berlin.
- Maxmin, J. 1975. "Meniskoi and the Birds," *JHS* 95, pp. 175–180.
- Meiggs, R., and D. Lewis, eds. 1969. *A Selection of Greek Historical Inscriptions to the End of the Fifth Century B.C.*, Oxford.
- Moon, W., ed. 1995. *Polykleitos, the Doryphoros, and Tradition*, Madison.
- Moore, M. B. 1986. "Horses by Exekias," *AJA* 72, pp. 357–368.
- Moustaka, A. 1999. "Unfertige Marmorplastik und andere Reste von Steinmetzwerkstätten," *OIBer* 11, pp. 357–366.
- Neils, J. 2001. *The Parthenon Frieze*, Cambridge.
- Orlandos, A. K. 1976. *Ἡ ἀρχιτεκτονικὴ τοῦ Παρθενῶνος*, 3 vols., Athens.
- Palagia, O. 1998. *The Pediments of the Parthenon*, 2nd ed., Leiden.
- . 2006. "Marble Carving Techniques," in *Greek Sculpture: Function, Materials, and Techniques in the Archaic and Classical Periods*, ed. O. Palagia, Cambridge, pp. 243–279.
- Patay-Horvath, A. 2006. "The Armor of Pelops," in *Common Ground: Archaeology, Art, Science, and Humanities. Proceedings of the XVIth International Congress of Classical Archaeology, Boston, August 23–26, 2003*, ed. C. C. Mattusch, A. A. Donohue, and A. Brauer, Oxford, pp. 424–427.
- Paton, J. M., ed. 1927. *The Erechtheum, Measured, Drawn, and Restored by Gorham Phillips Stevens*, Cambridge, Mass.
- Pfeiffer, R. 1941. "The Measurements of the Zeus at Olympia," *JHS* 61, pp. 1–5.
- Randall, R. H., Jr. 1953. "The Erechtheum Workmen," *AJA* 57, pp. 199–210.
- Rehak, P. 1998. "Unfinished Hair and the Installation of the Pedimental Sculptures of the Temple of Zeus at Olympia," in *Στέφανος: Studies in Honor of Brunilde Sismondo Ridgway*, ed. K. J. Hartswick and M. C. Sturgeon, Philadelphia, pp. 193–208.
- . 2002. "The Hairstyle of the 'Thallophoroi' on the Parthenon North Frieze," *Archaeological Institute of America, 104th Annual Meeting, Abstracts* 26, pp. 6–7.
- Ridgway, B. S. 1970. *The Severe Style in Greek Sculpture*, Princeton.
- . 1981. *Fifth Century Styles in Greek Sculpture*, Princeton.
- . 1990. "Birds, 'Meniskoi,' and Head Attributes in Archaic Greece," *AJA* 94, pp. 583–612.
- . 1993. *The Archaic Style in Greek Sculpture*, 2nd ed., Chicago.
- . 1997. *Fourth-Century Styles in Greek Sculpture*, Madison.
- . 1999. *Prayers in Stone: Greek Architectural Sculpture, ca. 600–100 B.C.E.*, Berkeley.
- Rockwell, P. 1993. *The Art of Stoneworking: A Reference Guide*, Cambridge.
- Säflund, M.-L. 1970. *The East Pediment of the Temple of Zeus at Olympia: A Reconstruction and Interpretation of Its Composition* (SIMA 27), Göteborg.
- Sauer, B. 1891a. "Die neuesten Versuche zur Anordnung des olympischen Ostgiebels," *JdI* 6, pp. 9–42, 75.
- . 1891b. "Nachträgliches zum olympischen Westgiebel," *JdI* 6, pp. 88–97.
- Schröder, B., 1921. "Alkamenes-Studien," *BWPr* 79, Berlin.
- Sinn, U. 1991. "Olympia: Die Stellung der Wettkämpfe im Kult des Zeus Olympios," *Nikephoros* 4, pp. 31–54.
- Six, J. 1889. "On the Composition of the Eastern Pediment of the Zeus Temple at Olympia, and Alkamenes the Lemnian," *JHS* 10, pp. 98–116.
- Stähler, K. 1972. "Zur Rekonstruktion und Datierung des Gigantomachiegiebels von der Akropolis," in *Antike und Universalgeschichte: Festschrift Hans Erich Stier zum 70. Geburtstag am 25. Mai 1972*, ed. R. Stiehl and A. Lehmann, Münster, pp. 88–112.
- . 1978. "Der Zeus aus dem Gigantomachiegiebel der Akropolis," *Boreas* 1, pp. 28–31.
- Stanier, R. S. 1953. "The Cost of the Parthenon," *JHS* 73, pp. 68–76.
- Stewart, A. F. 1990. *Greek Sculpture: An Exploration*, New Haven.
- Studniczka, F. 1887. "Über Stil und Ursprung der Giebelskulpturen des

- Zeustempels in Olympia," *RM* 2, pp. 53–57.
- . 1926. "Paionios und Alkamenes in Olympia," *Njbb* n.s. 3, vol. 2, pp. 385–395.
- Tanoulas, T. 1997. *Τα Προπύλαια της αθηναϊκής Ακρόπολης κατά τον Μεσαίωνα*, Athens.
- Themelis, P. 1996. "Damophon," in *Personal Styles in Greek Sculpture*, ed. O. Palagia and J. J. Pollitt, Cambridge, pp. 154–187.
- Touloupa, E. 1983. *Τα εναέτια γλυπτά του ναού του Απόλλωνος Δαφνηφόρου στην Ερέτρια*, Ioannina.
- . 1986. "Die Giebelskulpturen des Apollon Daphnephorestempels in Eretria," in *Archaische und klassische griechische Plastik. Akten des Internationalen Kolloquiums, vom 22.–25. April 1985 in Athen*, ed. H. Kyrieleis, Mainz, vol. 1, pp. 143–150.
- Treu, G. 1882. "Zu den Funden von Olympia, II: Die Anordnung der Statuen im Ostgiebel des Zeustempels," *AZ* 40, pp. 215–247.
- . 1891a. "Die neuesten Versuche zur Anordnung des olympischen Ostgiebels," *JdI* 6, pp. 63–75.
- . 1891b. "Nochmals die olympischen Giebel," *JdI* 6, pp. 98–109.
- . 1891c. "Zu den Institutschriften," *JdI* 6, p. 142.
- . 1895. "Die technische Herstellung und Bemalung des Giebelgruppes am olympischen Zeustempel," *JdI* 10, pp. 1–35.
- . 1897. *Die Bildwerke von Olympia in Stein und Thon (Olympia III)*, Berlin.
- Trianti, I. 1986. "Ο γλυπτός διάκοσμος του ναού στο Μάξι της Ηλείας," in *Archaische und klassische griechische Plastik. Akten des Internationalen Kolloquiums, vom 22.–25. April 1985 in Athen*, ed. H. Kyrieleis, Mainz, vol. 2, pp. 155–168.
- . 2002. "Neue technische Beobachtungen an den Skulpturen des Zeustempels von Olympia," in *Olympia, 1875–2000: 125 Jahre deutsche Ausgrabungen. Internationales Symposium, Berlin, 9.–11. November 2000*, ed. H. Kyrieleis, Mainz, pp. 281–300.
- Tzifopoulos, Y. Z. 1993. "Mummius' Dedications at Olympia and Pausanias' Attitude to the Romans," *GRBS* 34, pp. 93–100.
- Waelkens, M., P. de Paepe, and L. Moens. 1988. "Patterns of Extraction and Production in the White Marble Quarries of the Mediterranean: History, Preservation, Problems, and Prospects," in *Ancient Marble Quarrying and Trade. Papers from a Colloquium Held at the Annual Meeting of the Archaeological Institute of America, San Antonio, Texas, December 1986 (BAR-IS 453)*, ed. J. C. Fant, Oxford, pp. 81–116.
- Waldstein, C. 1902–1905. *The Argive Heraeum*, 2 vols., Boston.
- Walston, C. 1926. *Alcarnenes and the Establishment of the Classical Type in Greek Art*, Cambridge.
- Wegner, M. 1989. "Kentaurenkopf von Olympia," *Boreas* 12, p. 110.
- Weiss, C. 1984. *Griechische Flussgötter in vorhellenistischer Zeit: Ikonographie und Bedeutung*, Würzburg.
- Willemsen, F. 1959. *Die Löwenkopfwasserspeier vom Dach des Zeustempels (Olforsch 4)*, Berlin.
- Wood, S. 1952. "Argive Heraion Sculpture," unpublished paper, Blegen Library, American School of Classical Studies, Athens.
- Woodward, S. 1974. "More Light on Old Walls: The Theseus of the Centaureomachy in the Theseion," *JHS* 94, pp. 158–165.
- Wrede, W. 1916. "Kriegers Ausfahrt in der archaisch-griechischen Kunst," *AM* 41, pp. 1–374.
- Yalouris, A., and N. Yalouris. 1987. *Olympia: The Museum and the Sanctuary*, Athens.
- Yalouris, N. 1992. *Die Skulpturen des Asklepiostempels in Epidauros*, Munich.
- Younger, J. G. 1993. "The Periklean Building Program as Public Works Project," *AJA* 97, p. 309 (abstract).
- . 2003. "The Greek Sculptures Ascribed to the Temple of Apollo Sosianus, Rome: Their Greek Origin and Roman Program," *Archaeological Institute of America, 104th Annual Meeting, Abstracts 26*, pp. 65–66.
- . 2004. "Work Sections and Repeating Patterns in the Parthenon Frieze," in *The Parthenon and Its Sculptures*, ed. M. B. Cosmopoulos, Cambridge, pp. 63–85.
- Younger, J. G., and P. Rehak. 1994. "Technical Observations as Evidence for Reconstructing the East Pediment of the Temple of Zeus at Olympia," *AJA* 98, pp. 333–334 (abstract).
- . 1995. "Technical Observations on the Pedimental Sculptures from the Temple of Zeus at Olympia, II: The West Pediment," *AJA* 99, p. 309 (abstract).
- . 1996. "Technical Observations on the Sculptures of the Temple of Zeus at Olympia, III: The Metopes," *AJA* 100, pp. 367–368 (abstract).

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