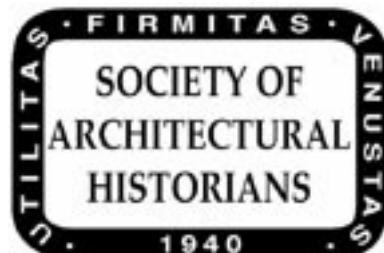




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Genesis and Mimesis

The Design of the Arch of Constantine in Rome

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Any radical departure from standard wisdom, whether it comes to be proved right or wrong, shakes up preconceptions and generates new research. This is certainly true of the theory that the Arch of Constantine in Rome (Figures 1, 2) is not his alone but the result of remodeling a forerunner from the high imperial period. Despite being soundly refuted since it was originally enunciated by Arthur Frothingham on the eve of World War I,¹ the idea has now bloomed again with fresh vigor. Following conservation and excavation work in the 1980s and early 1990s, new arguments have been advanced in Frothingham's support, raising the prospect of almost as clamorous a reappraisal of an ancient monument as the demonstration a century ago that the Pantheon was built by Hadrian, despite "Agrippa's" inscription on the front. The constraints imposed by adding on to an earlier monument could explain why the arch has such a classical stance, one so strikingly anachronistic in the context of late antique architecture. And here might even lie the key to its very existence, for Richard Krautheimer has argued that Constantine's building program was orientated toward the needs of the Christian flock and to works of civic utility, notably the great bath complex on the Quirinal and the refurbishment of the Circus Maximus. His patronage is thought to have embraced pagan ritual only for restoration projects, notably in the case of the latter, and perhaps the arch too—should Frothingham be right.²

There is alarm now over the arch just as there was in

the case of the Pantheon,³ with scholars from diverse institutions being drawn into an impassioned debate. It consumes almost the entire volume of the *Rendiconti* of the Pontificia Accademia Romana that appeared in 1997. Here the team from Rome's Istituto Centrale per il Restauro led by Alessandra Melucco Vaccaro champions a Frothingham-inspired interpretation,⁴ while Clementina Panella and Patrizio Pensabene defend the traditional single Constantinian phase.⁵ In September of the following year the German Archaeological Institute in Rome dedicated to the controversy a two-day conference that was given national media coverage.⁶ The self-awareness promoted by twentieth-century art history warns that opinion can reflect contrasting points of departure as much as objective facts,⁷ but such a divergence is also possible because, like a surprising number of prestigious monuments in Rome, the arch had yet to be thoroughly analyzed; the publications just mentioned, as well as this one and others in preparation, aim to remedy this situation.⁸

My own interest was provoked by the close affinity between Constantine's arch and that of Septimius Severus (Figures 3, 4), just a short walk away in the Forum Romanum. The accepted direction of influence flows from the Severan arch (A.D. 203) to the Constantinian one, but the revival of Frothingham's idea meant that this could no longer be taken for granted. Another cause for curiosity derived from my studies of the Corinthian order, which show that columns of Constantine's arch have proportions



Figure 1 Arch of Constantine, Rome, completed A.D. 315, view from north

that are anomalous for late antiquity but quite typical for high imperial practice. Could this be the result of mimicking columns or semicolonnades belonging to a predecessor?

To shed light on the problem, I set about evaluating the published evidence while embarking on a fresh avenue of study, an analysis of the architectural design of Constantine's monument, both in relation to its Severan cousin and on its own account. From this emerges a composition of remarkable coherence, a fact of some significance for the understanding of late antique practice. As for the connection between the two buildings, it is possible to unravel the process of design by which one was transformed into the other. The implications for the interpretation of Constantine's monument as a whole will be reviewed in conclusion, but first it is well to begin by sifting other types of evidence bearing on the current controversy.

The Question of Attribution

The common ground may first be outlined as follows. As declared by the inscription in the attic, the arch was dedicated to Constantine by the Senate and people of Rome (S.P.Q.R), probably in A.D. 315, three years after his portentous victory over Maxentius at the Battle of the Milvian Bridge. The specific occasion is generally thought to have been the *decennalia*, the celebration of the tenth anniversary of Constantine's rule as Emperor of the West, for this would explain the presence of the inscriptions *VOTIS X, sic x* just

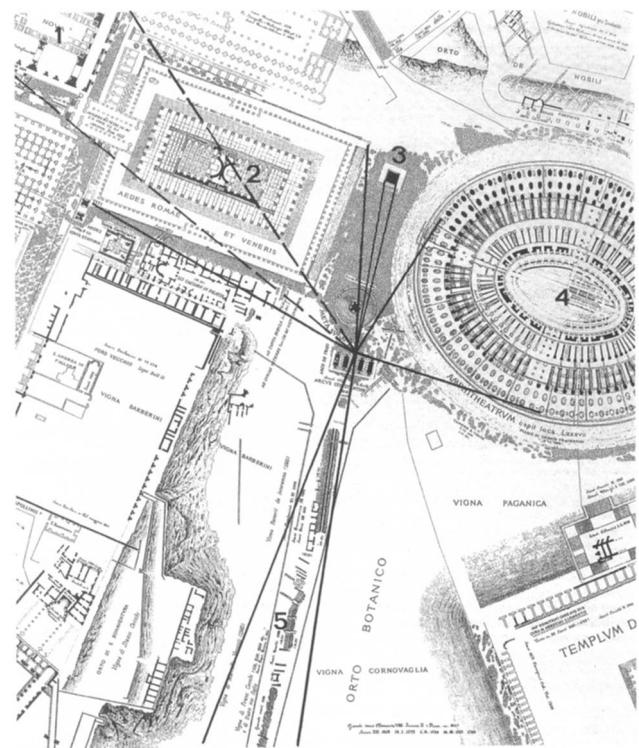


Figure 2 Arch of Constantine, site plan superimposed with lines of vision to Constantinian restoration projects: 1. Basilica of Maxentius-Constantine; 2. Temple of Rome and Venus; 3. Colossus of Sol; 4. Flavian amphitheater (Colosseum); 5. Circus Maximus



Figure 3 Arch of Septimius Severus, Rome, completed A.D. 203, view from west

under the main entablature (meanwhile the companion *votis xx; sic xx* inscriptions are interpreted as vows looking forward to his twentieth anniversary).⁹ The building brought together a formidable array of secondhand material, or spolia, notably the columns and some of the finest achievements of Roman sculpture: the panels from the so-called Great Trajanic Frieze in the central passage (Figure 5) and on the flanks of the attic; the four pairs of Hadrianic roundels, or *tondi*, on the main façades (Figures 1, 6, 7); the four pairs of panels on the attic from another arch dedicated to Marcus Aurelius; the series of eight statues, possibly Trajanic in origin, of barbarian captives set up on either side of the latter. The work commissioned *ex novo* includes the pedestals decorated with Victories and captives; the projecting stretches of entablature over the columns; the superstructure of the attic and the lost bronze statuary that it originally supported; the two *tondi* on the flanks, one of the Sun, the other of the Moon; the wraparound frieze running just underneath the *tondi* narrating the story of Constantine's "liberation" of Rome. It was this last element that Bernard Berenson, following Raphael's lead more than four centuries earlier, chose to epitomize the decline in standards that was perceived, from a formalist perspective, to characterize the art of late antiquity.¹⁰

The disputed territory is the entire remaining masonry, the framework as it were to which the sculpture and the columns were attached. The "traditionalists" regard this as

a combination of new and recycled material put together by Constantine's builders. The Istituto Centrale team sees here a previous arch that had semicolonnades where there are flat pilasters today (Figure 8); in contrast to Frothingham, who assigned it to Domitian, this is now given to Hadrian because his reign is the likely date of the *tondi* believed to be in their original setting.¹¹ For everything from constructional technique to iconography, the ramifications of such divergent views are considerable. For example, from the traditional viewpoint the current arrangement of the *tondi* represents a deconstructing of the original sequence; the pairs linking hunt and sacrifice—of the bear for Silvanus, of the boar for Diana, and of the lion for Hercules—are jumbled up, with, for example, the boar hunt on the north face of the arch (see Figures 1, 6) but its sacrifice on the south (see Figures 7, 24). The revisionist hypothesis sees the *tondi* as a coherent set of images if read in the anti-clockwise sequence established by the Constantinian frieze immediately below; in this way the boar hunt roundel (the first on the north face) is anticipated by the same beast's sacrifice (the last on the south face).¹²

Knowledge about the ancient world is so riddled with lacunae that aesthetic, iconographic, and historical arguments, significant as they might be, are almost bound to flex so as to fit individual scholars' preconceptions. It is salutary to recall the controversy over the reconstruction of the interior frieze from the Temple of Apollo at Bassae, which arose

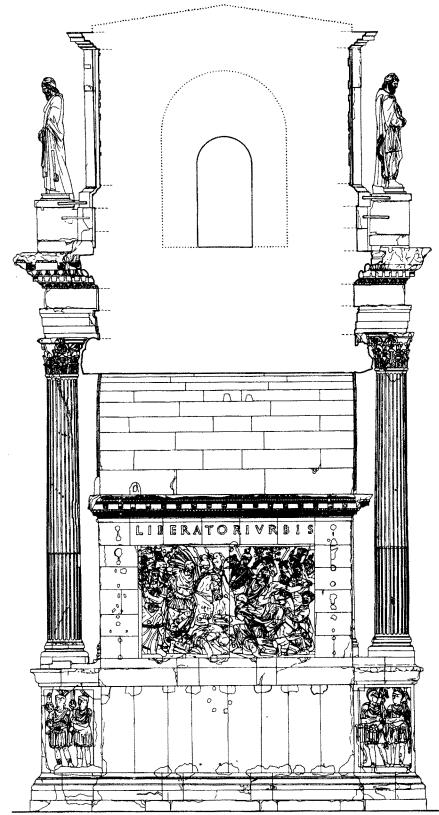
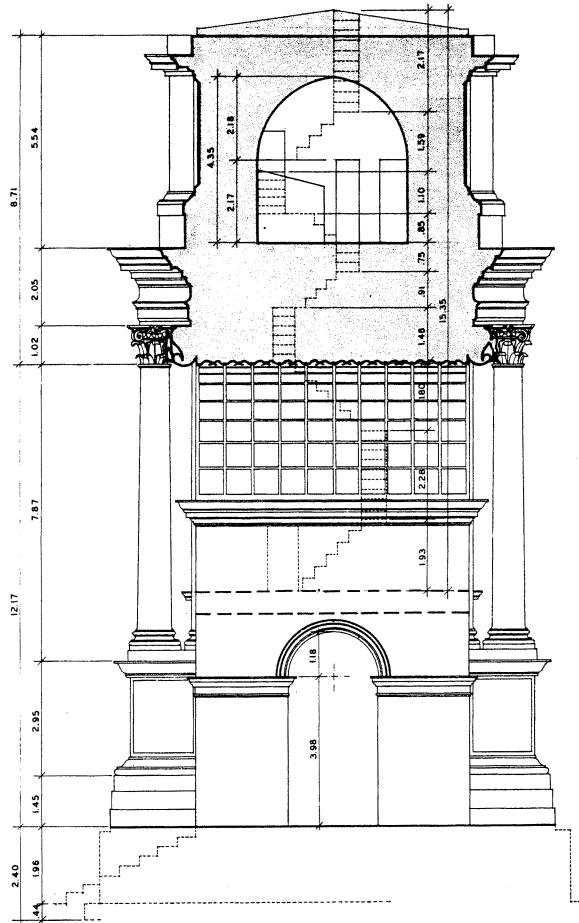


Figure 4 Arch of Septimius Severus, section through the central passage, 1:200. Broken line indicates position of impost moldings for side passages.

Figure 5 Arch of Constantine, section through central passage, 1:200, looking east. Main frieze panel dates from time of Trajan (or possibly Domitian).

due to its component blocks being shipped to London in 1812 without any record of their position. For over a century a succession of scholars advanced “definitive” solutions, each justified by a critique of the ideas behind the composition. Then William Bell Dinsmoor introduced a new methodology, putting aside the sculptural content and focusing instead on the concealed edges of the blocks, and in particular on the cuttings for metal ties; by matching the cuttings to the housings on the standing temple, a layout emerged that resembled none of the previous proposals argued on art-historical grounds. Dinsmoor’s specific proposal has naturally been challenged, but no one disputes the value of his strategy; indeed the prime motor behind subsequent revisions has been the observation of further aspects relating to technique.¹³ The point is that a sound methodology necessitates resolving questions of technique before

those of content, hence the approach pursued in the present paper.

Apart from observations regarding the foundations, which cannot be tackled here, since the definitive Istituto Centrale report has yet to be published,¹⁴ there are two main arguments in favor of a Hadrianic nucleus. First, there is a disjunction between the superstructure and the applied order of pedestals, columns, and projecting entablature (Figure 9); this is manifest in the lack of bonding at the level of the pedestal and in the fact that some of the columns were evidently slightly taller than the height envisaged. In order to get the tallest of them to fit into their new setting, the architraves were cut into the abacus of the capitals, while the subplinths under the column bases were hacked down (Figure 10; see Figure 5).¹⁵ Second, there are numerous signs of *in situ* working that has nothing in common with

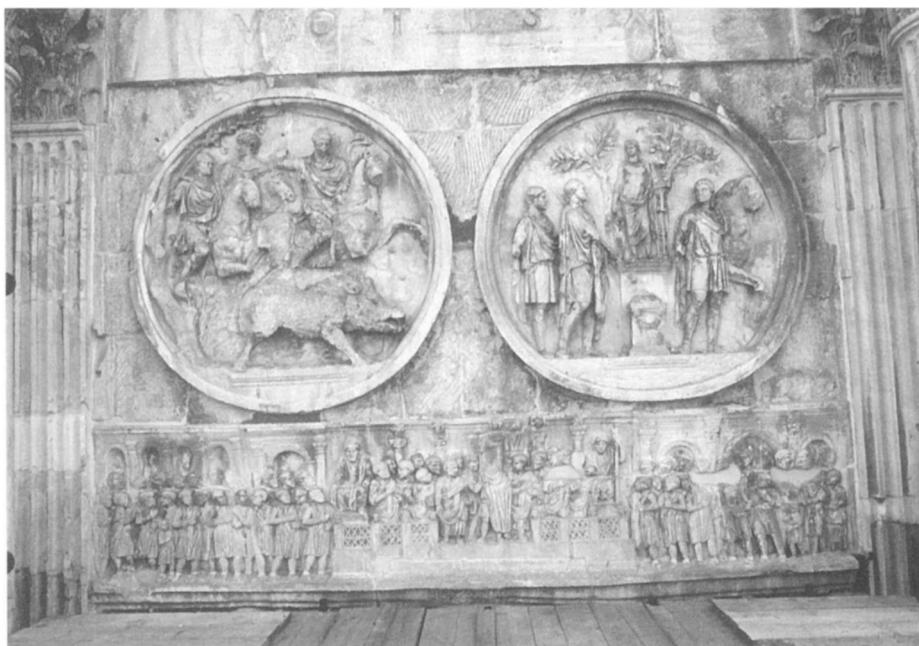


Figure 6 Arch of Constantine, north side, detail of relief sculpture. Tondo on left shows Emperor Constantine (originally Hadrian) as protagonist of a boar hunt. Tondo on right shows either Constantius Chlorus or Licinius (originally Hadrian) celebrating sacrifice to Apollo. Frieze shows Constantine's oration from rostra in Forum Romanum. Toolmarks on masonry around tondi signal in situ work aimed at accommodating (lost) porphyry facing.

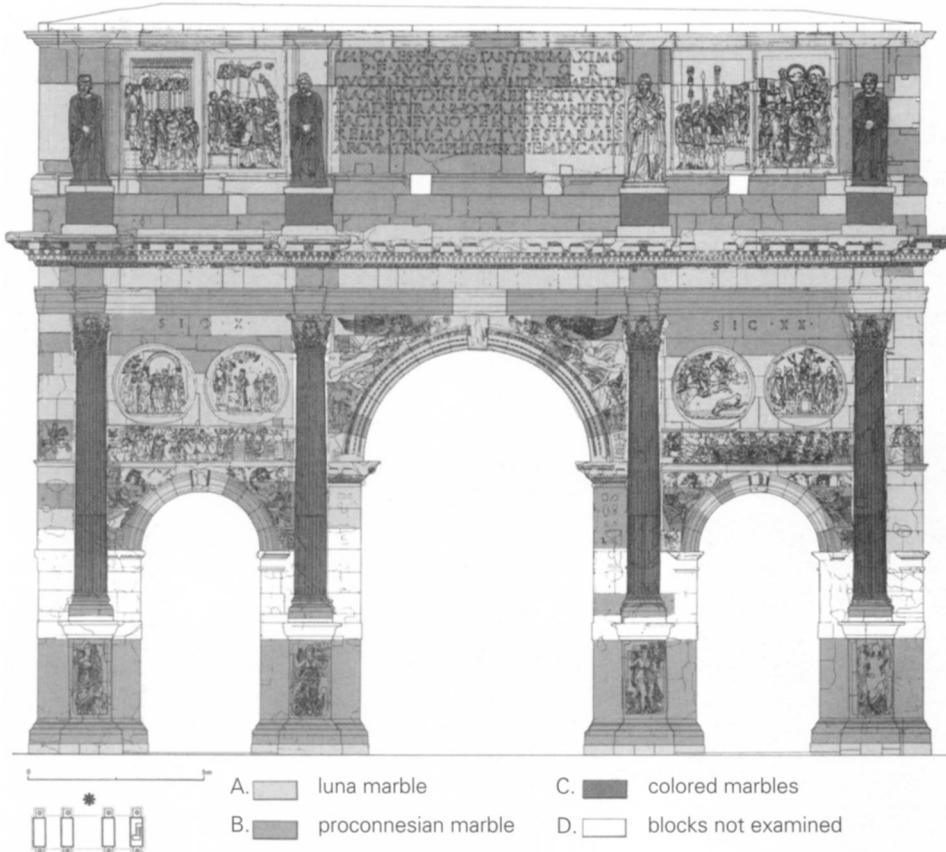


Figure 7 Arch of Constantine, south elevation showing distribution of the principal categories of marble: A = Carrara (Luna) marble; B = Proconnesian marble; C = miscellaneous colored marble; D = blocks not examined

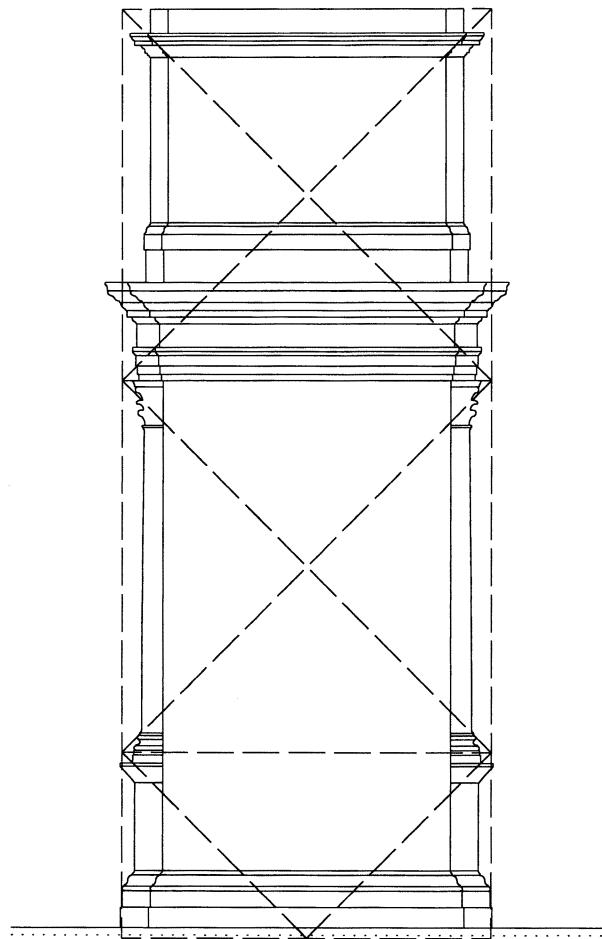


Figure 8 Arch of Constantine, schematic and elevation showing hypothetical earlier phase based on hypothesis of Alessandra Melucco Vaccaro and collaborators, with salient proportions overlaid

Figure 9 Arch of Constantine, detail of junction between a pedestal and main structure. Top course of pedestal (directly underneath column and pilaster bases) is bonded integrally with the body of the pier.



Figure 10 Arch of Constantine, detail of pilaster base. Note the unusually squat proportions and extremely shallow plinth. On front face of plinth is a vertical groove belonging to a surface treatment from a different earlier setting.



Figure 11 Arch of Septimius Severus, detail of Winged Victory in a spandrel of central fornix. Continuity of figure as it crosses from block to block shows it was carved in situ.

the quality which characterizes the Arch of Septimius Severus (Figure 11). A clear example may be seen where the porphyry facing panels around the tondi have disappeared, exposing traces of a vigorous redressing of the backing masonry—doubtless to make way for inserts that were not contemplated initially (see Figure 6).¹⁶

The substance of both points is not disputed, only the interpretation. It is true that the order is bonded at the Arch of Septimius Severus, but this ceases to be typical when recycling constituted the norm. The pedestals of the so-called Arch of Drusus are similarly not bonded, while a substantial quantity of facing for the (Constantinian?) Arch of Janus is attached only by metal clamps.¹⁷ In any case, at Constantine's arch both the bottom and the top courses of the pedestals are bonded (see Figures 5, 9). Equally significantly, the bottom course of the pedestals typically has no joints in it, which shows that it cannot have been extended in a second phase.¹⁸ There is nothing unusual, then, in the mid-to-late imperial period about the imperfect fit for the columns. Their components were typically prefabricated in quarries far from the destination and offered up to the building only when construction was nearing completion. Masonry structures might not be perfectly level, and a tol-

erance of 2 or even 3 inches is not uncommon in the length of a batch of large shafts. Usually a degree of flexibility was provided by an upstand, or *scamillus*, on top of the capital, one that could be either left intact or removed. Yet despite their presence at the Arch of Septimius Severus, which was undoubtedly built in a single campaign, it still proved necessary to cut the architrave into the abacus of the capital at the north end of the west side. Once spolia became the norm, such problems proliferated.

As regards the second point, concerning the quality of stonemasonry, no doubt the porphyry around the tondi was added later than the backing masonry. But this could respond to a variety of causes: perhaps an afterthought, perhaps difficulties with achieving a good fit, perhaps a later intervention, perhaps postantique restorations. (These were substantial, and often characterized by considerable skill, witness the substitution of seven of the eight pilasters in the eighteenth century.) In fact, alternative explanations such as these are potentially applicable to all the claims made by Melucco Vaccaro and her colleagues.

The details of thrust, counterthrust, and counter-counterthrust can get tiresome, and ultimately they can be sidestepped by considering the character of the purported

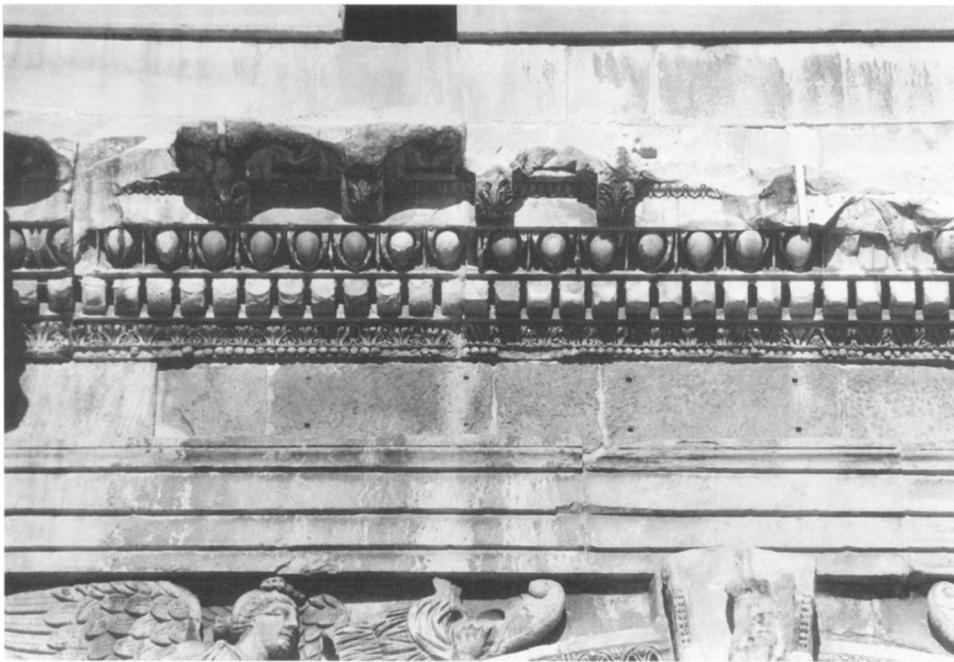


Figure 12 Arch of Constantine, detail of entablature over central fornix, showing discontinuities in moldings at the joint in the cornice. Dentils are compacted, while there is surplus in both the egg-and-dart and the leaf moldings; presumably the blocks are not in their original disposition.

Hadrianic arch, which it must be said would have been passing strange by the prevailing standards of the time. It is little short of inconceivable that a major Hadrianic monument in Rome could display such a catalogue of incongruities as this one, had it ever existed. There are several blocks belonging to the hypothetical building that present on their finish faces traces of previous usage, a phenomenon virtually unknown in Rome before the Severan period. Small vertical channels are visible on some surfaces, the vestige it seems of some earlier pattern of ashlar joints (see Figure 10). On frequent occasions the decoration of the main entablature presents a loss of continuity at the junction between its component blocks, as when two dentils butt up against each other (Figure 12); such ineptitude is unthinkable on the Pantheon, as it is for lesser Hadrianic monuments.¹⁹ Nor are the modillions running between the columns distributed in symmetrical groups, as they predictably are over the parade of projecting columns fronting Hadrian's Library at Athens.²⁰ It also seems highly unlikely that builders of the high imperial period would have contemplated intermixing indiscriminately varieties of white marble as are here Carrara and Proconnesian, of which some of the latter has prominent bluish gray striations laid without regard to consistency (see Figure 7).²¹ It is true that the Pantheon interior mixes Pentelic, Carrara, and Proconnesian, but by contrast each type is maintained uniformly for discrete families of elements (Pentelic bases, Carrara capitals, Proconnesian aedicule pediments). The

same may be said, too, of the Arch of Septimius Severus, with its Pentelic ashlar masonry, *cipollino* column shafts, and Carrara relief panels.

Although additional stylistic arguments may be of secondary importance by reason of their subjective component, they are hardly insignificant.²² The molded base enveloping Constantine's monument, which is obviously integral to it and not added on, betrays an unambiguously late antique profile (at any rate no second-century example has such a steep cyma as does this one). So the notion of a Hadrianic predecessor presupposes that an earlier molding was completely recut, which in turn prompts the question of why Constantine's architects would have insisted on such a time-consuming exercise when they accepted so many spolia in their original form, despite the messiness that sometimes resulted.²³ Indeed, wherever one looks carefully at the implications of Frothingham's theory and its variations, it becomes clear that it demands a reworking so comprehensive as to contradict the economic advantages of using spolia in the first place. He and his recent supporters have undoubtedly made important contributions to the study of the arch, but their main thesis is nonetheless mistaken.²⁴

Formal and Abstract Aspects of Design

Having thus confirmed the traditional chronology for the Arch of Constantine as the best working hypothesis, we may now leave aside this question pending the following analy-

sis of formal and mathematical aspects of design. This divides into three sections: first, the overall composition of the later arch; second, the proportions of its order; and third, its relationship to that of Septimius Severus.

Constantine's arch is not a building that jumps to mind as a likely paragon of proportional virtue, since the process of assembling secondhand components might be presumed to favor ad hoc or compromise solutions. True, the fact that the Parthenon in Athens incorporated columns from its previous incarnation has hardly inhibited rarefied speculation about its design, but the focus of the present inquiry is quite different in character. The resolution of many details of the arch fails to stand up to close scrutiny. The lack of continuity in the ornamentation of moldings, the absence of symmetrical modillion distribution, and the messy fit of the columns have all been mentioned already. Other imperfections include the ragged height of the frieze under the tondi; the fact that the recycled tondi are not true circles, having been cut down to make room for the frieze; and everywhere a fairly ample tolerance in dimensions that should be consistent. Considerations of detail were subordinated to the effect of the whole, an approach that is symbolized by the recutting of Trajan and Marcus Aurelius with Constantine's portrait so as to sustain one of the central messages the mon-

ument was built to convey, his equation with the "good emperors" of the past.²⁵ It might seem that proportions would suffer likewise, but on the contrary, the whole building resonates with proportional elegance. For ease of assimilation, the chief proportional "propositions" are listed in Table 1, and highlighted on the accompanying illustrations.

A series of relationships are striking both for their simplicity and for the fact that they all have one term in common, namely, the column height.²⁶ This is equal to the axial width of the flanks (*Proposition 1*), the height of the imposts of the main passageway (*Proposition 2*), the intercolumniation of the central fornix (*Proposition 3*),²⁷ and one-third of the total length of the building (*Proposition 4*; see Figure 13, A and B).

Next, the simple device of raising the columns off the ground by half their height (*Proposition 5*) gives rise to another 1:2 proportion, between the height of the façade up to the bottom of the entablature and its overall length (*Proposition 6*; Figure 13, A). The scansion of the columns/fornices, measured to the column axes, harmonizes with all the dimensions cited, while creating further relationships of 1:2, 1:4, 3:4, and 3:2 (*Propositions 7, 8, 9, 10, 11*; Figure 13, D). The proportions mentioned so far regulate the height of the building up to the bottom of the entablature, but it seems that the top of it too generated yet another 1:2 ratio, this time between the

Table 1 Principal Proportions of the Arch of Constantine
Measurements are given in meters.

<i>Proposition 1:</i>	Axial width of flanks (8.54) = Column height (8.51)	<i>Proposition 12:</i>	Height of order (≈ 10.92) = 1/2 Axial length ($22.06/2 = 11.03$)
<i>Proposition 2:</i>	Height of central imposts (8.53) = Column height (8.51)	<i>Proposition 13:</i>	Total width of flanks (10.36) = 1/2 Total height ($\approx 20.57/2 \approx 10.285$)
<i>Proposition 3:</i>	Central intercolumniation (8.59) = Column height (8.51)	<i>Proposition 14:</i>	Width of central passage (6.59) = Depth of central passage (6.58)
<i>Proposition 4:</i>	Column height (8.51) = 1/3 Overall length ($25.44/3 = 8.48$)	<i>Proposition 15:</i>	Width of lateral passage (3.40) = 1/2 Depth of lateral passages ($6.58/2 = 3.29$)
<i>Proposition 5:</i>	Height of columns off ground (≈ 4.11) = 1/2 Column height ($8.51/2 = 4.255$)	<i>Proposition 16:</i>	Width of lateral passage (3.40) = 1/2 Width of central passage ($6.59/2 = 3.295$)
<i>Proposition 6:</i>	Height up to entablature (≈ 12.62) = 1/2 Overall length ($25.44/2 = 12.72$)	<i>Proposition 17:</i>	Width of lateral passage (3.40) = Pier width inc. molding (3.37)
<i>Proposition 7:</i>	Width of lateral fornices (6.29) = 1/2 Height up to entablature ($12.62/2 = 6.31$)	<i>Proposition 18:</i>	Pier width exc. molding (2.89) = Clear width of lateral passage (2.92)
<i>Proposition 8:</i>	Width of lateral fornices (6.29) = 1/4 Overall length ($25.44/4 = 6.36$)	<i>Proposition 19:</i>	Pier width exc. moldings (2.89) = 1/2 Height of lateral imposts ($\approx 5.93/2 \approx 2.965$)
<i>Proposition 9:</i>	Width of lateral fornices (6.29) = $3/4$ Column height ($3/4 \times 8.51 = 6.38$)	<i>Proposition 20:</i>	Height to main cornice (≈ 14.82) = 2 x Total width of flanks ($\sqrt{2} \times 10.36 = 14.65$)
<i>Proposition 10:</i>	Width of lateral fornix (6.29) = $2/3$ Width of central fornix ($2/3 \times 9.48 = 6.32$)	<i>Proposition 21:</i>	Height to main cornice (≈ 14.82) = Overall length / $\sqrt{3}$ ($25.44/\sqrt{3} = 14.69$)
<i>Proposition 11:</i>	Width of central fornix (9.48) = $3/4$ Height up to entablature ($3/4 \times 12.62 = 9.465$)	<i>Proposition 22:</i>	Axial width of flanks (8.54) = Height to main cornice / $\sqrt{3}$ ($\approx 14.82/\sqrt{3} \approx 8.55$)

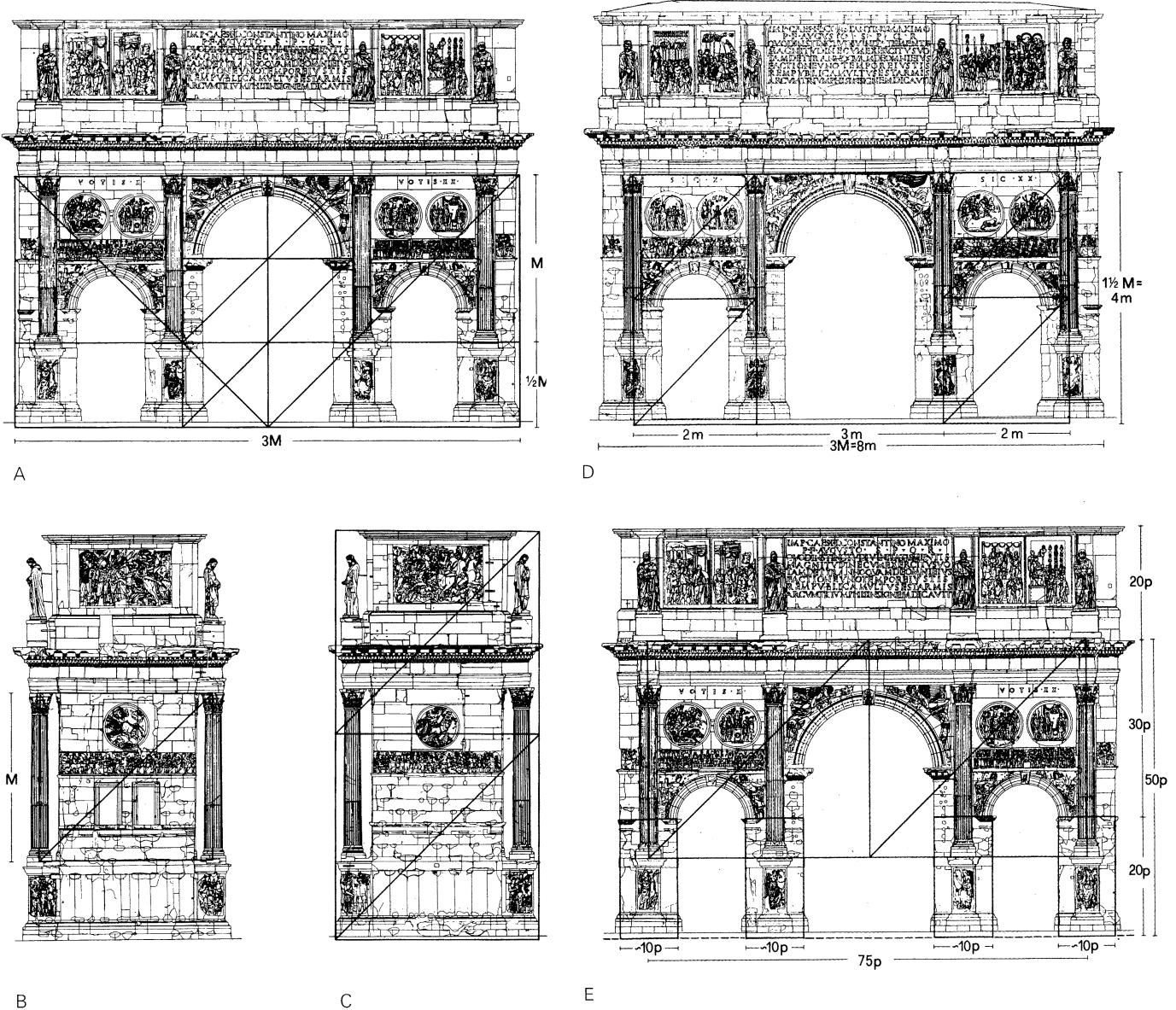


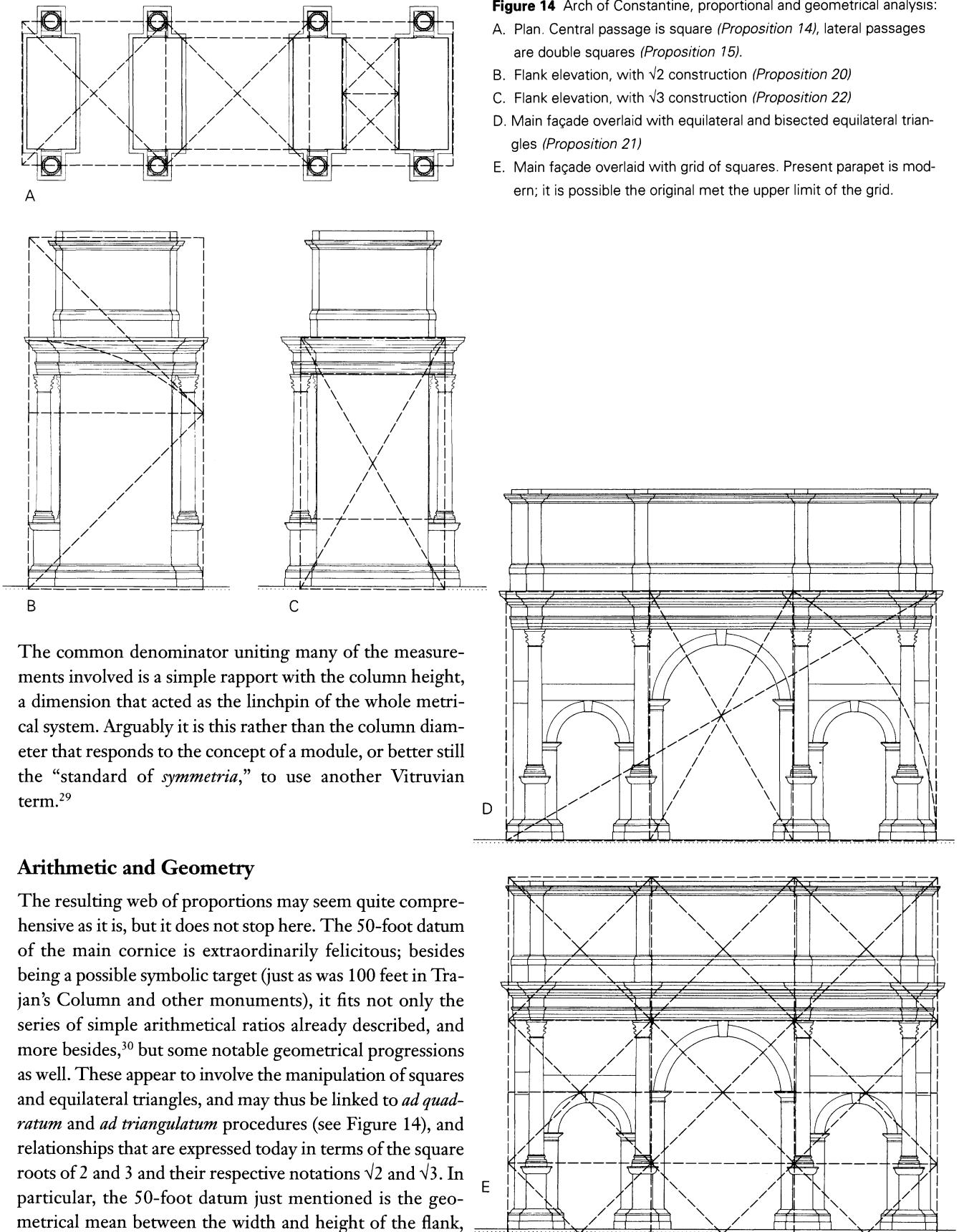
Figure 13 Arch of Constantine, proportional analysis of the elevation
 A North elevation showing 1:1, 1:2, and 1:3 relationships involving column height (*Propositions 2, 3, 4, 5, 6*)
 B. West elevation showing 1:1 relationship involving column height (*Proposition 1*)

- C. East elevation with 2:1 relationship (*Proposition 13*)
- D. South elevation showing 1:2, 2:3, 1:4, and 3:4 relationships involving fornices (*Propositions 7, 8, 9, 10, 11*)
- E. North elevation showing two types of 2:1 relationships involving fornices and piers (*Propositions 12, 19*)

height of the order and the width of the three fornices combined (*Proposition 12*; Figure 13, E).

Analogous mathematics affect both the shape of the flanks, which are double squares (*Proposition 13*; Figure 13, C), and the plan, with its square and double-square passages (*Propositions 14, 15, 16*; Figure 14, A). Finally, the series of

1:1 and 1:2 relationships is complemented by the equivalence in the width of the lateral passages and that of the piers either side (*Propositions 17, 18*), and by the double-square elevation for the piers themselves (*Proposition 19*; Figure 13, E), provided it is assumed that the original ground level lay about half a foot below the modern one.²⁸



The common denominator uniting many of the measurements involved is a simple rapport with the column height, a dimension that acted as the linchpin of the whole metrical system. Arguably it is this rather than the column diameter that responds to the concept of a module, or better still the “standard of *symmetria*,” to use another Vitruvian term.²⁹

Arithmetic and Geometry

The resulting web of proportions may seem quite comprehensive as it is, but it does not stop here. The 50-foot datum of the main cornice is extraordinarily felicitous; besides being a possible symbolic target (just as was 100 feet in Trajan's Column and other monuments), it fits not only the series of simple arithmetical ratios already described, and more besides,³⁰ but some notable geometrical progressions as well. These appear to involve the manipulation of squares and equilateral triangles, and may thus be linked to *ad quadratum* and *ad triangulatum* procedures (see Figure 14), and relationships that are expressed today in terms of the square roots of 2 and 3 and their respective notations $\sqrt{2}$ and $\sqrt{3}$. In particular, the 50-foot datum just mentioned is the geometrical mean between the width and height of the flank,

$$\begin{array}{cccc} \text{since} & 35\text{ft} & 50\text{ft} & 70\text{ft} \\ \text{relate as} & 1 & \sqrt{2} & 2^{.31} \end{array}$$

Incredibly, the same dimension is also the geometrical mean between the column height and the overall length of the arch, since $28\frac{1}{4}\text{ft}$ 50ft $86\frac{1}{4}\text{ft}$
relate as 1 $\sqrt{3}$ $3^{.32}$

The presence of *ad triangulatum* is intriguing, for studies of the Roman arches at Orange (Figure 15), Pola, Rimini, and Susa suggest there was a definite link between such geometry and this type of building.³³ However, we do well not to jump to conclusions. It is all too easy to trace lines over elevations and convince ourselves of patterns that did not necessarily occur to the original architect. Early in this century, Jay Hambidge inspired many with tracings of “Dynamic Symmetry” on the façade of the Parthenon, but recent scholars distance themselves from such notions.³⁴ As part of his monograph on the Arch of Septimius Severus, Richard Brilliant proposed an elaborate geometrical scheme (Figure 16),³⁵ but in my view its simpler components, including some 1:1 relationships, evoke instead an arithmetical process of juggling the proportions of the whole and the parts (Figure 17).³⁶

In general, Roman architects were more likely to use geometrical procedures in composing plans than elevations.³⁷ Vitruvius, after all, used geometry for planning theaters but arithmetic alone for their elevation.³⁸ Equilateral triangles were often used in laying out amphitheaters, but their façades consistently display arithmetical ratios. It is true that at the Colosseum equilateral triangles do fit the repeating bays of the second and third stories (Figure 18), but this followed inevitably from making the intercolumniations 20 feet wide, or half the story heights of 40 feet.³⁹ Then again, can we be sure that the 7:4 ratio at the Arch of the Sergii at Pola was not present on its own merits, and not merely as an approximation to $\sqrt{3}$?⁴⁰ Its appearance at the Arch of Constantine could likewise be merely a by-product of rounding off the cornice height to 50 feet.

Opinion may divide over the primacy of arithmetic or geometry, but in any event here is simplicity itself in both respects.⁴¹ If geometrical procedures were used, they probably revolved around a basic grid (see Figure 14, E).⁴² It is interesting to note that while planning grids found widespread application in the Graeco-Roman period, their use in elevation seems to have been a relatively late development.⁴³ Whatever the precise strategies adopted, the point is that Constantine’s arch was composed using conceptually simple means to produce a design of unusual richness and coherence.

In the course of working up the design, the ideal

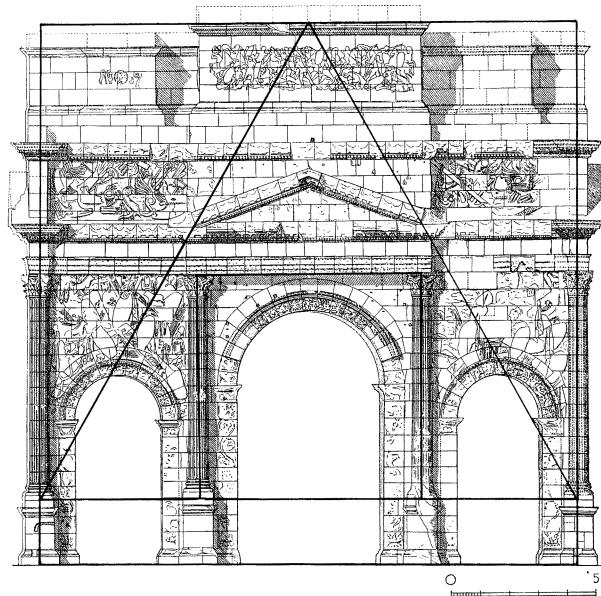


Figure 15 Arch at Orange, main façade with superimposed squares and equilateral triangle

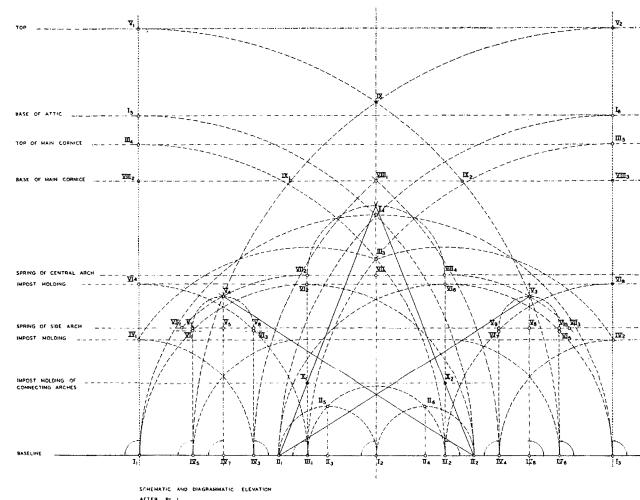


Figure 16 Arch of Septimius Severus, proposed geometrical design scheme according to Richard Brilliant

scheme was doubtless modified slightly for a number of reasons. Once the project came to be specified in dimensions, a certain inconvenience flowed from the point of departure, the column height of $28\frac{1}{4}$ feet. For example, the combined length of the three fornices, theoretically $75\frac{1}{6}$ feet (from *Propositions 9 and 10*), became 75.⁴⁴ The building has in fact a series of dimensions that likewise correspond more or less to multiples of 5 or of $2\frac{1}{2}$ feet, thereby creating further sim-

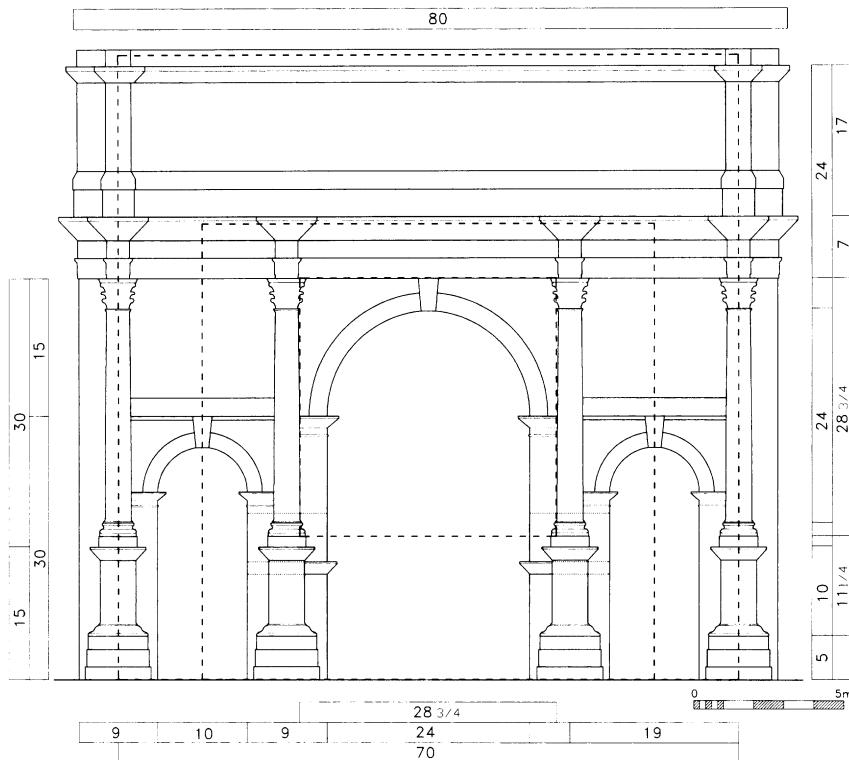


Figure 17 Arch of Septimius Severus, schematic elevation, 1:250, overlaid with principal dimensions and 1:1 relationships shown in broken line

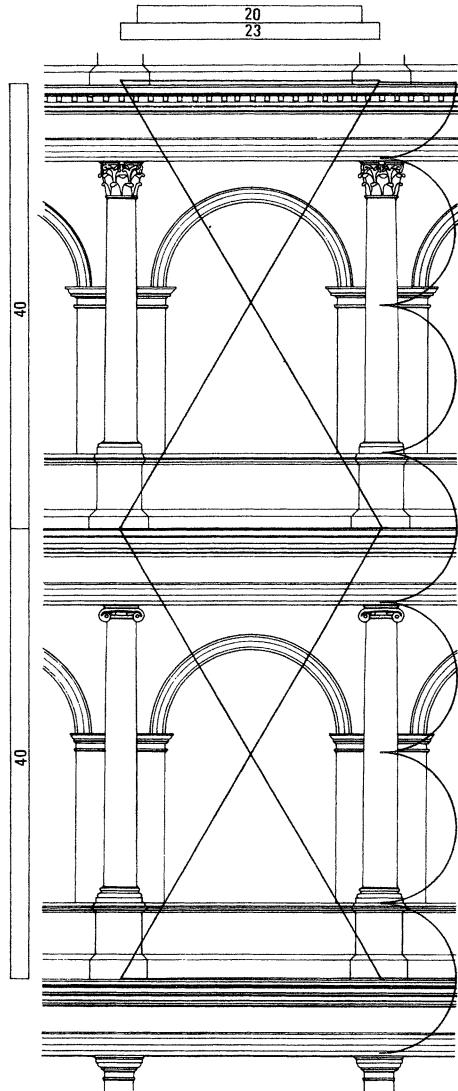
ple ratios (see Figure 13, E).⁴⁵ Another source of modifications arose from the conflicts that were bound to occur in a project so rich in interconnections. The central intercolumniation is one such example, being a dimension governed by two distinct ideals. It should equal the column height, 28 1/4 feet (*Proposition 3*), but other proportions governing the central fornix implicated 29 1/4 feet,⁴⁶ hence the compromise value of 29.⁴⁷ A further generalized source of imprecision lay in dimensional variations inherent in the use of spolia. Notwithstanding all these factors, the accuracy of the principal proportions is a remarkable testimony to the dedication of the Constantinian architect. Of the twenty-two “propositions” listed, twelve are executed within a margin of 5 centimeters, five within a margin between 5 and 10 centimeters, and only five within a margin exceeding 10 centimeters.

Proportion was very much still on the agenda in late antiquity. The use of spolia of obviously disparate sizes did not prevent the orchestration of rigorous mathematical schemes in Santa Costanza and the Temple of Saturn.⁴⁸ Indeed, architects of this period may have committed particular zeal to mathematical abstractions precisely because so many other areas of design were conditioned by the reliance on secondhand materials. It is almost as if the impossibility of achieving a satisfactory *eurythmia* (visual

harmony, including the quality of being well fitted) propelled the architect to lavish particular care on that other key Vitruvian principle, *symmetria* (mathematical harmony). The success of the arch in these terms was, it seems, the architect’s triumphant response to the spirit of the whole enterprise, as declared by the inscription: to celebrate Constantine’s victory over chaos thanks to “divine inspiration and greatness of spirit” (INSTINCTV DIVINITATIS MENTIS MAGNITUDINE).

The Corinthian Order

Given the key role in the design played by the columns, and the fact that dimensional and proportional simplicity so often go hand in glove in Roman architecture, what explains the awkward column height of 28 1/4 feet? The cause lies in that of the *shafts*, 24 feet, a dimension eight times the diameter of 3 feet. This happy combination made it a popular shaft size; at any rate, ones this big turn up in prestigious buildings all over the empire. Examples of first-time usage in Rome include Augustus’s forum, Trajan’s forum, and the Arch of Septimius Severus, and elsewhere the Library of Hadrian in Athens, the court of the sanctuary at Baalbek, and the Severan temple in Lepcis Magna. John Ward-Perkins was the first modern scholar to highlight the standardization of lengths in multi-



ples of 5 feet,⁴⁹ but it should not be forgotten that multiples of 4 and 8 feet were also common, given that they yielded half and whole foot diameters in conjunction with the favored slenderness of 8:1 (Figure 19).⁵⁰

Shaft size was especially important where monoliths of marble and granite were involved, since they had to be ordered early on in a contract due to the time lag associated with their supply. Cicero's correspondence tells us that he commissioned *portasanta* shafts from Chios in the Aegean for the construction of his daughter's funerary shrine even before finalizing the acquisition of the site.⁵¹ On different occasions emperors made gifts of sets of shafts,⁵² the receipt of which could well have conditioned the design of the buildings that housed them. Problems with the supply of monoliths from Egypt had a decisive impact on the resolution of the Pantheon portico.⁵³

Multiples of 4 ft suit a shaft slenderness of 8:1
Multiples of 5 ft suit the 6:5 rule

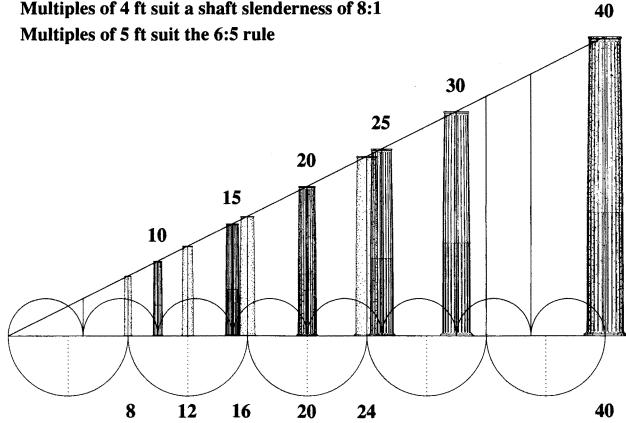


Figure 18 Colosseum, Rome, elevation showing second and third stories of a typical bay, 1:200, with superimposed equilateral triangles and key dimensions. Ratio of intercolumniation to story height is 2:1.

Figure 19 Diagram illustrating most common heights for shafts of Corinthian and Composite columns in the imperial period. Unfluted shafts represent those with multiples of 4 feet; fluted shafts represent those with multiples of 5 feet.

Where shafts were recycled, their dimensions naturally depended on the availability of a consistent set of an appropriate scale. The material was another important factor; the salmon-honey-colored Numidian marble known as *giallo antico* was chosen for the semimonoliths since it suited the project's polychromy. The original effect has to be mentally reconstructed, since the accumulated centuries of wear has made white and colored marbles alike converge toward a dull buff. Together with the (probably) deep green porphyry frieze in the main entablature, the red porphyry paneling around the tondi, the purple-veined *pavonazzetto* barbarians and their greenish-gray *cipollino* bases, the shafts completed a rich palette like that visible in the Pantheon today, and indeed more typical of internal rather than external spaces. Given the contraction of operations at the *giallo antico* quarries at Chemtou in Tunisia, and the partial disintegration of the imperial system of marble distribution, it is unlikely that shafts as magnificent as these were manufactured after the end of the Severan period. In theory, they could have come from Augustus's or Trajan's Forum, given that both had *giallo antico* shafts of the same size and likewise made of two pieces. There are minor differences, however, notably in the cabling that fills the lower part of the flutes, which is flat in the earlier monuments but convex in Constantine's.⁵⁴ Convex cabling may well be a Hadrianic innovation, given that it is found on the *giallo antico* and *pavonazzetto* shafts inside the Pantheon, as well as on *giallo* ones from the

Piazza d'Oro complex at Hadrian's Villa; in short, the shafts probably date to the Hadrianic period or later. There is also reason to doubt that Trajan's Forum was in part dismantled as early as the fourth century, for this sits ill with the lavish praise of it by Ammianus Marcellinus on the occasion of the visit of Constantine's son Constantius II.⁵⁵ It has been suggested that despoliation could have been instigated on what might be called a "surgical" basis, with attentive remedial stitching,⁵⁶ but even this is hard to reconcile with a setting of such civic importance.

It is true that St. Jerome tells us that Constantinople was constructed thanks to "denuding virtually all the cities" in the eastern empire of statuary, but this scenario does not transpose easily to the architecture of Rome itself. Instead of Constantine's agents "actively dismantling a number of Rome's distinguished monuments,"⁵⁷ we might better imagine them assembling the best from stockpiles of materials that had, for a variety of other reasons, already come to be set aside. The way in which the celebrated reliefs of the Palazzo della Cancelleria were discovered is consistent with such a scenario,⁵⁸ and there were after all legal provisions protecting the quality of urban frontage against disfigurement by the removal of marbles.⁵⁹ So while it was crucial for Constantine's program that the panels from the Great Trajanic Frieze, the statues of the defeated, and the *giallo antico* shafts should invoke direct associations with the Forum of Trajan and other imperial monuments of comparable rank, this was not necessarily their actual provenance. His conquest of Rome was not after all of the same kind as Sulla's conquest of Athens four centuries earlier, when the dictator had columns from the Temple of Olympian Zeus removed and brought to Rome as trophies, which were then used, perhaps, in the reconstruction of the Temple of Jupiter Optimus Maximus on the Capitoline.⁶⁰ These were real spolia in the ancient sense of military booty (modern borrowing of the term for artistic and architectural contexts goes back only as far as the sixteenth century).⁶¹

Columnar proportions are another key issue. The main rule for the design of the imperial Corinthian order—one at variance with the theories of Vitruvius and his Renaissance followers—fixed the column height as $\frac{6}{5}$ that of the shaft. These particular columns are entirely canonic in this respect (within an average tolerance of 0.15 percent), and it is this ratio that determined the "odd" height of 28 feet and 9 or 10 inches.⁶² In fact, they conform precisely with a standard orthodox scheme, one that I have called "Scheme C" (Figure 20).⁶³ The same system also anticipates that the lower diameter of the shaft is equal to that of the astragal at the top of the shaft, the height of the kalathos of the capital, and half of the diagonal width of both base and capital.

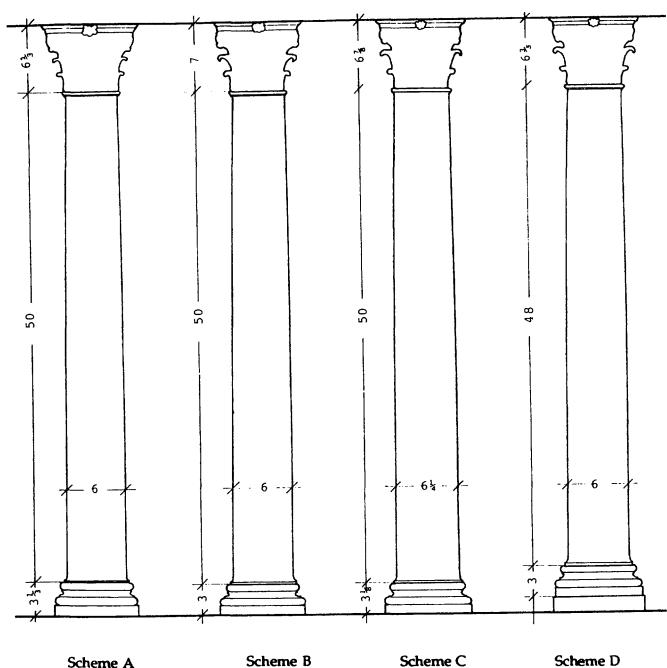


Figure 20 The most popular proportional schemes used for the imperial Corinthian column, assuming a common height of 60 feet. Columns of the Arch of Constantine conform with Scheme C, or approximately with Scheme D if plinth under base is included. H stands for column height, h for shaft height, D for shaft diameter, HB for base height, and H' for column height including subplinth.

Scheme A	Scheme B	Scheme C	Scheme D
$H = 6/5h$	$H = 6/5h$	$H = 6/5h$	$H = 6/5h$
$H = 10D$	$H = 10D$	$h = 8D$	$h = 8D$
$HB = D/2$	$HB = 5D/9$	$HB = D/2$	$HB = D/2$ $H' = 10D$

All these relationships appear, for example, in the Pantheon. But Rome was not by any means the sole locus for such orthodoxy. Its vast geographical range is illustrated by the fact that the arch's columns happen to be not only the same size but also the same shape as those of the Library of Hadrian in Athens and ones in the sanctuary at Baalbek; meanwhile, the same is true of the Arch of Septimius Severus too, even though the capitals are Composite rather than Corinthian. Allowing for the inevitable minor variations, it is clear that all the dimensions listed in Table 2 conform to nominally identical sets.

With such "coincidences" in mind, the student of Roman architecture should think twice before accepting Pierre Gros's sweeping, if seductive, generalization: "The empirical character of Roman architecture, [and] the almost total absence of a normative system, becomes evident to anyone who undertakes its study, whatever the type of

Table 2 Comparison of selected Corinthian and Composite columns with ideal dimensions predicted by Scheme C for a column 3 feet in diameter.

Dimensions are quoted in meters, to the nearest half centimeter, with nominal values in Roman feet, and derive from measurements by the author, save for those relating to the upper parts of the Arch of Constantine.

Taking the exterior orders from the Library of Hadrian at Athens, the altar court at Baalbek, the Arch of Septimius Severus, and the Arch of Constantine, respectively, the principal dimensions compare as follows:

Column heights:	8.490	8.58	8.530	8.510
Shaft heights:	7.080	7.14	7.070	7.080
Capital heights:	0.980	0.990	1.010	0.970
Shaft diameters:	0.870	0.890	0.885	0.885
Base heights:	0.430	0.45	0.450	0.450

building or the historic period taken into consideration.”⁶⁴ Coming together in Augustan times, the 6:5 and related rules became de rigueur in the second century. During the next, however, they fell from favor.⁶⁵ Although the columns from the Arch of Septimius Severus are reasonably canonic (matching the 6:5 rule with an error of a little under one-half of 1 percent), other monuments from this period start to display capitals and bases that are substantially too tall for the 6:5 rule.⁶⁶ Over time, capitals tended to take up an ever greater share of the elevation, a development that physically emphasized their significance. The increasing reliance on spolia undermined the logic of production, and by the second half of the third century canonic proportions are almost invariably absent (although they may persist in the components taken separately). The Mausoleum of Diocletian in Split is quite typical insomuch as the reconstituted columns err by more than 3 percent from the 6:5 rule.⁶⁷ So it is clear that in conforming to this outmoded canon the columns of Constantine’s arch are quite exceptional for their time, and indeed this orthodoxy makes a crucial contribution to the palpably harmonious, classical sense of balance of his monument.

The Mimesis of the Arch of Septimius Severus

The affinity between the Arch of Constantine and that of Septimius Severus is a commonplace of scholarly commentaries, and rightly so.⁶⁸ It is true that by late antiquity Rome was choc full of monumental arches, and that some influence was bound to have flowed from ones now lost, for example the triple arch in Trajan’s Forum. But since the relationship with the Severan arch is so dominant, it is safe to pursue this connection almost exclusively. Both the Sev-

eran and Constantinian structures have triple arches with four columnar ressauts on the main façades; both have the imposts of the central vault aligned with the keystone of the side aisles; both display a similar sculptural scheme, aside from the spolia, as is particularly apparent in the reprise of the sculpted pedestals and of the torch-bearing Winged Victories in the spandrels (see Figure 11). Such things are not to be taken for granted: quite a variety of organizational principles are to be found in the arches with three passages and/or four projecting ressauts at sites like Djemila, Orange (see Figure 15), Palmyra, and Sbeitla.⁶⁹ So, since in addition both arches in Rome have the same column size, the same width for the central fornix, and the same overall height, it is clear that the Severan monument supplied not just the model for Constantine’s in general terms, but the specific basis for its detailed design. This is in fact the chief secret of its success. Given that its composition was in this way effectively resolved, the architect could concentrate his mind on those changes that were necessary to accommodate the main elements absent earlier—the spolia.

Let us now look at the key stages in the transformation of the Severan project, beginning with its schematic elevation shown in Figure 21, A. The first major impetus for change flowed in the wake of the decision to include in Constantine’s project the huge battle frieze in the central passage (see Figure 5), thereby recalling the display of the famous friezes in the passage of the Arch of Titus even closer to hand. This meant that the arched links to the lateral passages in the Severan monument (see Figure 4) had to be suppressed. These elements played in fact a more important role in its design than is generally recognized, setting up a wonderful hierarchy of interpenetrating spaces and impost-to-vault relationships (Figure 22). It was the precisely the presence of these links that dictated the relatively vertical proportions of the side passages (for the crown of the former had to tuck under the imposts of the latter). Once these links disappeared, so did the requirement for such a height—and indeed a reduction favored the visibility of the frieze panels. Here then lies the justification for removing, in the new design, the lowest of the three fascias under the pedestals, an arguably inelegant feature in any case (Figure 21, B).⁷⁰

Next, the height lost was restituted to the attic (keeping the total unchanged). This decision gained prominence for the inscription—increasing its legibility on the long frontal approach down the Via Triumphalis (Figure 21, C)—while it also made the attic a more effective backcloth for the barbarian captives and the accompanying reliefs by allowing them to be raised well above the cornice, thus favoring their visibility when seen from below. A further

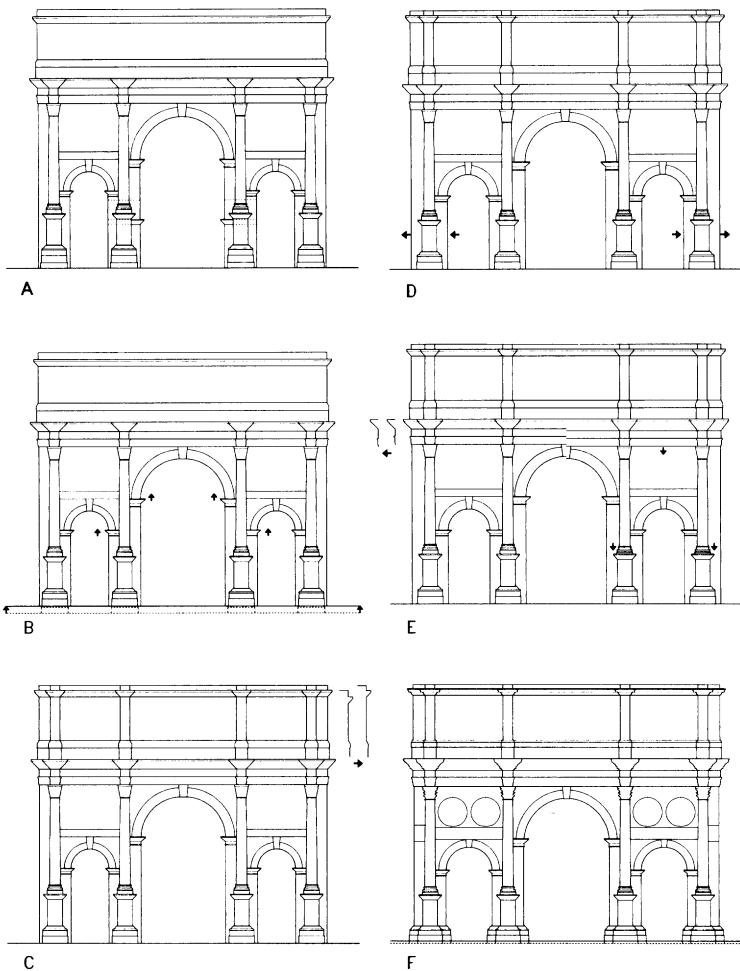


Figure 21 Schematic transformation of the Arch of Septimius Severus into that of Constantine. Each drawing is at the same scale and shares a constant column height. A: Arch of Septimius Severus; B–E: successive stages of design, modifying height of pedestals and imposts (B), height of attic (C), width of lateral fornices (D), height of components of the order (E); F: Arch of Constantine

alteration was the introduction of a tripartite scansion in sympathy with that below, a move that was triggered partly by the wish to incorporate the barbarian statues, partly by the awareness of other arches with articulated attics (for example, the Arch of Titus and the Trajanic ones at Ancona and Benevento). This is certainly one of the most successful transformations, for it gave vent to the thrust of the columns, while relieving the overbearing flat expanse of the Severan attic, which, rather than appearing as an adjunct, now became an integral part of the whole.

The last major change was the widening of the lateral fornices, presumably to accommodate the paired tondi and Aurelian reliefs in the attic (Figure 21, D; see Figure 6). The particular new dimension was doubtless calculated so as to achieve the proportional scheme described in the previous pages. Finally, the whole design would have been carefully reevaluated, with miscellaneous adjustments being made to the widths of piers, impost heights, size of the keystones, and so on, according to the emerging character of the new project, the supply of suitable spolia, and a consideration of molding profiles. Presumably the change in height of the

entablature, from 7 feet in the Severan arch to $7\frac{1}{2}$, reflected the availability of its components, and it may be that it was the imposition of an unwanted extra height that led to a corresponding reduction in the height of the subplinths under the columns, for in this way the height of the order above the pedestals remained constant (Figure 21, E).⁷¹ It is evident that further adjustments to the main façade were pretty minor, as shown by the scarcely discernible difference between the hypothetical project elaborated up to the preceding stage and the actual Constantinian realization (Figure 21, F). Otherwise, the new arch was made slimmer (a move suggested, perhaps, by the elimination of the links between the passages), the precise amount being tailored to achieve two of the important 1:1 relationships highlighted earlier (*Propositions 1, 14*).

So we may visualize the architect copying the Severan arch in a quite literal fashion, possibly using drawings of it as the starting point for the new endeavor. Here is a case of a mimesis hardly less significant than those linking the Arch of Titus with the Trajanic one at Benevento,⁷² Trajan's Column with that of Marcus Aurelius, the “twin” amphithe-



Figure 22 Arch of Septimius Severus, perspective looking across central passageway from one of the links connecting it with the lateral passageways

aters at Arles and Nîmes,⁷³ or the fifth-century b.c. temples at Agrigento that go by the name of Juno Lacinia and Concord.⁷⁴ The aim of course was not slavish copying, but emulation. In fact, the process of emulation always entailed reappraisal and change. When Trajan's Column was transformed into Marcus Aurelius's, the modifications made were more extensive than might appear at first sight, and they always—just as they do here—responded to specific considerations of program and practicality.⁷⁵

In singling out the Constantinian sculpture to illustrate his lament over decline in art, Berenson put the blame largely on the phenomenon of mimesis, which in losing vitality and elasticity from the midimperial period on, descended into mere copying.⁷⁶ But this reworking of the Arch of Septimius Severus does not come into the same category at all: here is a striving for emulation undertaken in a critical and principled fashion according to the best of ancient tradition. And much as modern sensibilities may recoil from first Raphael's and later Berenson's portrayal of decline in the sculpture of late antiquity, here is endorse-

ment of the former's assessment of the Arch of Constantine as proof of the continuing vitality of architecture, which was still “studied and practiced according to the good rules, and buildings erected in the same style as before.”⁷⁷

The Genesis of Constantine's Arch: What the Proportions Say

The proportions of ancient columns can yield a rough clue as to their date. For example, subject to local variations, Doric columns show a trend toward increasing slenderness over time, while the leaf range of Corinthian capitals tends to “grow.”⁷⁸ The proportions of entire monuments, however, are less easy to fit into a chronological framework. Nonetheless, they might still indicate if a project was built in one go or not, since it is reasonable to associate unified proportions with a unified project, and disjointed proportions with more than one phase. From this point of view, the balance tips in favor of a single campaign, since the critical 1:1 and 1:2 relationships not only appear in many guises, but also on both the front and the flank. Since part of the monument is undeniably Constantinian, this then should be the date for the whole. What is more, the key 1:1 relationship on the flanks implicate the axes of the existing *projecting* columns. The champions of a Hadrianic arch might argue that the same proportions could have applied to its overall width, measured across the outer edges of the supposedly smaller pedestals (see Figure 8), but this leaves out of account the 2:1 proportion fixing the overall dimensions of the actual structure (see Figure 13, C).

The anachronistic orthodoxy of the columns might be explained if they mimicked semicolonnades belonging to an earlier structure, but this is contradicted on several counts. Melucco Vaccaro speaks of “bases of semi-columns still visible behind the actual ones,”⁷⁹ but on inspecting the blocks in question I could detect no signs of the rounding in plan to be expected of the moldings, apart from the effect of damage (see Figure 10). These pilaster bases vary extensively in size—which is a surprising characteristic if they once belonged to a major second-century monument. Furthermore, a couple measure only 32 centimeters in height, an improbably squat proportion for columns 88–89 centimeters wide.⁸⁰ It might be imagined that the original bases were reworked, but their upper limit could not have been higher unless they were much wider (otherwise the present profile had to echo the previous profile, it being impossible to carve a torus where there had once been a scotia). But wider pilasters imply unusually squat proportions for the columns as a whole, unless they be Doric or Ionic. This is another feature that is hard to reconcile with a major Hadri-

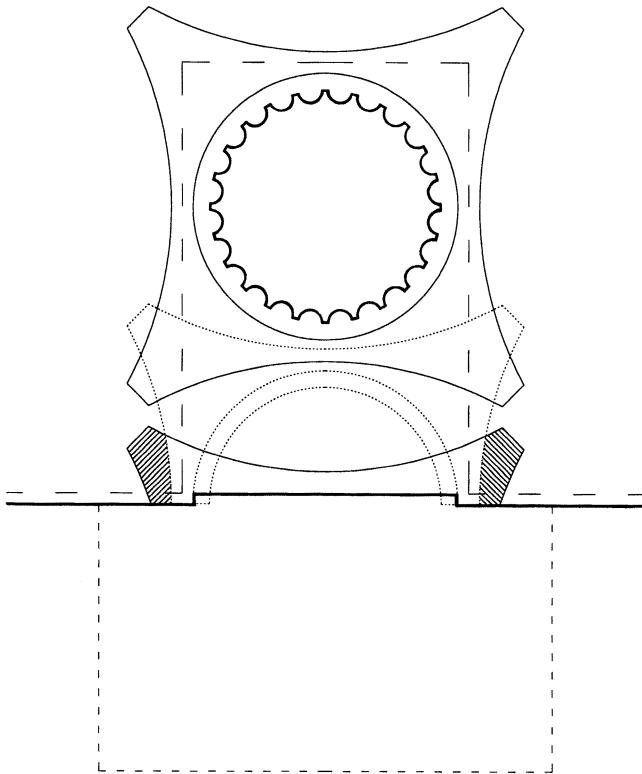


Figure 23 Arch of Constantine, reflected plan detail of projecting Corinthian column and accompanying pilaster. Dotted line shows outline of a hypothetical preexisting semicolumn; hatching illustrates portion of the existing pilaster abacus, which could not have been carved by trimming down such a semicolumn.

anic monument, given the primacy of Corinthian and Composite, especially since both orders were imbued with latent triumphalist overtones.⁸¹

Similarly, blocks that once accommodated semicapitals cannot have been recarved to yield the existing pilaster capitals (Figure 23). In any event, stylistic considerations show that most of them are of high imperial date, and therefore spolia. The notion that they could have been inserted into a preexisting structure seems optimistic to say the least, for these are objects that are delicate and massive at the same time. Unlike the veneer for the pilasters themselves, their capitals typically form part of blocks that run back into the structure by a distance comparable with their width. All things considered, the simplest explanation is the “traditional” one, namely, that the columns were erected in a single, Constantinian, campaign. Their canonic form is best explained if they were lifted lock, stock, and barrel from a single monument from the Hadrianic or Antonine periods, since this is the rough date of the capitals on stylistic grounds.⁸² By contrast, the summary quality of the pilaster

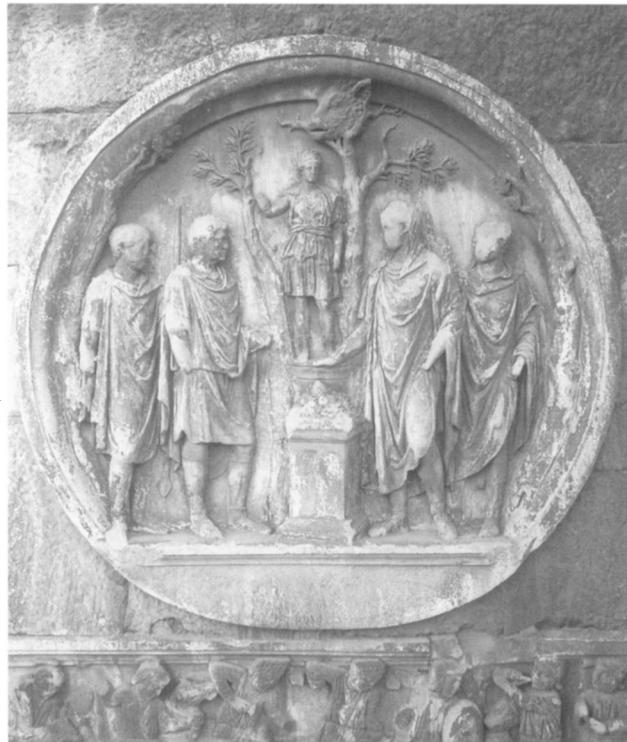


Figure 24 Arch of Constantine, tondo at east end of south façade representing a sacrifice to Diana thought to be celebrated by Constantine (originally Hadrian)

bases reflects both their Constantinian date and their concealed position. As for the entablature, this has orthodox proportions in its present form only because the cyma was cut away; the hypothetical predecessor must have had one, in keeping with normal practice (as represented by the Library of Hadrian and the Arch of Septimius Severus), in which case the proportions of its complete entablature would have been exceptionally heavy.⁸³ Once again, the existing configuration is most economically explained as a Constantinian assemblage.

The dialogue between the Severan and Constantinian arches is also significant, given that the rationale behind the transformation of the first into the second is so clear.⁸⁴ The alignment of the crown of the subordinate vaults with the springing of the main one is a sound architectonic principle in its own right (one used to great effect in three dimensions at the basilica begun by Maxentius and completed by Constantine), but its application in the later arch is likely to reflect the particular influence of the Severan precedent. Perhaps it is the reprise of this morphology that explains why the frieze,

tondi, and votary inscriptions are so cramped for space, why the frieze is less tall than on the flanks, and why the roundels had to be cut down (Figure 24; see Figure 6). This says two things: first, that the proportional scheme took precedence over detail; and second, that Constantine's arch, in its entirety, came after the Severan one. All things considered, it is surely right to keep calling the monument in the usual way.

A Unity of Intention

With its genesis now established, it is appropriate to turn to matters of wider import. The unitarian character of the Arch of Constantine can be perceived in everything from the choice of setting to the orchestration of the spolia as far as possible according to a coherent set of political and iconographic intentions.⁸⁵

The arch stands where it is not because its nucleus already existed, but on account of a Constantinian master plan. Sited on the triumphal route leading to the Forum from his most ambitious restoration project in the city, the Circus Maximus, the building fronted a monumental celebrative space that he endeavored to make his own (see Figure 2). This was defined by a series of huge structures full of significance: the great Flavian amphitheater; one end of the Temple of Rome and Venus, the cella of the latter now appropriated by Constantine as the shrine of his family line, the second *gens Flavia*;⁸⁶ and the Colossus, the 100- or 120-foot-tall statue of the sun god Sol (and the source of the name that was transferred to the amphitheater in the Middle Ages). Sol Invictus was the pagan divinity with which Constantine principally identified himself before the shift toward the Christians' God, and, what is more, Sol may be said to have presided symbolically over the shift itself, for this was in fact a period when Christ was popularly identified with the sun god, and vice versa, witness the cult of Christ-Helios.⁸⁷ Sol opposes Luna in the roundels on the west and east ends of the arch, evoking the cosmic dimension of the new order.⁸⁸ The connection was reinforced at an urban level by the fact that the axis of the arch aligns almost exactly with the Colossus (the base of which is still visible), thanks to the already established alignment of the latter with the Via Triumphalis. So the immense statue was the first monument that came into view on passing through the arch.⁸⁹ It has also been speculated that its gaze was orientated toward the Via Triumphalis, and thus also toward the arch itself.⁹⁰ Meanwhile, the towering bulk of (what had become) Constantine's basilica, still so imposing today, could perhaps have been glimpsed behind the precinct of the Templum Romae-Gentis Flaviae. In short, the views from the arch (see Figure 2) presented a singularly Constantinian spectacle.

The main façades of the arch respond thematically to the urbanistic program, with the well-known predominance of military scenes on the south side and civic scenes on the north side, that is to say, toward the civic space just mentioned. An intriguing sign of this distinction is manifest in the carving on the north face alone of a nimbus, the pagan precursor of the Christian halo, behind the heads of Constantine and the senior figure that alternates with him on the tondi—most probably his father Constantius Chlorus (Constantius I) but possibly his coemperor Licinius, whom Constantine finally eliminated in 324.⁹¹ The nimbus images, solar orbs in origin, suitably face the Sol Colossos.⁹² They also tell the viewer that the divinity they signal comes after, and therefore by virtue of, the military triumph the monument records. And if it is indeed Chlorus, his participation can be understood as reinforcement of the dynastic theme expressed in urbanistic terms.

The narrative function of the arch is sustained by an anticlockwise movement passing from the preparation for war, war itself, and on to victory. Its most coherent manifestation is, naturally, the only continuous new ribbon of sculpture, the Constantinian frieze describing the principal events connected with his "liberation" of Rome. It starts on the west side with his army's departure from Milan, turns to the south with first the siege of Verona and then the battle of the Milvian Bridge, moves on to the east with the army's entry procession into Rome, and concludes on the north side with first Constantine's address in the Forum (see Figure 6) and then his distribution of largesse (*larginio*) to the people of Rome. The two main cycles of spolia—the tondi and the panels on the attic—cannot of course tell the same story literally, but they do sustain parallels, particularly at the beginning and end of the sequence. Logically, the tondi begin with the departure for the hunt and close with the sacrifice to Hercules, a scene that was chosen for its triumphal overtones, for the god is shown holding a personification of victory in one hand. The attic cycle begins with the emperor (né Marcus Aurelius)⁹³ addressing the army in an *ad locutio* scene outside a walled city, one that lends itself to assimilation with the similarly walled city of Verona shown in the narrative frieze below (see Figure 7).⁹⁴ In general terms, the tondi serve the present task by means of metaphor, with hunting presented as a manifestation of imperial *virtus* combating bestial and chaotic forces. By contrast, the Aurelian panels lend themselves more directly, for their first home was in any case a triumphal arch.⁹⁵

The spolia performed more than just a complementary function to the narrative. Recycled reliefs and parts of the orders had already been built into Galerius's arch in Thessalonika (c. 300), Diocletian's Arcus Novus (294?),⁹⁶ and

probably still earlier on another one, demolished in modern times, that also straddled the Corso, ancient Rome's Via Lata, the "Arco di Portogallo" (250s to 270s?).⁹⁷ The use of secondhand material may be seen in Berensonian terms, as a way of overcoming a decline in skills and a "confession of inferiority to the past," but as numerous studies have shown, it took on a new dimension in Constantine's time, transcending the act of despoliation engendered by economic necessity.⁹⁸ As Richard Brilliant has put it, Galerius's arch is *bricolage*, but Constantine's is not.⁹⁹ The innovation lies in promoting recycling as a positive choice aimed at identifying Rome's new ruler with the "good" emperors of the past, particularly Trajan, Hadrian, and Marcus Aurelius.¹⁰⁰ The bringing up to date of the portraits confirms this intent, as does the apparent representation of statues of Trajan and Hadrian in the narrative frieze, authorizing as it were Constantine's oration by virtue of their position at either end of the rostra (see Figure 6). No longer is mimesis, in the classic sense, so relevant; what counts above all is the recognition factor in broad terms, for many of the finer pieces in this puzzle must have been either invisible to observers admiring the monument from below, or beyond the cognizance of many of them in any case. Hence the novel introduction of supplementary "labels" to help the viewer understand that the protagonist of the reliefs in the main passage (see Figure 5) was now the recipient of the arch, Constantine: *LIBERATORI URBIS* (To the liberator of the city) and *FUNDATORI QUIETIS* (To the founder of tranquility).¹⁰¹

Also present, courtesy of the formal, proportional, and dimensional echoes described above, is Septimius Severus, not everyone's idea of a "good" emperor, but nonetheless a plausible candidate in view of the fact that he was the last before the reign of tumult that prevailed until the accession of Diocletian.¹⁰² Indeed, it seems that his arch was copied quite as faithfully as it was precisely so as to underline the recovery of past glories, making it transparent to all that the new monument took its cue from a traditional precedent in the traditional heart of Rome. In a sense, this neutralized the disturbing connotations of the representations of civil war, by reassuring Rome's citizens that Constantine had come not to break up the old order but to restore it. There is also a parallel between the extreme lucidity of the proportional scheme and the general desire to bring order to the accumulation of spolia, and to make it speak plain to the viewer. In effect, the proportional unity of Constantine's arch mirrors that of the whole—something that should hardly come as a surprise, for the formal and mathematical aspect of design was not, for a Roman architect, a discipline divorced from the rest.

The constant interweaving, or juxtaposition, of old and new mirrors another key theme: the ambiguous stance of

the arch with respect to its religious orientation. This is first and foremost apparent in the phrasing of the main inscription: "To the emperor Flavius Constantine the Great, pious and fortunate, the Senate and People of Rome, since by divine inspiration and greatness of spirit with his army he avenged the State on the tyrant and all his faction once and forever in just battle, dedicated this arch resplendent with triumphs."¹⁰³ What should be understood by this "divine inspiration"? Modern scholars see the divinity to be pagan, Christian, or Constantine himself; perhaps a comparable latitude of meaning occurred to ancient readers too.¹⁰⁴ It was all things to all comers. The possible Christian overtones associated with Sol Invictus have already been mentioned. Also significant is the omission, here or anywhere else on the arch, of any reference to the traditional climax of triumphal rite, the sacrifice to Jupiter Optimus Maximus on the Capitoline.¹⁰⁵ This echoes Constantine's refusal to so conclude, as custom ordained, his victorious entry into Rome, instead retiring "hurriedly" to the Palatine. Hence José Ruysschaert's masterful remark, that "the arch is pagan for that which it says, Christian for that which it doesn't."¹⁰⁶

There is a serious impediment here, however, inasmuch as modern scholarship unanimously identifies Constantine as the celebrant of the sacrifice to Diana (see Figure 24), the single such scene in the tondi on the south façade. On the north, meanwhile, the sacrificer is not Constantine, but Licinius or Constantius Chlorus. The violence that Constantine's participation in the core act of pagan ritual does to Ruysschaert's "silence" is to some extent diminished if the hunting-cum-sacrifice cycle referred to a time preceding Constantine's "conversion" of 312. But Constantine's identification is itself open to question, for the head on the Diana tondo is extremely poorly preserved.¹⁰⁷ At first glance the slimness of the figure brings to mind the youthful Constantine of the boar hunt rather than the older protagonist of the sacrifice to Apollo (Figures 25, 26; see Figure 6), but much of this effect may be due to erosion. Then there is the glimpse of youthful curls just behind the ear, where the hair is incompletely covered by the headdress—but this could be a remnant of Hadrian's hair. Obviously it makes sense to concentrate on the side of the face turned toward the backing surface, the one shielded from the elements and consequently more intact (Figure 27). The puffy eyelids evoke an older man, but the smoothly shaven cheeks evoke a younger one; there is still too little to go on. There is, however, a small area of forehead which is well enough preserved to suggest that the hair did not come forward in a fringe but rather receded.¹⁰⁸ Who our subject might be I hesitate even to guess; the older emperor in the tondi on the north side—whether Constantine Chlorus or Licinius—



Figure 25 Arch of Constantine, detail of tondo representing Emperor Constantine (originally Hadrian) as protagonist of a boar hunt (see Figure 6)



Figure 26 Arch of Constantine, detail of tondo representing a sacrifice to Apollo (see Figure 6), portrait of senior emperor, either Constantine's father, Constantius Chlorus, or Licinius

Figure 27 Arch of Constantine, detail of tondo representing a sacrifice to Diana, portrait usually attributed to Constantine



is the most obvious candidate, but these show him with a close-cropped beard. My point is only that the absence of a fringe on the celebrant of the sacrifice to Diana seems to rule out Constantine, thus producing a small but critical rebalancing of the religious equation.

If this deattribution is correct, then throughout the tondi cycle it is Constantine who hunts; hunting befitting a warrior-emperor in the prime of life, showing him metaphorically eliminating inhuman and chaotic forces.¹⁰⁹ The sacrifices are conducted by someone other than Constantine, an older man (or men) who was (or were) pagan. This provides a justification in temporal terms for the sequential disposition of the tondi anticlockwise, with the

sacrifice of bear and boar preceding the respective hunts, rather than the contrary as might logically be expected. In other words, Constantine's forebears precede him, and pagan precedes Christian. Constantine's own spiritual inclination is left indeterminate; so both his position, and Ruysschaert's exposition of it, achieve greater coherence. Constantine's absence from the sacrifices partakes of a deliberate, indeed vital, ambiguity—one that was designed to offend neither pagans nor Christians. It neatly matches the famous ambiguity of the attic inscription, with its polyvalent "divine inspiration" phrasing. In late antiquity the celebration of the *adventus* to Rome, with all its pagan paraphernalia, had become a prerequisite of the imperial accession. In the words of Thomas Mathews, "Invoking this technical term is like humming the first bars of Beethoven's *Eroica*, it carries such a load of triumphal associations."¹¹⁰ Constantine could not afford to forgo either the ceremony or the monument that perpetuated it, for pagans as well as Christians had to be convinced of the just authority of his rule. The latter, however, were spared from seeing their defender indulging in an act so central to pagan cult.

Clearly a professional of consummate skill and judgment, the architect remains anonymous. Can we say more of his partner in design, the patron? The relationship between the two is, of course, crucial to the success of any architectural endeavor. Technically the patron was the Senate. The attic inscription tell us so, as do those in the main passage, being in the dative case. But the emperor's contribution must have been decisive, given the recutting of past emperors' images and the copious assembly of spolia, which, having been created for imperial monuments, presumably remained imperial property. The coherence of the iconography also points to Constantine as the driving force behind the project—albeit operating via a delegate, given his frequent absence from the capital. It may make for conceptual neatness to contrast the arch to his Christian benefactions, and so to portray it as a pagan monument commissioned by a pagan Senate, but this would be to simplify the complex intermeshing of imperial and senatorial institutions. The Senate may have built the arch, but it did as the emperor bid. Krautheimer was right, however, to identify the Forum and its surroundings as the arena where Constantine interfered least with the status quo.¹¹¹ In fact, Constantine was quite capable of erecting monuments with pagan overtones there even at a later date, like the Equus Constantini set up near the Severan arch in A.D. 334.¹¹² After the victory over Maxentius, under the protection of the *Chi-ro* sign daubed on his soldiers' shields, Constantine may have leaned toward the Christians' God, but his was a syncretic, inclusive faith, as typical for its time as it was later

to become unthinkable.¹¹³ In any event, arches continued to be built by Christian emperors for some time to come. Not so contaminated as were temples, triumphal monuments continued to be political necessities.

So Constantine's input comes through on several levels: in the urbanistic intentions; in the instruction to mimic the grandest arch in the Forum Romanum; in the orchestration of spolia and the sculptural program; in the careful attention to what was included and what was excluded. Most of all, it is manifest in the unitarian character of the project, and in its sweeping synthesis of past masterpieces of composition, proportion, sculpture, and iconography. History was compacted synchronically: the Arch of Constantine encapsulated old ways of design and heralded the new.

Notes

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1. Arthur L. Frothingham, "Who Built the Arch of Constantine? Its History from Domitian to Constantine, Part I," *American Journal of Archaeology* 16 (1912): 368–386; "Part II," *AJA* 17 (1913): 487–503; "Part III," *AJA* 19 (1915): 1–12; "Part IV," *AJA* 19 (1915): 367–384. The main opposition prior to the 1990s comes from Hans Peter L'Orange and Armin von Gerkan, *Der spätantike Bildschmuck des Konstantinsbogens*, 2 vols. (Berlin, 1939), 4–33, and José Ruysschaert, "Essai d'interprétation synthétique de l'arc de Constantin," *Atti della Pontificia accademia romana di archeologia, Rendiconti* 35 (1962/3): 79–100; idem, "Unità e significato dell'Arco di Costantino," *Studi Romani* 11 (1963): 1–12. For the consensus view, see Sandro De Maria, *Gli archi onorari di Roma e dell'Italia romana* (Rome, 1988), 203–211, 316–319; Alessandra Capodiferro, s.v. "Arcus Costantini," *Lexicon Topographicum Urbis Romae*, ed. Margherita E. Steinby (Rome, 1993), 1: 86–91.
2. Richard Krautheimer, *Three Christian Capitals: Topography and Politics* (Berkeley, 1982), 7–40; idem, "The ecclesiastical building policy of Constantine," *Costantino il Grande dall'antichità all'umanesimo. Colloquio sul cristianesimo nel mondo antico*, ed. Giorgio Bonamente and Franca Fusco, 2 vols. (Macerata, 1, 1992; 2, 1993), 2: 509–552, esp. 530ff.
3. Notably on the part of the then Minister of Public Instruction, Guido Bacelli, who had been instrumental in having the "Agrippan" inscription reset in bronze alloy just a few years before the investigations of the 1890s leading to the Hadrianic attribution; see Luca Beltrami, *Il Pantheon riven-dicato ad Adriano* (Milan, 1929), 10.
4. Alessandra Melucco Vaccaro and Angela M. Ferroni, "Chi costruì l'arco di Costantino. Un interrogativo ancora attuale," *Atti della Pontificia accademia romana di archeologia, Rendiconti* 66 (1993/4 [1997]): 1–60; Dora Cirone, "I risultati delle indagini stratigrafiche all'arco di Costantino," *Rendiconti* 66 (1993/4 [1997]): 61–76. See also Andreas M. Steiner, "Chi costruì l'arco

- di Costantino?" *Archeo* 9 (May 1994): 38–43; A. Melucco Vaccaro and A. M. Ferroni, "La conclusione delle indagini all'arco di Costantino: nuove evidenze e nuove proposte," *XIV Congreso Internacional de Arqueología Clásica*, Tarragona, 1993 (Tarragona, 1994), 273–274.
5. Clementina Panella and Patrizio Pensabene, "Riempiego e progettazione architettonica nei monumenti tardo-antichi di Roma," *Atti della Pontificia accademia romana di archeologia, Rendiconti* 66 (1993/4 [1997]), 111–283. See also Clementina Panella, Patrizio Pensabene, and Marina Milella, "Scavo nell'area della Meta Sudans e ricerche sull'arco di Costantino," *Archeologia Laziale* 12, no. 1 (1995): 41–59.
6. The conference, entitled Arco di Costantino, Giornate di studio (Rome, 24 and 25 September 1998), included addresses by Alessandra Melucco Vaccaro, Pietro Cicerchia, Giuliana Calcani, Angela Maria Ferroni, Dora Cirone, Patrizio Pensabene, Clementina Panella, Sabina Zeggio, Marina Milella, Matthias Bruno, and myself. Acts of the conference are not planned, but much of what was said by the "traditionalists" is contained in Patrizio Pensabene and Clementina Panella, eds., *Arco di Costantino. Tra archeologia e archeometria* (Rome, 1999).
7. See Sigfried Giedion, *Space, Time and Architecture* (Cambridge, Mass., 1941), 5; various contributions in *New Literary History* 17 (1986); David Carrier, *Principles of Art History Writing* (University Park, Pa., 1994), esp. 3–7. For recent discussion in *JSAH*, see Alina Payne, "Rudolf Wittkower and Architectural Principles in the Age of Modernism," *JSAH* 53 (1994), 322–342; Letters to the editor by M. F. Hearn and Peter Draper, *JSAH* 57 (1998), 238–240.
8. The final report of the Istituto Centrale team is announced for a forthcoming issue of *Bulletino di Archeologia*.
9. Although 315 finds the greatest consensus, some have argued for 313 (Frothingham, "Who Built the Arch"); 316 (Theodore V. Buttrey, "The Dates of the Arches of Diocletian and Constantine," *Historia* 32 [1983]: 357–383); and 325/6 (Larry Richardson, "The Date and Program of the Arch of Constantine," *Archeologia Classica* 27 [1975]: 72–78).
10. Bernard Berenson, *The Arch of Constantine or The Decline of Form* (London, 1954). See also Jās Elsner, "Berenson's decline or his *Arch of Constantine* reconsidered," *Apollo* (July 1998): 20–22. It has been proposed that the frieze is not Constantinian, but a recycled work taken from a tetrachic monument (perhaps an arch of Maxentius, see Sandra E. Knudsen, "The So-called Historical Frieze on the Arch of Constantine," *American Journal of Archaeology* 93 [1989]: 267–268), but this hardly affects the thrust of Berenson's polemic.
11. The tondi are in themselves the subject of an extensive bibliography; see most recently Mary T. Boatwright, *Hadrian and the City of Rome* (Princeton, N.J., 1987), 190–202; Robert Turcan, "Les tondi di Hadrien sur l'Arc du Constantin," *Académie des inscriptions et belles-lettres. Comptes rendus*, 1991: 53–80; Cécile Evers, "Remarques sur l'iconographie de Constantin. À propos du remploi de portraits des 'bons empereurs,'" *Mélanges de l'Ecole française de Rome, Antiquité* 103 (1991): 785–786, esp. 786–793; Andreas Schmidt-Colinet, "Zur Ikonographie der hadrianischen Tondi am Konstantinsbogen," in Fritz Blakolmer et al., eds., *Fremde Zeiten. Festschrift für Jürgen Borchhardt* (Vienna, 1996), 2: 261–273; Giuliana Calcani, "I tondi adrianei dell'arco di Costantino," *Rivista dell'Istituto Nazionale di Archeologia e Storia dell'Arte* 19–20 (1996–1997 [1999]): 174–201.
12. Calcani, "I tondi."
13. William B. Dinsmoor, "The Sculptured Frieze from Bassae (a Revised Sequence)," *AJA* 60 (1956): 401–452. For qualification, see Frederick A. Cooper in Brian C. Madigan, *The Temple of Apollo Bassitas, II. The Sculpture* (Athens and Princeton, N.J., 1993), 38ff.; Ian Jenkins and Dyfri Williams, "The Sculptured Frieze from the Temple of Apollo Epikourios at Bassae," in Olga Palagia and William Coulson, eds., *Sculpture from Arcadia and Laco-*
- nia* (Oxford, 1993), 57–77.
14. See n. 8 above. The excavations now being closed over, it is impossible to verify the conflicting reports of the two teams who worked around the monument in the early 1990s, that directed by Cirone and Ferroni to the south, and that directed by Panella to the north. In a preliminary report (Cirone, "Risultati"), the former propose that foundations of a Domitianic arch were covered over by those of the present arch, datable to the second century A.D., with the exception of later additions corresponding to the pedestals. This interpretation is contested by Panella and Pensabene, "Reimpiego," 251–259, and by Sabina Zeggio, "La realizzazione delle fondazioni," in Pensabene and Panella, eds., *Arco*, 117–137.
15. Melucco Vaccaro and Ferroni, "Chi construì," 10–13.
16. Ibid., 29. I limit myself to mentioning the porphyry because the evidence is in this case comparatively solid, which cannot be said in my view for the claims relating to the insertion of the panels of the Great Trajanic Frieze.
17. Panella and Pensabene, "Reimpiego," 228ff., 241ff.
18. Clementina Panella, "Tecniche costruttive e modalità di inserimento dell'apparato decorativo," in Pensabene and Panella, *Arco*, 43–73, esp. 54–58.
19. Panella and Pensabene, "Reimpiego," 180–182. As regards such discontinuities in the impost molding of the main passage, the counterexplanation (Melucco Vaccaro and Ferroni, "Chi construì," 23–24) sees them as the consequence of the purported dismantling and reassembly work that was necessary to introduce the panels of the Great Trajanic Frieze.
20. In this building, as elsewhere, appreciable differences were only permitted in the spacing of the modillions with respect to the different conditions of use, namely, in the run of cornice bonded to the wall, the sides of the ressaups, and on the front of the ressaups.
21. Matthias Bruno et al., "Determinazione dei marmi dell'Arco di Costantino su base archeometrica," in Pensabene and Panella, eds., *Arco*, 171–184.
22. For example, there are no obvious high imperial parallels for the plain treatment of the vaults, which were typically articulated with coffering, as in the case of the arches of Titus and Septimius Severus. Smooth vaulting would appear to be a characteristic of later construction, as in the Arch of Janus, see Panella and Pensabene, "Reimpiego," 241.
23. In addition, there are traces of anathyrosis on at least one of the blocks of the bottom course, a feature that is both a sign of a previous use, as well as an argument against the possibility that the molding was cut down (otherwise the anathyrosis would have been cleaned away).
24. The same may be said of the debate over the early-first-century A.D. arch at Orange. After an attempt to date it to the Severan period (James C. Anderson, "The Date of the Arch at Orange," *Bonner Jahrbuch* 187 [1987]: 159–192), the "traditional" date now once again enjoys consensus. See Fred S. Kleiner, "The Study of Roman triumphal and honorary arches 50 years after Kähler," *Journal of Roman Archaeology* 2 (1989): 195–206, esp. 204–206; Annette Küpper-Böhn, *Die römischen Bogenmonumente der Gallia Narbonensis in ihren urbanen Kontext* (Eselkamp, 1996), 86–109, esp. 100–103; Fred S. Kleiner, "The Roman arches of Gallia Narbonensis," *Journal of Roman Archaeology* 11 (1998): 610–612.
25. On the importance of this message, see, most recently, Patrizio Pensabene, "Progetto unitario e reimpiego nell'Arco di Costantino," Pensabene and Panella, "Arco," 13–42.
26. For a brief proportional analysis identifying some of the relationships described here, see Mark Wilson Jones, "Osservazioni sul progetto dell'arco," *Archeologia Laziale* 12, no. 1 (1995): 59–61. More detail is given in idem, "La progettazione architettonica: riflessioni su misure, proporzioni e geometrie," in Pensabene and Panella, eds., *Arco*, 75–99.
27. The measurements relating to *Proposition 3* differ by about 8 cm, but

the accurate application of the same relationship at the Arch of Septimius Severus is a strong argument in favor of its relevance here, too. It was probably more common, however, for the axial width of the central fornix (that is, measured across the column centers) to equal the column height, with or without the subplinth below the base proper, as in the Arch of Titus and the arches at Benevento and Orange.

28. The present paving of modern travertine and antique marble slabs was laid in 1936 (see Panella and Pensabene, "Reimpiego," 259ff.). I have taken the original finish level (or, at any rate, that envisaged by the architect) to be 17 cm lower than at present, by virtue of the accuracy of "fit" with respect to the proportional analysis.

29. Vitruvius, VI,2,1.

30. 50 feet is just one of a number of dimensions that are multiples of 2½ or 5 feet and therefore relate to one another as more or less simple ratios:

Element	Ideal Foot Dimension	Actual Foot Dimension
height of entablature	7½	7½–7¾
width of pier	10	10
height of pedestals	12½	13
height of lateral imposts	20	20¼
height of attic	20	19½
height, pedestals to entablature	30	29¾
height, pedestals to cornice	37½	37½
total height excluding attic	50	50–50¼
total height	70	69¾

The lack of precision in most cases results from a conflict with the proportions summarized in Table 1. For example, this series generates a height from pavement level to the top of the columns of 42½ feet—in conflict with *Proposition 4*, which predicts 43½ feet ($3/2 \times 28\frac{1}{4}$ feet). In reality 42½ or thereabouts seems to have been the chosen compromise.

31. The actual ratios are sufficiently inaccurate to call this particular intention into doubt, in part because 10:7 and 7:5 are only rough approximations to $\sqrt{2}$ (17:12 is better). On approximations to $\sqrt{2}$ and $\sqrt{3}$, see L. Frey, "Médiétès et approximations chez Vitruve," *Revue archéologique*, 1990: 285–330; Herman Geertman, "Vitruvio, la realtà architettonica e la progettazione di porte templari," *Bulletin Antieke Beschaving* 68 (1993): 209–245. In addition, the cornice would have been somewhat more than 50 feet from the ground if this was indeed lower than it is at present.

32. The cornice level should in fact be 49½ feet to obtain $\sqrt{3}$ exactly.

33. Georg Dehio, *Ein Proportionengesetz der antiken Baukunst* (Strasbourg, 1895), figs. 68–77; Robert Amy et al., *L'arc d'Orange, xv^e Supplément, Gallia* (1962), 1: 57–62; 2: pl. 42; Gustavo Traversari, *L'arco dei Sergii a Pola* (Padua, 1972), 89–90, tav. 5; Guido A. Mansuelli, "Il monumento augusteo del 27 a.c.: Nuove ricerche sull'arco di Rimini," *Arte Antica e Moderna* 8 (1959): 375–378; Ermanno Ferrero, *L'arc d'Auguste à Suse* (Turin, 1901), 11–12.

34. Compare Jay Hambidge, *The Parthenon and other Greek Temples: Their Dynamic Symmetry* (New Haven, 1924), with various contributions in *Parthenon-Kongress*, ed. Ernst Berger (Mainz, 1984). For a selection of other more or less optimistic geometrical interpretations, see Robert W. Gardner, *The Parthenon; its Science of Forms* (New York, 1925); Ernst Moessel, *Die Proportion in Antike und Mittelalter* (Munich, 1926); Odilo Wolff, *Tempelmasse. Das Gesetz der Proportion in den antiken und altchristlichen Sakralbauten* (Vienna, 1932); André Texier, *Géométrie de l'architecte* (Paris, 1934); Tons Brunés, *The Secrets of Ancient Geometry and Their Use* (Copenhagen, 1967); Albrecht Kottmann, *Die Kultur vor der Sintflut. Das gleiche Zahlendenken in Ägypten, Amerika, Asien, Polynesien* (Heiligkreuztal, 1992); Greg Wightman, "The Imperial Fora at Rome: Some Design Considerations," *JSAH* 56 (1997): 64–88.

35. Richard Brilliant, *The Arch of Septimius Severus in the Roman Forum, Memoirs of the American Academy in Rome* 29 (1967), 41–44.

36. Key proportions and dimensions include the following:

- a. the equality between the column height (8.52 m) and the width of the central intercolumniation (8.55 m);
- b. the rough equality of the combined length of the fornices (20.65 m) and the total height of the building (20.88 m), both nominally 70 feet;
- c. the frequent presence of 10-foot dimensions (width of the lateral arches, 2.97 m; height of pedestals, 2.95 m; height of die of attic, 2.94 m), along with multiples of 10 feet (30, 40, and 80 feet, see below);
- d. the equality of the shaft height (7.07 m) and the width of the flanks, excluding the pedestals (avg. 7.075 m), both 24 feet;
- e. the 2:1 ratio between the height of the columns (8.89 m, including the subplinth directly over the pedestals), and the height up to the top of the pedestals (4.40 m). The first term, 30 feet, is also $\frac{3}{4} \times 24$ feet, 3×10 feet (see above), and $\frac{3}{4}$ the 45-foot height of the façade measured up to the bottom of the entablature.
- f. the rough 2:1 relationship between the overall length and overall width, the top of the travertine foundation measuring nominally 80 by 40 feet (24.05 m \times 11.83 m);
- g. the rough 2:1 relationship between the height of the order (10.93 m, measured from the pedestals) and the width of the lateral fornices (5.62 m).

37. Mark Wilson Jones, "Principles of design in Roman architecture: the setting out of centralized buildings," *Papers of the British School at Rome* 57 (1989), 133ff. For fundamental observations on the basis of Graeco-Roman practice, see J. J. Coulton, "Towards understanding Greek temple design: general considerations," *Annual of the British School at Athens* 70 (1975): 59–99.

38. Vitruvius, V, 6.

39. Mark Wilson Jones, "Designing amphitheatres," *Mitteilungen des Deutschen Archäologischen Instituts. Römische Abteilung* 100 (1993): 391–441, esp. 429–430.

40. Traversari (*L'arco dei Sergii*) highlights the relationship between the height of the order (7.26 m) and half the width of the arch (4.155 m). The implied ratio is 1.747, almost exactly 1.75 or 7:4.

41. See the analysis of Janet DeLaine, *The Baths of Caracalla. A study in the design, construction, and economics of large-scale building projects in imperial Rome = Journal of Roman Archaeology* supp. 25 (Portsmouth, R.I., 1997), 45–68. For complementary observations regarding façade design in the Hellenistic period, see Jean-François Bommaelaer, *Akten des XIII Internationalen Kongresses für Klassische Archäologie* (Mainz, 1990), 420–422.

42. The original configuration of the parapet terminating the attic is unknown. Not so elaborate as sometimes reconstructed (Filippo Magi, "Il coronamento dell'arco di Costantino," *Atti della Pontificia accademia romana di archeologia, Rendiconti* 29 [1956]: 83–110), the parapet may have comprised just one course as at present, of uncertain height; see Alessandro Casatella and Maria Letizia Conforto, *Arco di Costantino: il restauro della sommità* (Pesaro, 1989), 14ff., 51.

43. For the gridded elevation of the precinct of the Mausoleum of Maxentius, see Jürgen J. Rasch, *Das Maxentius Mausoleum an der Via Appia in Rom* (Mainz, 1984), taf. 78. For a comparable proposal for Constantine's arch itself, see Mario d'Onofrio, *Roma e Aquisgrana* (Rome, 1983), 68. Thus it may not be necessary to look mainly to Egypt for the source of Byzantine artists' reliance on grids, as does Hjalmar Torp, *The Integrating System of Proportion in Byzantine Art. An Essay on the Method of the Painters of Holy Images, Acta ad archaeologiam et artium historiam pertinentia, Series Altera* 4

- (1984), 189ff. For an exquisite gridded Pharaonic elevation, see H. S. Smith and H. M. Stewart, "The Gurob Shrine Papyrus," *Journal of Egyptian Archaeology* 70 (1984): 54–64.
44. Similarly, the ideal values for the height up to the entablature and the width of the lateral fornices (respectively, 43% and 21% feet) were rounded off to 43 and 21½ feet.
45. See n. 30.
46. *Propositions 9 and 10* have the effect of making the axial width of the fornix % the height of the column, or 32½ feet. Since the column diameter is 3 feet, this should dictate an intercolumniation of 32½ – 3 feet, i.e. 29½ feet.
47. For further compromise, see nn. 30 and 71.
48. Patrizio Pensabene, *Il Tempio di Saturno* (Rome, 1986), 145ff.; Wilson Jones, "Amphitheatres," 424.
49. John B. Ward-Perkins, "Quarrying in Antiquity: technology, tradition and social change," *Proceedings of the British Academy* 57 (1971), 137–158, n. 25; idem, "Columna Divi Antonini," *Mélanges offerts à Paul Collart* (Lausanne, 1976), 348; idem, "Nicomedia and the Marble Trade," *Papers of the British School at Rome* 48 (1980), 25–26; idem, *Marble in Antiquity. Collected Papers*, *British School at Rome Monographs*, 6, ed. Hazel Dodge and Bryan Ward-Perkins (Rome, 1992), 25 and n. 18. Here the editors question the extent of standardization, sometimes using erroneous data: the supposedly 39-foot shafts of the Temple of Antoninus and Faustina are 11.8 m or 40 feet tall.
50. The popular 20- and 40-foot sizes are multiples of both 4 and 10 feet. Shafts at the Mons Claudianus quarries in Egypt group into the following lengths: multiples of 10 feet (60, 50, 30, 20, 10 feet), of 8 feet (24, 16, 8 feet), and one exception, 14 feet; see David P. S. Peacock and Valerie A. Maxfield, *Mons Claudianus 1987–1993*, Vol. I. *Topography and Quarries* (Cairo, 1997), 212.
51. Cicero, *Ad. Atticus*, 12,19.
52. J. Clayton Fant, "Ideology, gift and trade: a distribution model for the Roman Imperial Marbles," *The Inscribed Economy, Journal of Roman Archaeology*, supp. 6 (1993): 145–170, esp. 155.
53. Paul Davies, David Hemsoll, and Mark Wilson Jones, "The Pantheon: a triumph of Rome or a triumph of compromise?" *Art History* 10 (1987): 131–151; Mark Wilson Jones, *Principles of Roman Architecture* (New Haven and London, 2000), chap. 10.
54. The porticoes in the Forum of Augustus include *giallo antico* shafts of the same diameter, 88–89 cm, and height, c. 7.07 m (as may be reconstructed by comparison with columns in the Sala del Colosso); these have the same overall height, with shafts that are on average 7.02 m tall, but with capitals around 5 cm taller than those of the porticoes). These shafts also resemble those of the arch in having the same fillet-plus-astragal termination at the bottom, and in Trajan's Forum there are several comparable fragments.
55. Ammianus Marcellinus (XVI,10,15). By the same token, it seems doubtful that this was the source of the panels in the main passageway and the attic from the Great Trajanic Frieze. For its attribution to Trajan's Forum, see Anne-Marie Leander Touati, *The Great Trajanic Frieze* (Stockholm, 1987), 90ff. with preceding bibliography; James E. Packer, *The Forum of Trajan in Rome: A Study of the Monuments*, with reconstructions by Kevin L. Sarrinen, 3 vols. (Berkeley, 1997), 1: 113, 445. For an alternative location, see Pedro Barceló, "Una nuova interpretazione dell'arco di Costantino," *Costantino il Grande* (see n. 2), 1: 105–114, and for speculation that it belonged instead to Domitian's reign, and was set aside following the annulment of his monuments (*damnatio memoriae*), see Eugenie (Mrs. Arthur) Strong, *Roman Sculpture* (London, 1907), 164; Amanda J. Claridge, *Rome. An Oxford Archaeological Guide* (Oxford, 1997), 274.
56. Melucco Vaccaro and Ferroni, "Chi construì" (see n. 4), 18–21, with further references.
57. Jaś Elsner, *Imperial Rome and Christian Triumph* (Oxford, 1998), 188; for the St. Jerome citation, see p. 189.
58. Filippo Magi, *I rilievi del Palazzo della Cancelleria* (Rome, 1945), esp. 52–54.
59. Joseph Alchermes, "Spolia in Roman Cities of the Late Empire: Legislative Rationales and Architectural Reuse," *Dumbarton Oaks Papers* 48 (1994): 167–178, esp. 170; Panella and Pensabene, "Reimpiego" (see n. 5), 112ff.; Dale Kinney, "Spolia, *Damnatio* and *Renovatio memoriae*," *Memoirs of the American Academy in Rome* 42 (1997 [1999]), 117–148, esp. 120–125. For the idea that some of the spolia could have been retrieved from buildings damaged in the fires of 287 and 307, see I. Jacopi, *L'arco di Costantino e le Terme di Caracalla (Itinerari des Musei, Gallerie e Monumenti d'Italia* (Rome, 1977), 3.
60. Pliny *HN*, XXXVI, 6.45.
61. Alchermes "Spolia"; Kinney, "Spolia," 119–122.
62. In theory, the ideal height is 28% feet (24 feet × %). Expressed in meters, this rule predicts that the shaft height, 7.08 m, should generate a column height of 8.496 m, just 1½ cm less than the actual figure of 8.51 m. See Mark Wilson Jones, "Designing the Roman Corinthian Order," *Journal of Roman Archaeology* 2 (1989): 35–69.
63. Alternatively, if the subplinth under the base is mentally included as part of the column, the proportions approximately match "Scheme D," although the height of the subplinth is substantially less than the ideal value. See Wilson Jones, "Corinthian Order," 44ff., 54.
64. Pierre Gros, *Aurea Tempa* (Paris, 1976), 197: "Le caractère empirique du développement de l'architecture romaine, son absence quasi totale de système normatif, s'imposent à quiconque en aborde l'étude, quels que soient le type d'édifice ou la période historique envisagés."
65. Wilson Jones, "Corinthian Order"; idem, *Principles* (see n. 53), chap. 7.
66. Various sets of columns from the Baths of Caracalla approximate to the 6:5 rule, but without any great exactitude; see DeLaine, *Baths of Caracalla* (see n. 41), 258. At the Severan reconstruction of the Portico Octavia H/h exceeds % by about 0.75 percent (h = 8.78 m, H = 10.615 m). At the Severan Temple of Lepcis Magna, H/h exceeds % by about 0.63 percent or 5 cm (h = 7.08 m, H = 8.55 m).
67. The main set of columns are 7.34 m tall with 5.91 m shafts, yielding a ratio of 1.242, or 3.5 percent greater than 1.200 (%); see Ernest Hébrard and Jacques Zeiller, *Spalato, Le Palais de Dioclétien* (Paris, 1912), 83ff.
68. The main study of the Severan arch remains Brilliant, *Septimius Severus* (see n. 35); see also R. Nardi, "L'arco di Settimio Severo, indagini storiche e conservative," *Atti della Pontificia accademia romana di archeologia, Rendiconti* 55–56 (1982–1984): 299–313; De Maria, *Archi onorari* (see n. 1), 180–185, 305–307, with comment on the connection between the two arches on 207; Richard Brilliant, *Lexicon* (see n. 1), s.v. "Arcus Septimi Severi."
69. For collected arch formats, see De Maria (see n. 1); Fred S. Kleiner, *The Arch of Nero in Rome. A Study of the Roman Honorary Arch Before and Under Nero* (Rome, 1985); Pierre Gros, *L'architecture romaine*, Vol. 1. *Les monuments publics* (Paris, 1996), 56–92, with bibliography 93–94.
70. The extent of the shortening would presumably have been determined by the desire to achieve a 2:1 proportion between the height of the column and that of its support, one that applies to the Severan arch when the subplinth under the base is included as part of the column, and in the Constantinian arch when the same is included as part of the pedestal.
71. In fact, the measurements of the building display a certain ambivalence between those that harmonize with the actual 7½ feet height of the entablature, and those that would have worked better using one of 7 feet. 7½ feet fits well with a series of multiples of 2½ feet (see n. 30). On the other hand, 7 feet suited the sum 43 feet + 7 feet = 50 feet, 43 feet being 1½ times the column height and so a natural member of the family of "propositions" listed in Table 1. A conflict between these alternatives may lie at the cause of some of the more inaccurate of the propositions, that is, nos. 6, 12, 20,

- and 21. This dilemma may also have contributed in some way to the difficulties of getting the columns to fit within their intended housing.
72. Although the idea that the same workshops executed both arches has been discredited (Michael Pfanner, *Der Titusbogen* [Mainz, 1983], esp. 22, 44), the architectural composition used at Benevento does indeed mimic its predecessor closely, at about 90 percent size. For surveys, see Almerico Meomartini, *I monumenti e le opere d'arte della città di Benevento* (Benevento, 1889), chap. 1, tav. II–IX, and Antoine Desgodets, *Les édifices antiques de Rome* (Paris, 1682), chap. XVII, fols. 174–191.
73. Wilson Jones, “Amphitheatres” (see n. 39), 407, 434.
74. Burkhardt Wesenberg, *Gnomon* 48 (1976): 800; Dieter Mertens, *Der Tempel von Segesta* (Mainz, 1984), 112 ff.
75. Mark Wilson Jones, “100 feet and a spiral stair: the problem of designing Trajan’s Column,” *Journal of Roman Archaeology* 6 (1993): 23–38; idem, *Principles* (see n. 53), chap. 8. For further general discussion, see Florenz Felten, “Antike Architekturkopien,” in Gabriele Erath et al., eds., *Komos. Festschrift für Thuri Lorenz zum 65. Geburtstag* (Vienna, 1997), 61–69.
76. Berenson (see n. 10), esp. 35.
77. Robert Goldwater and Marco Treves, *Artists on Art from the XIV to the XX Century* (New York, 1945), 74–75. For the original text and commentary, see *Raffaello. Gli scritti*, ed. Ettore Camesasca and Giovanni M. Piazza (Milan, 1993), 257–322. See also Francis Haskell, *History and its Images* (New Haven and London, 1993), 118–121, and on the vigor of architecture in the fourth century, John B. Ward-Perkins, *Roman Imperial Architecture* (Harmondsworth, 1981), 430.
78. J. J. Coulton, “Doric Capitals: A Proportional Analysis,” *Annual of the British School at Athens* 74 (1979), 81–153; idem, “The Parthenon and Periclean Doric,” *Parthenon-Kongress*, ed. Ernst Berger (Mainz, 1984), 40–44; Mark Wilson Jones, “Designing the Roman Corinthian Capital,” *Papers of the British School at Rome* 59 (1991), 142ff.
79. “...l’ipotesi che l’edificio originario non avesse colonne staccate è avvalorato dalle tracce de basi di semicolonne ancora visibili dietro le attuali,” Melucco Vaccaro and Ferroni (see n. 4), 273.
80. 32 cm divided by 88.5 cm yields a ratio of 0.36. Ratios of ¼ (0.500) or ⅓ (0.555) are the norm in the midimperial period, where bases own plinths, as these do (see Wilson Jones, “Corinthian Order” [see n. 62], 40).
81. John B. Onians, *Bearers of Meaning. The Classical Orders in Antiquity, the Middle Ages, and the Renaissance* (Princeton, N.J., 1988), 42–48; Antonio Giuliani, “Vitruvio e l’acanto,” *Palladio* 16 (1995): 29–36; Pierre Gros, “La sémantique des ordres à la fin de l’époque hellénistique et au début de l’Empire. Remarques préliminaires,” *Studi archeologici in onore di Antonio Frova. Studi e ricerche sulla Galla Cisalpina* 8 (Rome, 1995), 27.
82. Wolf-Dieter Heilmeyer, *Korinthische Normalkapitelle* (Heidelberg, 1970), 167; Klaus S. Freyberger, *Stadtrömische Kapitelle aus der Zeit von Domitian bis Alexander Severus: zur Arbeitsweise und Organisation stadtrömischer Werkstätten der Kaiserzeit* (Mainz, 1990), 63. Thanks to the standardization of proportions and dimensions, however, it remains possible that each set of components came from different sources.
83. Including the cyma, the entablature would have measured 8 feet or so, that is to say, the column height divided by approximately 3½. Typically, the relative height ranges between 1:4 and 1:5.
84. It would in theory be possible to propose a reverse sequence originating in the purported Hadrianic arch, but the logic is less transparent. It might be argued, for example, that the Severan frontage had to be reduced in length because of space restrictions in the Forum.
85. Ruysschaert, “Essai” (see n. 1); Richard Brilliant, *Visual Narratives. Storytelling in Etruscan and Roman Art* (Ithaca and London, 1984), 119–123; Philip Peirce, “The Arch of Constantine: Propaganda and Ideology in Late Roman Art,” *Art History* 12 (1989): 387–418; Ann Kuttner, “Acclaiming the New Augustus: Text and Image on the Arch of Constantine,” *Word and Image*, in press.
86. Simon Price, *Rituals and Power. The Roman Imperial Cult in Asia Minor* (Cambridge, 1984), 142–143; Kuttner, “Acclaiming.”
87. Constantine’s father is also said to have aligned himself with the sun god, although the evidence is disputable; see Mark D. Smith, “The Religion of Constantius I,” *Greek, Roman and Byzantine Studies* 38 (1997): 187–208.
88. L’Orange and von Gerkan, *Konstantinsbogens* (see n. 1), 57–58, 162ff., 174ff.
89. Clementina Panella, “La valle del Colosseo nell’antichità,” *Bollettino di Archeologia* 1–2 (1990): 87. On the Colossus itself, see Claudia Lega, *Lexicon* (see n. 1), s.v. “Colossus: Nero.”
90. Just as shown in the reconstruction of Ernest-Georges Coquart of 1863 (see *Roma Antiqua. “Envoi” degli architetti francesi (1788–1924): L’area archeologica Centrale*, Catalogue of the exhibition, Paris–Rome [Rome, 1986], cat. no. 123, p. 255), and sustained by Marianne Bergmann, “Der römische Sonnenkoloss, der Konstantinsbogen und die Ktistes-statue von Konstantinopel,” *Jahrbuch Braunschweigische Wissenschaftliche Gesellschaft*, 1997, 111–129, esp. 115, 120, fig. 14. (I owe this reference to Patrizio Pensabene, having not been able to consult the article in person.)
91. For the identification of Licinius, see L’Orange and von Gerkan, *Konstantinsbogens* (see n. 1), 165ff. For the revision in favor of Constantius Chlorus, see Raissa Calza, “Un problema di iconografia imperiale sull’arco di Costantino,” *Atti della Pontificia accademia romana di archeologia, Rendiconti* 32 (1960), 133–161, and for endorsement, Ruysschaert, “Essai” (see n. 1), 81–82; Evers, “Remarques” (see n. 11), 790–791. But for restatement of his earlier position, see Hans Peter L’Orange, *Das spätantike Herrscherbild von Diokletian bis zu den Konstantin-Söhnen 284–361 n. Chr. = Das römische Herrscherbild* 3, 4 (Berlin, 1984), 44, and for renewed support, Jens Rohmann, “Die spätantiken Kaiserporträts am Konstantinsbogen in Rom,” *Mitteilungen des Deutschen Archäologischen Instituts. Römische Abteilung* 105 (1998): 259–282. See also R.R.R. Smith, “The Public Image of Licinius I: Portrait Sculpture and Imperial Ideology in the Early Fourth Century,” *Journal of Roman Studies* 87 (1997): 170–202.
92. On the background, see Patrick Bruun, “Una permanenza del ‘Sol Invictus’ di Costantino dell’arte cristiana,” *Costantino il Grande* (see n. 2), 1: 218–229.
93. The actual head of the emperor is the work of the eighteenth-century sculptor Pietro Bracci.
94. Ruysschaert, “Essai” (see n. 1), 87.
95. Or perhaps two arches; see José Ruysschaert, “Les onze panneaux de l’arc de Marc-Aurèle érigé en 176,” *Atti della Pontificia accademia romana di archeologia, Rendiconti* 35 (1962/3), 101–121; Mario Torelli, *Lexicon* (see n. 1), s.v. “Arcus Marci Aurelii.”
96. De Maria, *Archi onorari* (see n. 1), 312–314; Mario Torelli, *Lexicon* (see n. 1), s.v. “Arcus Novus”; Kinney, “Spolia” (see n. 59), 129–133.
97. Mario Torelli, *LTUR*, s.v. “Arco di Portogallo”; Kinney, “Spolia” (see n. 59), 133–134.
98. Friedrich W. Deichmann, *Der Spolien in der spätantiken Architektur* (Munich, 1975); Beat Brenk, “Spolia from Constantine to Charlemagne: Aesthetics versus Ideology,” *Dumbarton Oaks Papers* 41 (1987): 105ff.; Alchermes, “Spolia” (see n. 59); Lucia de Lachenal, *Spolia. Uso e reimpiego dell’antico dal III al XIV secolo* (Milan, 1995); Patrizio Pensabene, “Riempiego e nuove mode architettoniche nelle basiliche cristiane di Roma,” *XII Int. Kongresses für christliche Archäologie*, Bonn, 1991 (Bonn, 1995), 1076ff.; Dale Kinney, “Rape or Restitution of the Past?” in Susan C. Scott, ed., *Spolia. The Art of Interpreting. Papers in Art History from The Pennsylvania State University* 9 (1995): 53–68; Kinney “Spolia” (see n. 59).
99. Brilliant, *Narratives* (see n. 85), 119.

100. Peirce, "Propaganda" (see n. 85), 389–410; Evers, "Remarques" (see n. 11); Pensabene, "Progetto unitario" (see n. 25).
101. Kuttner, "Acclaiming" (see n. 85).
102. Brilliant, *Narratives* (see n. 85), 122.
103. IMP·CAES·FL·CONSTANTINO MAXIMO / P·F·AUGUSTO·S·P·Q·R / QUOD INSTINCTU DIVINITATIS MENTIS / MAGNITUDINE CUM EXERCITU SUO / TAM DE TYRANNO QUAM DE OMNI EIUS / FACTIONE UNO TEMPORE IUSTIS / REM PUBLICAM ULTUS EST ARMIS / ARCUM TRIUMPHIS INSIGNEM DICAVIT.
104. For collected opinion, see Capodiferro, "Arcus" (see n. 1), 87; G. W. Bowersock, "From Emperor to Bishop: The Self-Conscious Transformation of Political Power in the Fourth Century AD," *Classical Philology* 81 (1986): 302–303.
105. Augusto Fraschetti, "Costantino e l'abbandono del Campidoglio," in Andrea Giardina, ed., *Società romana e impero tardoantico II* (Rome–Bari, 1986), 59–98; François Paschoud, "Ancora sul rifiuto di Costantino di salire al Campidoglio," *Costantino il Grande* (see n. 2), 2, 737–748; Garth Fowden, "The Last Days of Constantine: Oppositional Versions and their Influence," *Journal of Roman Studies* 84 (1994): 164ff.
106. Ruysschaert, "Essai" (see n. 1), 99. "Paien per ce qu'il esprime, l'arc de Constantin est chrétien par ce qu'il tait."
107. The judgments of both L'Orange and von Gerkan, *Konstantinsbogens* (see n. 1), 165ff., and Calza, 136, not to mention subsequent corroboration, are based primarily on preception (see Peirce, "Propaganda" [see n. 85], 412).
108. For photographs, see L'Orange, *Herrscherbild* (see n. 91); Licinius/Constantius Chlorus, Taf. 28 (sacrifice to Hercules tondo), 29 (sacrifice to Apollo tondo); Constantine, 32 (boar hunt tondo), 33 (lion hunt tondo), and the "Constantine" at issue, 36a (sacrifice to Diana tondo). See also Sandra E. Knudsen, *The Portraits of Constantine the Great: types and chronology, A.D. 306–337* (Ann Arbor, 1989).
109. Consistency cannot be proved, however, for the protagonist of the bear hunt is missing.
110. Thomas F. Mathews, *The Clash of Gods. A Reinterpretation of Early Christian Art* (Princeton, N.J., 1993), 24–25. See also Sabina MacCormack, *Art and Ceremony in Late Antiquity* (Berkeley, 1981), 35ff.
111. Krautheimer, "Three Christian Capitals" (see n. 2), esp. 26.
112. Cairoli F. Giuliani and Patrizia Verducchi, *L'area centrale del Foro Romano* (Rome, 1987), 69–73, 143–147; P. Verducchi, LTUR, s.v. "Equus Constantius."
113. The bibliography on Constantine's religious development and its effects is immense; for an introduction in English see: Andreas Alföldi, *Conversion of Constantine and Pagan Rome* (Oxford, 1948); J. W. Eadie, ed., *The Conversion of Constantine* (New York, 1977); Bowersock, "From Emperor to Bishop" (see n. 104); Timothy D. Barnes, "The Conversion of Constantine," *Echos du monde classique. Classical Views* 29 (1985): 371–391; R. Malcolm Errington, "Constantine and the Pagans," *Greek, Roman and Byzantine Studies* 29 (1988): 309–318; Michele R. Salzman, "How the West was Won. The Christianization of the Roman aristocracy in the West in the years after Constantine," *Studies in Latin Literature and Roman History* (Brussels, 1992), 451–479; Michael Grant, *The Emperor Constantine* (London, 1993); Mathews, *Clash of Gods*.

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