THE COFFERING OF HADRIAN'S PANTHEON:

PRECEDENT, INTERPRETATION, AND TRADITION

by

MARION CONWAY FARMER BRACKETT

(Under the direction of James C. Anderson, Jr.)

ABSTRACT

Much attention has been given to why the architect of Hadrian's Pantheon incorporated a coffering scheme of 28 radials into the concrete dome that do not absolutely align with the subordinate architectural elements of the Pantheon's drum. It is the purpose of this thesis to answer that query firstly by examining the antecedents of coffering established in Greek, Etruscan, and Roman architecture by surveying coffers' physical appearance, architectural environment, and metaphorical role. Then, secondly and more significantly, this paper addresses that question directly by reviewing and critiquing a variety of notable interpretations regarding the construction, purpose, and symbolism of the Pantheon's coffers. Finally, this study concludes by investigating if and how the Pantheon's coffering influenced the coffering of later Roman Imperial architecture.

INDEX WORDS: Coffer, Pantheon, Greek and Roman architecture, Vault decoration

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INTRODUCTION

τό τε Πάνθειον ώνομασμένον ἐξετέλεσε·προσαγορεύεται δὲ οὕτω τάάχα μὲν ὅτι πολλῶν θεῶν εἰκόνας ἐν τοῖς ἀγάλμασι, τῷ τε τοῦ ᾿Αρεως καὶ τῷ τῆς ᾿Αφροδίτης, ἔλαβεν, ὡς δὲ ἐγὼ νομίζω, ὅτι θολοειδὲς ὄν τῷ οὐρανῷ προσέοικεν. ἠβουλήθη μὲν οὖν ὁ ᾿Αγρίππας καὶ τὸν Αὔγουστον ἐνταῦθα ἱδρῦσαι, τήν τε τοῦ ἔργου ἐπίκλησιν αὐτῷ δοῦναι μὴ δεχαμένου δὲ αὐτοῦ μηδέτερον ἐκεῖ μὲν τοῦ προτέρου Καίσαρος, ἐν δὲ τῷ προνάῳ τοῦ τε Αὐγούστου καὶ ἑαυτοῦ ἀνδριάντας ἔστησε.

Cass. Dio 53.27.2-3.

Also he [Agrippa] completed the building called the Pantheon. It has this name, perhaps because it received among the images which decorate it the statues of many gods, including Mars and Venus; but my own opinion of the name is that, because of its vaulted roof, it resembles the heavens. Agrippa, for his part, wished to place a statue of Augustus there also and to bestow upon him the honour of having the structure named after him; but when the emperor would not accept either honour, he placed in the temple itself a statue of the former Caesar and in the pronaos statues of Augustus and himself.¹

From Agrippa's original structure to the Hadrianic fusion of a temple façade,

intermediate block, and rotunda, the sphinx of the Pantheon's name, structure, and purpose has set riddles for admirers for centuries. A similar problem pertains to the coffering scheme of the Pantheon's cupola. Renaissance critics clearly voiced their dissatisfaction concerning the disjointed couplings between the ceiling's 28 coffered radials and the eight major and minor axes that punctuate the Pantheon's drum. Modern scholars have also acknowledged the discrepancy and in response have investigated the

¹ The translation is from Kjeld de Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon* (Copenhagen: Jutland Archeological Publications VIII, 1968), 180. All translations are my own, unless otherwise noted.

coffering's metaphorical role, adhering rather resolutely to Dio's account in advocating celestial imagery by propounding that the coffering represents the 28 day lunar cycle and five orbital rings of a classical orrery.² Recently, applications of Neo-Platonic principles that apply the ancient *quadrivium* of mathematics, geometry, astronomy and music to the Pantheon's architectural milieu have also presented new readings of the function and symbolism of its coffered dome.³ Why did the architect of the Hadrianic Pantheon adopt this unique coffering design? The objective of this thesis is to answer that query firstly by examining the antecedents of coffering established in Greek, Etruscan, and Roman architecture by surveying coffering's physical appearance, architectural environment, and metaphorical role. Then, secondly and more significantly, this paper addresses that question directly by introducing and critiquing a variety of notable interpretations regarding the construction, purpose, and symbolism of the Pantheon's coffering influenced later Imperial architecture.

Chapter One begins by investigating the history of coffering construction and motifs in ancient architecture up to the time of Hadrian. Coffers emerge in various shapes and media, adorned with an assortment of decorative elements, in edifices such as temples, memorials, honorific arches, and baths, which contrast in both form and function. The Hephaisteion introduces us to the traditional orthogonal coffered ceiling and decorative motifs commonly found in classical Greek architecture. Since it has been

² William Loerke, "A Rereading of the Interior Elevation of Hadrian's Rotunda," *Journal of the Society of Architectural Historians* 49 (1990): 39-42. L. Alvegård, *The Pantheon Metrological System*. (Billdal: Chalmers University of Technology, 1987), 17-18; Gert Sperling, *Das Pantheon im Rom: Abbild und Mass des Kosmos* (Neuried: Ars Una, 1999), 229-35.

³ Gert Sperling, "The 'Quadrivium' in the Pantheon of Rome," *Nexus II: Architecture and Mathematics* (1998): 127-42.

suggested that the style of the Pantheon's vaulting originated from coffering of round buildings, an evaluation of coffering schemata in three Greek *tholoi* will be conducted.⁴ This chapter further analyzes an additional edifice that immortalizes the ruler: the Mausoleum of Halicarnassus, which exhibits a new coffering composition, sculpted relief. Identifying coffers in a funerary context leads to an overview of Etruscan tumuli and the possibility of Roman wooden domes as a precedent to the concrete coffered dome. Moreover, late Republican stuccoed vaults in private homes and tombs that simulated coffered ceilings provide possible sources for the decorative scheme and ornamentation of future concrete coffered vaulting designs. It will also be pertinent to examine the tradition of coffering vaults under the passageways of *fornices* at Pola, Rome, and Beneventum, and their direct connection to the design and symbolism of the Pantheon's coffered dome - a practice in Roman official architecture that has been previously unnoticed. Furthermore, the appearance of coffered ceilings in the imperial private sphere, specifically in Nero's Golden House and Domitian's palace on the Palatine, will illustrate not only these emperors' need for decorative excess, but also the manner in which possible star-like coffers exalted their divinity in an architectural context. Finally, this chapter concludes by discussing the celestial imagery of vaulted ceilings in *thermae* and exploring the Baths of Trajan, whose semi-circular *exedrae* parallel the Pantheon's vault in height, aedicule placement, and most importantly, in their coffering schema.

Chapter Two seeks to elucidate and critique a number of theories about the Pantheon's coffering construction, appearance, and astronomical and metaphorical

⁴ S.A. Cook, F.E. Adcock, M.P. Charlesworth, eds., CAH Vol. 11 (New York: MacMillan, 1936), 797.

purposes. It begins by analyzing the dome's construction in order to understand the choices available to the architect in drafting the arrangement of 140 coffers. A reading of the Pantheon's interior elevation is a requisite in treating the visual effects of the coffering to the cella's overall design. Was the primary contrivance of the dome's layout aesthetically motivated? This chapter also explores the theories behind number symbolism, specifically the numbers seven and 28, since they are factors of the 28 rows of vertical coffers. Do they have cultural, mathematical, or astronomical significance in the Roman world? Likewise, equal attention is given to Archimedean theory and Loerke's attempts to link the rotunda's coffering to the lunar cycle and celestial globe.⁵ Current research on gnomonics and helicocentricity, and how they are exhibited in the Pantheon's architectonic lines, questions whether the coffers in fact were visible components of an astronomical device or the Pythagorean doctrine, 'Music of the Spheres.' Finally, this chapter seeks to identify possible allusions to solar kingship and apotheosis as part of an imperial ideology through traditional ceiling designs and topographical associations.

Chapter Three presents the possible influence of the Pantheon's coffering on later imperial edifices in both architectural and allegorical terms. Buildings surveyed include the Hadrianum, Maxentius' rebuilding of Hadrian's Temple of Venus and Rome, the Basilica Nova, and the *caldarium* of Constantine's *thermae*. The misalignment between coffers and subordinate *aediculae* in the walls of the Pantheon reappears in later imperial apses, creating a type of loose, detached canopy of heaven, which frames the representations of god and emperor enthroned. Did subsequent emperors adopt the

⁵ Loerke, 39-42.

coffering of the Pantheon's dome and translate it into their own metaphor to extol personal imperial doctrines?

My thesis concludes by contending that although extensive studies have attempted to define heliocentric and astronomical principles with architectural elements in the Pantheon's interior, results remain unpersuasive. The aesthetic evidence concerning the 'loosening' effect of the Pantheon's coffering alignment to inferior architectural elements of the walls is more predominate in pre- and post- Hadrianic building. This explains why the Pantheon's architect was compelled to adopt a coffering layout that did not correspond to the eight-fold pattern of the drum. The orchestration of combining the Pantheon's dome with its drum embodied the perfect relationship in geometrical symmetry defined by Archimedes' proof on the sphere and cylinder. Twenty-eight represented a perfect number in arithmetical terms: it equaled the sum of its factors. Attaining perfection in both geometry and mathematics, coupled with a newfound technique in dividing a circle into 28 sections using the spiral of Archimedes, explains the number of the coffering scheme. Furthermore, evidence concerning the Pantheon's name and purpose dismisses the popular notion that Hadrian's edifice was a temple to 'all the gods,' and asserts instead that the Pantheon was an aula regia as an expression of the imperial cult. In the context of this imperial ideology, the dome appears to evoke imagery of coffered vaults in imperial *fornices*, where coffers framed, enhanced, and to some degree embodied motifs of imperial glorification and apotheosis. This iconography is possibly adapted into the imperial decorative protocol in coffered apses that emulate the aesthetic layout of the Pantheon's dome.

CHAPTER ONE

PRECEDENT IN CONSTRUCTION AND DESIGN

In addition to a few precursors from Cycladic architecture,¹ the coffer, also known as the *lacunar* or $\varphi \dot{\alpha} \tau \nu \eta$, became a decorative element in the ceilings of Greek temples that covered the space between intersecting ceiling beams.² Evidence of preserved beam holes, literary allusions, and representations from vase paintings indicate that wooden coffered ceilings were quite prevalent, even more so than the subsequent stone coffered ceilings.³ Vitruvius cites an example of a cypress coffered ceiling in the Temple of Diana at Ephesus;⁴ moreover, there are numerous accounts of temple fires to support the widespread use of timber ceilings.⁵ Around the 5th century B.C., stone coffered ceilings, primarily of marble, first began to appear in the colonnades of large Doric temples and in the grand sepulchral monuments of Asia Minor.⁶ Although wooden ceilings could encompass broad spans more easily than heavy marble ones, stone afforded greater durability against the elements. These preserved stone coffered ceilings supply ample

¹ Karin Tancke, "Deckenkassetten in der Griechischen Baukunst," *Antike Welt* 20, no. 4 (1989): 24. ² For *lacunar*, or its plural *lacunaria*, see Vitr. *De arch*. 4.6.1; 5.2.1; 6.3.4,6; and 6.7.3. Vitruvius also

identifies *lacunaria* as soffits under the architrave, 4.3.1, 5. For φάτνη, see Ath. V 208 B. ³ Tancke, 24; D.S Robertson, *A Handbook of Greek and Roman Architecture* (Cambridge: Cambridge

University Press, 1954), 51.

⁴ Vitr. *De. arch.* 2.9.13.

⁵ F. Ebert, "Lacunar," in RE Vol. 12 (Stuttgart: J.B. Metzlersche Publishers, 1924), 369-75.

⁶ Tancke, 24.

records for us to study, and at the same time impart a picture of the characteristics of wooden coffering carved in marble.⁷

There are two types of stone coffered ceilings: the beamed ceiling and the platform ceiling (sometimes called a plinth ceiling).⁸ In a beamed ceiling, timber or stone rafters assembled in a lattice pattern were topped in regular intervals with stone plinths ($\pi\lambda\alpha$ (σ i\alpha ορ κλιμακ(δ ε₅),⁹ on which two rows of square or rectangular coffers were fashioned (Fig. 1).¹⁰ In a platform ceiling, coffered plinths were laid side-by-side to form a continuous ceiling.¹¹ In the plinths of both ceiling types, coffers were either carved out of solid slabs of marble as seen in the Parthenon, Propylea, Temple of Ares, and Temple of Apollo at Bassai, or formed by attaching coffer lids or caps (καλύμματα)¹² over two rows of square apertures.¹³

⁷ Ibid.

⁸ Ebert, 369; Tancke, 24.

⁹ *IG* I² 372 fr. E, line 2.

¹⁰ Ebert, 369-75. Coffered ceilings with visible beams are still preserved in the following buildings: the front and rear halls of the Parthenon, the Theseum, the Temple in Rhamnus, the Temple of Nike, the north hall of the Erechtheum, the Propylea of the Acropolis, the Propylea in Eleusis, the Temple of Athena in Priene, the Mausoleum in Halicarnassus, the tomb monument in Mylasa, and the Temple of Zeus in Aizonoi.

¹¹ Ibid. Platform ceilings include: the side passages and galleries of the Parthenon, the side gallery in Phigalia, the Porch of the Caryatids in the Erechtheum, the Nereiden monument in Xanthos, the halls of the great altar of Pergamon, the passage of Tholos in Delphi, the Tholos in Epidauros, and the Phillipeion in Olympia.

¹² *IG* I² 373 fr. J, col. V.255.

¹³ Wyatt, Willam F. and Colin N. Edmonson, "The Ceiling of the Hephaisteion," AJA 88 (1984): 135-36.

The Ceiling of the Hephaisteion

Removable coffer lid construction is found in the beamed ceiling of the Hephaisteion, which was begun ca. 460 B.C. and completed between 420 and 415 B.C. Here masons cut two rows of four or six square apertures $(\dot{o}\pi\alpha\tilde{i}\alpha)^{14}$ into Pentelic and island marble to form the lower frames of each coffer (Fig. 1). In their study of the Hephaisteion's ceiling, Wyatt and Edmonson document how these soffit slabs were often doweled into the ceiling beams or clamped over the end peristyles.¹⁵ On their lower visible surface, the area framing each aperture was sanded and carved into a bead-andreel molding that was later painted. This decoration appears to be added for the purpose of masking joints. On the upper surface, each $\pi\lambda\alpha$ iσια contained a recessed level bedding prepared with a tooth chisel to accommodate individual coffer lids.

The detachable coffer lids vary in decoration and material. As viewed from below, the base of each lid is outlined with a simple ovolo molding; each top is slightly curved and painted in patterns.¹⁶ Most $\kappa \alpha \lambda \dot{\nu} \mu \mu \alpha \tau \alpha$ consist of marble, shaped in the form of a truncated pyramid; the remaining lids are flat in both marble and terracotta. What is of particular interest is the inscription of over 300 marks in alphabetic series, which occur on both soffit slabs and coffer lids.¹⁷ It appears the masons had a blueprint, matching each coffer to a particular aperture.

Scholars have proposed a range of theories regarding the purpose of this type of detachable ceiling design, specifically in the Hephaisteion. The earliest hypothesis, by

¹⁴ *IG* I² 374 fr. K, col 8.127-35.

¹⁵ Wyatt and Edmonson, 135-36.

¹⁶ Ibid.

¹⁷ Ibid., 141-67.

W.N. Bates, suggests that the removable lid system allowed light to illuminate the *cella*.¹⁸ Such a lighting technique would differ from the way most interiors of Greek cellae were lit: by orienting the temples' doors to the East for maximum sunlight. A wooden roof most likely covered the ceiling of traditional roofed temples, thus impeding any sunlight from above. Furthermore, removing lids to allow sunlight through would mean that a priest would have to climb and access all 608 $\kappa \alpha \lambda \dot{\nu} \mu \mu \alpha \tau \alpha$ - an improbable scenario.¹⁹ M.H. McAllister proposed that the coffer lids were made separately in order to ameliorate the carving of the lower coffer frames in the marble plinths.²⁰ Trevor Hodge also suggested that the Hephaisteion's ceiling and the similar design at Rhamnous might have been constructed to elevate the ceiling to ensure proper architectural proportions for the frieze.²¹ Wyatt & Edmonson transform Hodge's proposal and convincingly assert that the Hephaisteion's removable coffer system was most likely designed to reduce the weight of the ceiling since coffer lids on the west peristyle had been trimmed by chiseling off from the top of lids.²² Slabs and coffers had been pared at Rhamnous and in the Temple of Ares, where even the stone beams were channeled to reduce the weight.²³ Consequently, the purpose of the alphabetic series became clear: each coffer lid was designated for a particular placement because of its weight.²⁴

¹⁸ W.N. Bates, "Notes on the 'Theseum' at Athens," AJA 5 (1901): 37-50.

¹⁹ Wyatt and Edmonson, 139.

²⁰ M.H. McAllister, "The Temple of Ares at Athens," *Hesp.* 28 (1959): 41. According to Wyatt & Edmonson, 140: "this idea is more an apology for the flat, awkward moldings on the ceiling coffers of the Temple of Ares than an explanation of the ceiling design used in the Hephaisteion."

²¹ A. Trevor Hodge, *The Woodwork of Greek Roofs* (Cambridge: Cambridge University Press, 1960), 15, 112-15.

²² Wyatt and Edmonson, 140-41.

²³ Ibid.; William Bell Dinsmoor. "The Temple of Ares at Athens," Hesp. 9 (1940): 42; McAllister, 41.

²⁴ Wyatt and Edmonson, 135.

The Hephaisteion provides a glimpse into the construction and design of the classical coffered ceiling in an orthogonal grid. The alphabet markings illustrate the architect's regard for each lid's proper placement in a ceiling that incorporates a variety of materials. Likewise, reducing structural loads by affixing lighter coffer caps indicates the importance of actually covering exposed rafters and the demand of aesthetically designed ceilings. Later in this chapter, we will see how the concept of removable coffer lids assisted in the production of caps with sculpted figurines. Although the implementation of a detachable lid system proved irrelevant to Roman cement casting, it will reappear in imperial dining rooms as spectacular constructions of extravagance. Furthermore, the original shape and recessed gradation formed by coffer lids into two and three-tiered coffers and the concern for diminishing the ceiling's heft will endure well into the Roman era in the new cement medium.

Decoration of Greek Ornamental Coffers

Greek coffer ornamentation in the early 5th century B.C. usually consisted of two or three tiered coffers measuring 20-50 centimeters in length.²⁵ At first, these coffers were adorned with painted decorations, such as colored *cyma*. Later, sculpted borders common to the Ionic order, the bead-and-reel and egg-and-dart, emerged in bright red and blue tints. Coffer lids first began to feature gold stars, usually as an elevated piece carved from the plate, fixed on a deep blue background.²⁶ Examples of these types can be

²⁵ Tancke, 25.

²⁶ Ibid., fig. 3.

found in the Hephaisteion, the temple of Artemis in Athens, the Propylea, and the temple of Athena Nike on the Acropolis.²⁷ Tancke asserts that the idea of the ceiling with astral coffers as a representation of heaven becomes evident: the star-filled night sky appears to shine through openings in the ceiling.²⁸ Prototypes can be traced back to temples and graves in Egypt and Asia Minor where ceilings were embellished with astral décor, such as in the Tomb of Agamemnon at Mycenae.²⁹

Leaf motifs also begin to appear in conjunction with astral ornamentation in the fifth century B.C. A coffer in the Parthenon (447-432 B. C.) displays an alternating lotus leaf and palmette design radiating around a central star on what would have been a blue background bordered by brightly painted red, blue, and gold moldings.³⁰ The execution of rosettes and other leaf décor ushers in a new development in coffer decoration, one that involves the attachment of ornaments that had been sculpted free hand.³¹ Sometime in the course of the two construction phases of the Erechtheum (421 B.C – 414 B.C. & 409 B.C. – 406 B.C.), in the center of the marble coffers above the northern portico there appears a notch for the doweling of a separate carved ornament, such as a metal rosette. These coffers, in addition to the three-tiered coffers with sculpted moldings and painted oval borders in the Porch of the Caryatids, might indicate that each room in the Erechtheum displayed its own distinct ceiling variation.³²

²⁷ Ibid.

²⁸ Ibid.: "de durch Öffnungen in der Decke errheint der nächtliche Sternenhimmel."

²⁹ William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny* (Cambridge, MA: Harvard University Press, 1976), 38; De Fine Licht, *Rotunda*, 145.

³⁰ Tancke, 25; fig. 4.

³¹ Ibid., 25.

³² Ibid.

The display of floral and leaf motifs parallels ornamentation incised on Greek vases. In a religious setting, such sculpted decor not only celebrates the beauty in nature and perfection of geometrical shapes such as the rosette, but also their significance to the gods. Offering flora and foliage as a perfumed offering to the Greek gods was customary, as was the image of garlands festooning divine brows and locks. Just as the gods' physical heads were adorned with wreathes, so too were their temples' ceilings crowned with bloom-filled coffers.

<u>Tholoi</u>

At the beginning of the 4th century, the shape and ornamentation of coffers underwent another transformation, which in this case was due to a new architectural form: the *tholos*. The exact purpose of these circular buildings has been much debated, but they always occur in a religious context. Circularity in monumental architecture had been identified in the 4th century primarily with tombs, such as those in Asia Minor and Eastern Greece. The distinct shape of the peripteral rotunda, which is girded with a concentric peristyle buttressed by inner and outer columns carved in various classical orders, was to be admired and viewed from outside. While *tholoi* frequently served as a backdrop to outdoor ceremonies, the inner *cella*, privy to a select few, housed cult objects and occasionally the ritual itself.³³ Since the origin of the Pantheon's vaulting has been

³³ MacDonald, *Pantheon*, 49.

attributed to Hellenistic *tholoi*,³⁴ we may investigate three examples: the *Tholos* at Delphi, the *Tholos* at Olympia, and the *Tholos* at Epidauros.

The curved pteron ceiling of the *tholos* posed a challenge in arranging traditional square coffers. The solution presented itself in diamond-shaped coffers, positioned in a radial relationship as seen in the *Tholos* of Theodorus of Phocaea at Delphi (380 B.C.) (Fig. 2).³⁵ The earliest example of these lozenges or rhombic coffers occurred in the fifth century temple of Apollo at Bassai.³⁶ Here, three rows of offset diamond-shaped coffers are fringed by triangles over the entire ceiling in a non-structural grid, like an "elastic trellis."³⁷ Depictions of lattice arbors with dangling flora and fruit as temporary tent ceilings had appeared in earlier Egyptian grave paintings.³⁸ More elaborate ornamentation materializes in the middle rhomboi, where sixteen-point stars are incised for in-laid materials and the borders between coffers are painted in a swastika pattern. Above the band of coffers sat a raised wooden roof, a central cone, related in design to the roofs of the Odeum in Athens and the Telesterion in Eleusis.

An analogous ceiling arrangement emerges in a reconstructed ceiling of the *Tholos* at Olympia, the Philippeum, named by the benefactor himself, Philip of Macedonia after his victory at Chaeronea in 338 B.C. (Fig. 3). This *heroön* glorified King Philip as well as his family, for the building was planned to house gold and ivory portrait statues of members of Philip's royal house.³⁹ Here, eighteen Ionic columns encircle and

³⁴ See introduction *supra*, p. 3, n. 3.

³⁵ Ebert, 369-75. Rhombic coffers first appeared in the Doric Temple of Bassae.

³⁶ T.L. Donaldson, 'The Temple of Apollo Epicurius at Bassae, near Phigalia' in *Antiquities of Athens and Other Places in Greece*, eds., Stuart James et al. (London: Priestly and Weale, 1830), pl. X.

³⁷ Tancke, 26.

³⁸ Ebert, 369-375.

³⁹ Helmut Berve and Gottfried Grüben, Greek Temples, Theatres, and Shrines (New York: Harry

N. Abrams, Inc., 1963), 316; Pausanias identifies the statues, Paus. 5.17.4 and 5.20.10.

support a 45 ft. diameter ceiling fabricated with 36 large rhombi, each of which is subdivided into four smaller diamonds.⁴⁰ Flanking these coffers are triangles duplicating the same diamond pattern. Although this lattice scheme, like its Delphic predecessor, creates an 'elastic' and somewhat detached design, coffer ribs do align precisely with peripteral columns.

Similar alignments occur in the *Tholos* at Epidauros (360-330 B.C), or the Thymele, which deserves a more detailed analysis because its decorative elements are comparable to the design of the Pantheon's cupola. The ceiling of the Thymele was divided into three parts: 1) the portion springing from the inner colonnade of 14 Corinthian columns that covered the inner *cella*, which most likely was constructed of wood; 2) the plinth ceiling with 40 coffers in radial array that spanned the area between the inner Corinthian colonnade and the intermediate *cella* wall; and 3) the plinth ceiling consisting of two radial coffers bands above the external peristyle from the *cella*'s wall to the outer 26 Doric columns.⁴¹

The Thymele's curvilinear ceilings, like those at *Tholoi* at Delphi and Olympia, forced modifications to the classical square coffer profile. The layout of 40 square coffers in the ceiling over the inner colonnade incorporates a conspicuous triangular shape between each three-tiered coffer as a result of the circular arrangement.⁴² The ornamental motif of this wedge, bordered by a Lesbian cyma, depicts an acanthus scroll, resembling wave-like tendrils overflowing from an acanthus cup.⁴³ The bottom edges of these coffers are also underlined by a new motif: a wave band, the so-called running

⁴⁰ Tancke, 26.

⁴¹ Ibid., 27; R.A. Tomlinson, *Epidauros* (Austin: University of Texas, 1983), 65.

⁴² Tancke, fig. 9.

⁴³ Ibid., 27.

dog.⁴⁴ In the center of each detachable coffer lid, which are bordered by three frames alternating in ovolo and cyma moldings, a twelve-petal rosette sits on top of four acanthus leaves shaped in the letter χ and four double-tongued leaves in the form of a cross.⁴⁵ Studies of these coffers in 1883 revealed painted yellow hues on the ornamentation against a blue background.⁴⁶ Judging from the inscriptions at the temple of Asklepios in Epidauros, where rosettes, astragals, and faces or masks bedecked the coffers, it is highly probable that these rosettes were gilded.⁴⁷ The curved ceiling of the peristyle between the *cella*'s wall and the exterior perimeter of Doric columns employs an alternative design with 70 trapezoidal plinths housing two concentric rows of coffers, also shaped into trapezoids.⁴⁸ Each of these 140 coffers displays two undecorated frames studded with an eight-petaled lily over the same criss-cross arrangement of acanthus and double-tongued leaves. A nail attaching the boss to the coffer lid also apparently served as the lily's pistil.⁴⁹

What do the coffering designs and décor of the Thymele symbolize? To obtain a broader understanding, one must first study the building's function and purpose, which are still quite puzzling. Pausanias supplies the only literary evidence, in which he describes a mural in its inner *cella* depicting Eros carrying a lyre instead of his customary bows and arrows.⁵⁰ Certainly, the richness of the sculpted ornamentation and craftsmanship exhibited in the ceilings of the Thymele indicate its importance, in addition

- ⁴⁴ Ibid.
- ⁴⁵ Ibid.
- ⁴⁶ Ibid.
- ⁴⁷ Ibid.
- ⁴⁸ Ibid., fig. 7.

⁴⁹ Ibid., 27.

⁵⁰ Paus. 1.27.3.

to its central position and close proximity to the Temple of Asklepios and the Abaton. The central foundation of the Thymele also contains a subterranean pit, which is generally believed to have sheltered sacred snakes of the therapeutic god.⁵¹ The Asklepieion at Athens contained a comparable pit, but its structure, unlike the *Tholos*, was rectangular in form. Thus, it is more likely that the Thymele filled a ritualistic role housing the sacrifices to Asklepios as the fallen mortal.⁵² The dual nature of Asklepios, as both god and man, was known throughout the Roman world, as detailed by Cicero four hundred years after the sanctuary at Epidauros had been erected.⁵³ With the Temple and its cult statue honoring Asklepios the god in traditional rectangular form, the Thymele might be an homage to the mortal and his apotheosis in a traditional round funerary structure, perhaps even denoting one of the burial places of Asklepios known to exist.⁵⁴

The association of death and rebirth brings the coffering and its trimming into a new context different from architectural ornament used to conceal superior voids. The blossoming flora and acanthus foliage, although continuing the traditional plant motif found in the orthogonal coffering of Greek temples, now might be read in a new funerary setting. Flowers were a part of the funerary tradition in ancient society, from bouquets strewed at graves to rosette designs carved on Greek *stelai*, such as the Acanthus Column at Delphi.⁵⁵ Perhaps the coffers of the Thymele symbolized the advent of a new and abundant life associated with the apotheosis of the mortal, Asklepios.

⁵¹ R.A. Tomlinson, *Epidauros* (Austin: University of Texas, 1983), 66.

⁵² Ibid.

⁵³ Cic. Nat. D. 2.24; 3.15.

⁵⁴ Tomlinson, 66-67.

⁵⁵ Verg. *Aen.* 6.883-86; William Bell Dinsmoor, *The Architecture of Ancient Greece* (London: Batsford, 1950), 254.

Is the *Tholos* at Epidauros a direct predecessor to the coffered vaulting of Hadrian's Pantheon? The 140 trapezoidal coffers in the outer peristyle of the Thymele correspond to the number and shape of the coffers in the Pantheon's cupola. The correlation between the 14 inner and 26 outer columnar rings of the *tholos* appear to have no architectural or mathematical relationship, which parallels the unusual correspondence between the factors of the Pantheon's coffering and its drum.⁵⁶ Hadrian did indeed travel quite extensively to the East before and during the Pantheon's construction.⁵⁷ More importantly the Temple of Asklepios in Pergamom, which was constructed immediately after the Pantheon, not only is a smaller replica of the Pantheon, but is also identified with Hadrian himself as Asklepios Soter.⁵⁸ Given Hadrian's fascination with the god of healing and certain architectural counterparts between the two structures, an argument might be made that the *Tholos* at Epidauros partially influenced either Hadrian or his architect in the design of the Pantheon's dome.

Mausoleum of Halicarnassos

The Tomb of Mausolus, prince of Caria, dedicated in 353 B.C. by his wife Artemisia, is an example of a *heroön*: a memorial aggrandizing a ruler as a hero. The influence of the Tomb of Mausolus is still recognizable etymologically in that the term "mausoleum" is derived from the name of the Halicarnassean ruler, 'Maúoωλoç'. Pliny

⁵⁶ The factor of the Pantheon's 28 radial coffered rows is 7, which contrasts the architectural features of its attic and drum, which are based on 4 and 8 radials.

⁵⁷ SHA *Hadr.* 13; Cass. Dio 69.16.2.

⁵⁸ M. Le Glay, "Hadrien et l'Asclepieion de Pergame," *Bulletin de Correspondance Hellenique* (1976): 347-72.

and Vitruvius both recognize Scopas as one of the monument's sculptors.⁵⁹ A full account of the Mausolean structure by Pliny describes an outer colonnade supporting a 24 stepped pyramid topped with a four-horse chariot in marble at its zenith, a self-aggrandizing spectacle in its day. It is worth noting that the Mausoleum's architect wanted to vaunt both the array of decorative sculpture and coffers in a public context; thus, archaeologists assume that those coffers unearthed were fastened under the architrave in the outer intercolumnar space.

Although our first literary evidence for figurines framed by coffers appears in the Temple of Asklepios, the Mausoleum introduces the earliest archaeological sampling of them. Only a few fragments of coffer lids have been excavated, but of those a small number exhibit sculpted reliefs: male figures, a female figure in a chiton, weapons, and Amazons.⁶⁰ Since classic Attic metopes depict Theseus battling Skiron and other themes on the Hephaisteion in Athens, researchers assume that the figures depicted on the coffers at Halicarnassos are those that represent the deeds of either Theseus or Hercules.⁶¹ As the first colonists of Halicarnassos hailed from Troizen, the birthplace of Theseus, there may be an implied analogy between Mausolus as the synoikist of Halicarnassos and Theseus as the synoikist of Athens.⁶² Thus, the coffers from the Mausoleum in Halicarnassos demonstrate how earlier structural ornaments can be transformed into architectural *tituli* of heroic iconography in a new funerary tradition of adulation and proclamation of divine transmission and apotheosis.

⁵⁹ Plin. HN 36.4.30-31; Vitr. De arch. 7.pref.12-13.

⁶⁰ Tancke, 32.

⁶¹ Ibid.

⁶² Ibid.

Greek Coffers with Figures

According to Pliny, Pausias of Sikyon first invented the custom of painting coffered ceilings (*lacunaria*).⁶³ One can assume that there were other artists prior to Pausias, but perhaps not as famous.⁶⁴ The Nereid monument at Xanthos (350 B.C.) is one of the first monuments to exhibit both painted flora and figure designs. In addition to conventional egg-and-dart and palmette motifs, one coffer depicts a female bust in threequarter perspective with a veil-like covering and a single flower in one corner. Figures sculpted into the marble lids are found not only at Halicarnassos and the Mausoleum to Lysimachos at Belevi in Ephesus (246 B.C.), but also in the Hieron and Propylon at Samothrace (350 B.C). Those unearthed at Belevi are tinged with bold earth colors to highlight scenes of a Centauromachy against the shadow cast from the effect of the tiered coffers.⁶⁵ Four different motifs within three different sized coffers decorate the ceiling of the Samothracian Propylon: large foliate coffers, full frontal heads, three-quarter busts, and others in profile. These coffers depict the Samothrace's main divinities, legendary figures, and heroic initiates and are organized into a schematic design balanced by foliate coffers.⁶⁶ Similar categorization occurs in the ceiling above the tripartite porch of the Serapeion in Miletos, where Muses and possibly Graces flank busts of divinities.⁶⁷ Finally, the finest example of freely sculpted figures, as though they were actually hung

⁶³ Plin. *HN* 35.40.124: *idem et lacunaria primus pingere instituit, nec cameras ante eum taliter adornari mos fuit*: "Futhermore, he was also the first to establish painting coffers, nor was it customary to decorate vaults in such a way before him."

⁶⁴ Tancke, 30.

⁶⁵ Ibid., 32-33.

⁶⁶ Phyllis Lehmann, Samothrace: The Temenos, Vol. 5 (New York: Pantheon, 1982), 165.

⁶⁷ Ibid., 160.

in the coffer, appears in the Temple of Athena in Priene although their date is still debatable. These coffers depict a Gigantomachy in a most exquisite fashion, leading many to date these coffers to the 2nd century B.C. when the figural coffering tradition ends with the conclusion of the Hellenistic building programs, unlike ornamental coffer systems that continue.⁶⁸ Thus, the 4th, 3rd, and 2nd centuries B.C. in Greece and Asia Minor provide solid examples how shape, decoration, and representation of divine images played a role in the overall coffered ceiling design of funerary monuments and sanctuaries where initiation, regeneration, and divination are visually expressed through architectural ornament.

One can only speculate whether or not coffers with ornamental figures in the 2nd century B.C. continued to be manufactured in less durable material such as wood, stucco, or metal since archaeological evidence is meager. Literary documentation does highlight a few of the extravagant coffers. Pausanias mentions decorative birds made of wood or plaster carved into coffers in the Temple of Diane at Stymphale.⁶⁹ Vitruvius specifies cedar in the ceiling of the Temple of Artemis at Ephesos.⁷⁰ Livy states that the Temple of Zeus at Antioch gleamed with gilded coffers in addition to its walls of gold and tin.⁷¹ Gold ceilings appear to draw particular attention from classical writers;⁷² according to Kallixeinos of Rhodes, the Thalamegos, a ship of Ptolemy IV ca. 3rd century B.C.

⁶⁸ Tancke, 34.

⁶⁹ Paus. 8.22.7: Although Pausanias does not clearly indicate whether these carvings were affixed or not, but if the birds were made of stucco, then they most certainly would have been attached.
⁷⁰ Vitr. *De arch.* 2.9.13.

⁷¹ Livy *Epon*. 41.20.9.

⁷² Tancke, 30.

possessed a coffered ceiling, like the ship of Hieron II of Syracuse, made of cypress wood that framed various sculpted and gilded ornaments.⁷³

Etruscan Tumuli

From the 6th century B.C. onward, the interiors of Etruscan tomb chambers displayed the use of sculpture and painting to reproduce architectural features common, we assume, to Etruscan palaces and homes, such as door posts, lintels, Doric, Aeolic, and Tuscan columns, and decorative ceilings. In the 5th century B.C., chiseled coffers crown the flat, rock-hewn ceiling of the *Tomba della Scimmia* at Chiusi and appear between the ceiling beams in the *Tomba dei Capitelli* at Caere, perhaps illustrating the architect's knowledge of Greek coffering construction. The *Tomba dei Relievi* and *Tomba dell'Alcove* at Caere, which date to the 4th century B.C., illustrate the sumptuousness of the Etruscan atrium house with its gabled central hall, the *tablinum*, side rooms, and various types of coffered or otherwise embellished ceilings.⁷⁴ Rather imposing sunken panels also emerge in the 3rd century B.C. in the *Tomba del Cardinale* at Tarquinia. These Etruscan coffers appear in both square and rectangular shapes, but unlike Greek coffers, carved or stucco tiers or decorative moldings are not integrated.

At Tarquinia, funerary ceilings exhibit an array of painted decorative motifs incorporating geometric designs of circles, scattered flowers, and two-tone checkerboards. The ceiling of the *Tomba Bartoccini* (530 B.C.) reveals a checkered

⁷³ Ath. V 196 A.D.E; V 206 D-F.

⁷⁴ Axel Boëthius and J.B. Ward Perkins, *Etruscan and Roman Architecture* (New Haven: Yale University Press, 1978), 75.

pattern in green, gray, white, and muddy red colors.⁷⁵ The Tomba del Cacciatore (6-5th century B.C.) echoes the same checkerboard design amid pitched brown roof rafters, so that the colored squares appear more like roof tiles over the interior depiction of a hunting pavilion.⁷⁶ Red and white squares adorn the ceiling of the *Tomba della Caccia al* Cervo (6-5th century BC), the murals of which also portray banqueters and a hunting scene.⁷⁷ Although these painted checkered ceilings seem to imitate domestic architecture, they may also represent shelters for funeral games or temporary ornament for such sanctuaries.⁷⁸ A canopy of similar function has been ascribed to the ceiling of the 5th century B.C. Tomba della Scimmia at Chiusi.⁷⁹ Here, a square coffer in the center of the horizontal roof depicts a red disk supported diagonally by four winged sirens. Four leaves radiate in the middle of the medallion, encompassed by a double border with scalloped edging. Karl Lehmann argued that this is a type of baldachin or canopy of heaven in planar projection, one of the first representations of what will become a common theme in ceiling decoration.⁸⁰ Likewise, the motif of four winged creatures or sirens, which are connected with celestial imagery in Etruscan art, will continue to surface in a diagonal arrangement propping up a central celestial representation.⁸¹

As would be expected, many examples of orthogonal coffering schemata may be found at Caere and Tarquinia. However, a more direct link to the origin of the circumferential rings of the Pantheon's coffers and ribs may be traced back to the

⁷⁵ Mario Moretti, *New Monuments of Etruscan Painting*, trans., Dawson Kiang (University Park, PA: Pennsylvania State University Press, 1970), 10-16

⁷⁶ Ibid., 154-57.

⁷⁷ Ibid., 186-87.

⁷⁸ Boethius and Ward Perkins, 68.

⁷⁹ Karl Lehmann, "The Dome of Heaven," Art Bulletin 27 (1945): 2; fig. 2.

⁸⁰ Ibid., 2.

⁸¹ Ibid.

radiating roofs in archaic Etruscan tomb chambers at the Banditaccia Cemetery in Cerveteri and at Vulci.⁸² These semi-domes or conoids, sometimes referred to as umbrella or lampshade or fan-shaped, consist of a central disk surrounded by meridian rays contoured from the rock in relief.⁸³ In the necropolis at Cerveteri, continuous vertical ribs forged in the ceiling encompass the *Tomba della Nave* (7-6th century BC) in an umbrella-like arrangement.⁸⁴ A similar ceiling appears in the *Tomba Campana* 1 (Fig. 4). Such a design parallels the decoration depicted on the back of a 3rd century B.C. Etruscan mirror, where the figures of Meleager and the Dioscuri are situated under what Karl Lehmann described as a wooden *tholos*.⁸⁵ Lehmann used this mirror as an isolated example of an early prototype that simulates a canopy where multiple folds of a "tent-like *velum*" are fastened at the upper central opening and extend down to the awning's bottom edge.⁸⁶

The Banditaccia Cemetery also furnishes us with the *Tomba della Tumulo* VIII (c. 650 B.C.), a tomb with a ceiling excavated from the native rock and molded into a fanpattern analogous to the concentric, circular layout of the Pantheon's coffers.⁸⁷ Vertical ribs radiate and intersect with horizontal circular bands in a semispherical vaulted ceiling. In like fashion, a fan-shaped semi-dome tops a rectangular floor plan in another *tumulus* in Cerveteri, which has been named the *Tomba degli Animali Dipinti* (Fig. 5). The apex

⁸² George Dennis, *Cities and Cemetaries of Etruria*, Vol. 2 (John Murray: London, 1848), 33, describes these ceilings existing in Cerveteri; Dennis specifically cites the *Tomba Campana* having this design on its ceiling and in relief on its wall, 2:57, n. 3. See also Massimo Pallottino, *The Necropolis of Cerveteri* (Rome: Istituto Poligrafico Dello Stato, 1960): 13, and 20.

⁸³ Giovanni T. Rivoira, *Roman Architecture* (New York: Hacker Art Books, 1972), 176.

⁸⁴ Friedham Prayon, *Frühetruskische Grab- und Hausarchitektur* (Heidelberg: F. H. Kerle Verlag, 1975), pls. 8, 2; and 29; 1. See also pls. 38 and 40.

⁸⁵ Karl Lehmann, fig. 26.

⁸⁶ Ibid., 11.

⁸⁷ Prayon, 94, fig. 20.

of the design is a circular disk resembling an *oculus*. This chamber is of particular interest because it is one of three coffered roof designs from a single tomb (Fig. 6). The anterior chamber consists of an elliptical ground plan with a flat roof with an orthogonal pattern of square coffers.⁸⁸ The conoid chamber follows with a ceiling coffered in a fan-pattern above a quadrangular room. A door wall leads to the posterior inner square chamber, which in turn features a traditional coffering grid underneath a pitched roof.

Although there is no correspondence in the number of coffers or circumferential rings between any of the fan-shaped tombs at Cerveteri and the Pantheon, one tomb unearthed at Vulci in 1830 merits examination because of its implied celestial symbolism. The eight-chambered *Tomba del Sole e della Luna* (7th century BC) parallels the motif of the domed *tumulus* in the necropolis at Cerveteri; it too features rectangular sunken coffers fashioned in radial array with meridian ribs or rafters intersected by latitudinal ones.⁸⁹ Lehmann conjectured that since the incised ribs or "rays" only accounted for the representation of the sun, that perhaps the tombs' naming, like other *tumuli*, coincided with a mural, or in this case a painted ceiling of the sun and moon that quickly eroded after its excavation.⁹⁰

⁸⁸ Ibid., pl. 31; the *Tomba dei Leoni DiPinti* has the same design, pl. 35.

⁸⁹ Dennis, 2:57; Dennis also cites concentric square coffers in the *Tomba del Colle Casuccini* in Chiusi, 2:63 and in the *Tomba dei Volumnii* in Perugia, 2:477.

⁹⁰ Karl Lehmann, 20, n. 176.

Roman Coffering

It is sensible to include wooden coffering as one of five types of Roman coffered ceilings manufactured in the Roman era.⁹¹ A second group consists of stone coffers on flat roofing slabs, identical to those of Greek precedent previously surveyed, which the Romans adopted from classical Greece primarily for temple construction in Italy and continued in the Eastern Empire.⁹² Decorated coffers carved in limestone or marble can be found in the rotunda temple at Tivoli, the round temple in Rome, and in the soffits preserved from the Temple of Mars Ultor in the Forum of Augustus.⁹³ A third grouping, to which the Baths of Trajan and the Pantheon belong, includes those *lacunaria* or recessed coffers fashioned in vaults and arches cast in concrete that begin to emerge in the West towards the end of the Republic and continue well into Constantine's reign. Here, decorative stucco work and other ornaments such as wood, ivory, or metal appear and form a tradition of adorning newly molded coffers.⁹⁴ Stucco coffering, which began at relatively the same time, will be considered the fifth type, for its quick evolution in scheme and ornamentation appears to define a decorative standard for both concrete and stone coffering. Finally, a fifth type of coffering emerges in the inner fornix of the

⁹¹ Sheila McNally, *Architectural Decoration of Diocletian's Palace at Split*, British Archaeological Reports Series 639 (Oxford: B.A.R., 1996), 63, does not include wooden coffers as a grouping. F.W. Deichmann, "Kassettendecken," *Festschrift fur Otto Demus zum 70. Geburtstag. Jahrbauch der Osterreichischen Byzantinistik* 21 (1972): 83-107, includes wooden coffers. Neither mention stucco coffering as a grouping, but its development in scheme and ornamentation is applicable to this study.

⁹² Karin Tancke, *Figuralkassetten grechischer und römischer Steindecken* (Frankfurt: Peter Lang, 1989), documents the stone coffers and their development in Roman temples in Syria and Asia Minor, e.g. the Temple of Bel in Palmyria, ca. 1st century A.D., 278, and pl. 54, 1, 2; and the Temple of Bacchus in Baalbek, ca. 2nd century A.D., 282, and pl. 58, 1-4.

 ⁹³ Giuseppe Lugli, *La Tecnica Edilizia Romana con Particolare Riguardo a Roma e Lazio*, Vol. 1 (Rome: Presso Giovanni Bardi, 1957), 678; E. M. Steinby, *Lexicon Topography Urbis Romae*, 5 Vols. (Rome: Quasar, 1995), 2:455, fig. 119: *Forum Augustum*, reconstruction of the portico's attic.
 ⁹⁴ Lugli, 1:678.

passageways of gates and monumental arches constructed of stone, such as the Arch of Titus at Rome and the Arch of Trajan at Beneventum. The classification of Roman coffering into these five categories depends not only on the materials employed, but the shape of the structures as well.

Roman Wooden Domes

The question arises whether or not fan-shaped coffering was used in wooden domes in the Roman era. We can neither assume that the Romans had access to the sealed tomb chambers of their northern neighbors nor infer categorically that the Etruscan radial roof design was prevalent and widespread enough to be embraced by Roman architects. However, we can rely on the notion that the Romans, like the Etruscans, had wooden prototypes that were translated and thus adapted into cement vaulting. In 1950, E. Baldwin Smith, in his study of the history of the dome, emphasized that all evidence illustrates that early vaulting and domes were "traditional roof shapes originating in pliable materials and later imitated in masonry for ideological purposes."⁹⁵ Other scholars cite wooden coffers as both preceding and contemporaneous with concrete and stucco coffers, often referencing Vitruvius' 1st century B.C. description of wooden *lacunaria* in the ceilings of Hellenistic homes.⁹⁶ If these premises are true, then the

⁹⁵ E. Baldwin Smith, *The Dome: A Study in the History of Ideas* (Princeton: Princeton University Press, 1950), 6–11.

⁹⁶ Roger J. Ling, "Stucco Decoration in Pre-Augustan Italy," *PBSR* 40, (1972): 20; Lugli, 1:678; Vitr. *De arch.* 6.3.9: *Ex instestino opere*: "of fine joinery." Isidore of Seville, ca. mid 6th century A.D. also documents coffers of wood, Isid. *Etym.* 19.12: *Laquearia sunt quae cameram subtegunt et ornant, quae et lacunaria dicuntur quod lacus quosdam quadratos vel rotundos ligno vel gypso vel coloribus habeat pictos cum signis intermicantibus*, "Coffered ceilings are those which cover and decorate a vault, which are also

Pantheon's cupola design may be an adaptation of a standard or popular aesthetic design of timber framed domes in the Roman west during the early principate. Evidence of wooden domes in and around central Italy is found in both coins and wall paintings.⁹⁷ Two coins, representing the Temple of Vesta in the Forum, validate the appearance of timber domical roofs in civic architecture. One, a denarius of Quintus Cassius, minted around 55 B.C. depicts a dome of the round temple constructed of rafters arranged radially in the umbrella style.⁹⁸ The second coin, an *aureus* issued in the reign of Titus A.D. 73 (Fig. 7), illustrates a somewhat different tholos, as would be expected since the Temple of Vesta went through numerous reconstructions. Its outer roof delineates a fanshape pattern, incorporating the intersection of vertical and horizontal beams in concentric rings.⁹⁹ Interpreting the impressions of these coins as domical timber roofs is logical, since there is a tradition of Roman coins depicting wooden rafters on pitched roofs of Roman temples, such as the Temple of Jupiter on the Capitoline. Moreover, the probability that these two coins represented concrete roof structures is highly unlikely since the majority of Roman cement vaulting concealed its framework from the outside.

The outer circular roof depicted on the *aureus* of Titus provides two rather important features relevant to Roman coffering. First, there appear to be visual vertical alignments between the rafters and supporting concentric columns below and between the central rafter over the cella's entrance. The occurrence of vertical alignments, as well as

called *lacunaria* because the hollow contains some squares or circles in wood or in stucco or ones ornamented in color with gleaming figures."

⁹⁷ Karl Lehmann, 20 and n. 177, not only believed that wooden domes were fabricated in Etruria by their replication in Etruscan tombs previously cited, but were also continued into the Imperial age by the Romans.

⁹⁸ Steinby, 5:350, fig 73: Vesta aedes.

⁹⁹ Ibid., fig 75: Vesta ara, signum, aedes.
the departure from them will be part of a developing theme in the evolution of Roman coffered ceilings, specifically in the appearance of concrete 'ribs.' Secondly, the intersection of vertical and horizontal rafters on dome-like structures creates voids in the shape of trapezoids, the exact shape of the coffers adorning the Pantheon's cupola. Just as the orthogonal beams of rectangular Greek roofs naturally produced square coffers, the trapezoid is inherent in the design of wooden domes with intersecting beams.

The only literary source possibly implying this type of fan motif in wooden domes of the Roman era comes to us through the commentaries of Servius. In Book 9 of Vergil's *Aeneid*, the Trojan Nisus invokes Diana with a prayer remindful of his acts of *pietas*, one of which specifies hanging game offerings in her tholos.¹⁰⁰ Servius remarks: *tholus proprie est veluti scutum breve, quod in medio tecto est, in quo trabes coeunt; ad quod dona suspendi consueverant*.¹⁰¹ If Servius' description is indeed referring to a fanlike domical structure, then we are now presented with documentation illustrating the knowledge and (or) appearance of wooden domes with the fan motif in the Augustan age as well as in the 4th century (during Servius' lifetime).

The outer configuration of the Temple of Vesta imprinted on the *aureus* provides a possible visual template for the logical arrangement of wooden coffers in circumferential rings in the inner *cella*. Unfortunately, archaeological evidence indicates that this was not the case; instead, flat marble coffers, richly sculpted with the earliest known egg-and-dart moldings ca. mid 2nd century B.C. or late 1st century B.C., were part

¹⁰⁰ Verg. Aen. 9.407-08: si qua ipse meis venatibus auxi suspendive tholo aut sacra ad fastigia fixi, "If I myself have offered any (gifts) with my hunting or have suspended any in your tholos or have affixed any to your sacred roofs."

¹⁰¹ Serv. *Dan.* 9.407: "There is a tholos in particular like a short shield, which is in the middle of the roof where the rafters join together, the place at which it had been customary to hang offerings."

of a plinth ceiling that concealed the architectural timber framework.¹⁰² Yet, we can certainly understand that if the plinth ceiling were not utilized, the architect would have been confronted with finding alternative facings to cover the trapezoidal voids in a structural arrangement that is similarly reproduced in the concrete dome of the Pantheon.

Our attention now needs to turn towards other forms of documentation that can provide an interior perspective, especially from the architectural edifices and décor rendered in Roman murals. Several depictions of wooden domes with celestial imagery from Pompeian wall paintings are preserved, but one in particular deserves special attention: a section of a wall decoration from the House of Caecilius Jucundus in Pompeii (Fig. 8).¹⁰³ In this mural characteristic of the third style (20 B.C.- A.D. 60), a dome fashioned with coffers in the fan-shape motif rests above a curved wall with what appears to be engaged columns. The color of the roof is brown – strongly suggesting that the medium depicted here is wood. It is interesting to note that a rather large oculus, like the Pantheon's, appears to be incorporated into the structure. Whether the painting reproduces a genuine coffered dome or simply characterizes one is still debatable. The painting from the House of Caecilius Jucundus and depiction of the outer roof from the aureus of Titus imply the appearance of fan-shaped wooden domes at the beginning of the Imperial period. The Pompeian mural and suppositions of modern scholarship suggest that the use of wooden coffers in such domes is plausible. We can only speculate if and how this tradition directly affected the Pantheon's design, whether the architect originally

¹⁰² Ebert, 371: The round temple in Tivoli also incorporated flat marble coffers in a plinth ceiling, similar to Greek *tholoi*; c.f. Lugli, 1:678, and Ling, 50.

¹⁰³ Karl Lehmann, fig. 58; 20, n. 177.

adopted and translated a wooden model into the concrete cupola, or whether he was influenced indirectly by an earlier adaptation of wooden décor into concrete vaulting.

Republican Concrete Coffering

At the end of the 2nd century B.C., a new type of coffering emerges in Rome simultaneously with constructional techniques and experimentation with the new cement medium that most fittingly characterizes and defines Roman architecture. Cement allowed adventurous, large-scaled designs and structural freedom with its casting of arches and vaults that enveloped large amounts of space and height in novel contours. One of the earliest and most impressive examples of this newfound technique was exploited by Sulla in the Temple of Fortuna Primigenia in Praeneste constructed or reconstructed around 110 B.C, which also provides the first recorded occurrence of concrete coffered vaulting.¹⁰⁴

Steeply terraced on a hillside, the Temple complex in Praeneste creatively synthesizes ramps, arcades, hemicycles, and porticoes layered one atop another with an accentuated system of arches.¹⁰⁵ Each tier is organized symmetrically around a visible central axis that is pinnacled with a modestly scaled *tholos*, the Temple of Fortuna, atop a large amphitheater in the shape of a hemicycle. Two smaller concentric hemicycles in the middle tier symmetrically flank the central axis. Each of these hemicycles houses seven columns that mirror the path of its inner curved wall constructed of *opus*

 ¹⁰⁴ Rabun Taylor, *Roman Builders: A Study in Architectural Process* (Cambridge: Cambridge University Press, 2003), 53, n. 75, specifies 110 BC. John Ward-Perkins, *Roman Architecture* (New York: Harry N. Abrams, Inc., 1977), 39, dates the Temple of Fortuna complex to the 1st century B.C.
¹⁰⁵ Ward-Perkins, fig. 46.

*incertum.*¹⁰⁶ Here, fabricated between the concentric wall and columns, a concrete annular vault spans 180° in plan, imprinted with three rows of three-tiered 'square' coffers that conform to the curve.¹⁰⁷ Although no molding remains on the frames, each coffer contains five holes, four in the corner and one in the center - a clear indication that ornamentation, most likely of stucco or wood, was affixed.¹⁰⁸

Because the combination of lime, sand, and water provided new pliability in the mortar, these cement coffers, unlike marble coffers of Greek precedent, had the ability to adapt to the curvature of a vaulted roof. Fabrication of these quadratic hollows in cement depended on a wooden centering or framework on which rubble aggregate of cement could set. It had been widely accepted that wooden molds of ziggurat-shaped coffers were affixed firmly on top of the surface strips, or lagging, to create desired shapes and then were detached once the concrete cured. However, Rabun Taylor convincingly opposes this assumed notion, due to the engineering intricacies involved in disassembling the centering: if coffer molds were fastened, it would be impossible for carpenters to ease down the lagging without resistance from molds adhering to the rough aggregate.¹⁰⁹ Examining the affects and tensile strength of cement, Taylor recognized that when liquid concrete began to set after it was applied in horizontal layers from the bottom up, its strength and cohesion increased, while the burden upon the centering gradually

¹⁰⁶ Furio Fasolo and Giorgio Gullini, *Il Santuario della Fortuna Primigenia a Palestrina* Vol. 1 (Rome: Istituto di Archeologia, 1953), 130-31, figs. 195 and 197.

¹⁰⁷ William L. MacDonald, *The Architecture of the Roman Empire*, Vol. 1, 2nd Edition (New Haven: Yale University Press, 1982), 8; pl. 10; De Fine Licht, *Rotunda*, 276, n. 32. Because of the curvature of the roof, these coffers resemble square coffers on a two-dimensional surface, but they are actually assymetrical. Fasolo and Gullini, 133, and fig. 203.

¹⁰⁸ Fasolo and Gullini, fig. 204.

¹⁰⁹ Taylor, 188-90.

decreased.¹¹⁰ Taylor applied this rationale to the coffer molds, which he believed were free to slide upon the lagging before being attached with removable wooden pegs. When the concrete applied at the bottom of the forms had hardened, these wooden bosses would become sufficiently embedded so that the pegs could then be dislodged before full casting of concrete was completed. Thus, according to Taylor, the coffer molds would not snag during the dismantling process undertaken by carpenters, who would in turn transform the framework into scaffolding suitable for stuccoists and painters to trim the vault above.¹¹¹

The coffers of the hemicycles at Praeneste, in terms of their shape and layout, are relatively simple – they embody the traditional quadratic shape with indented tiers. Yet, their appearance in this new milieu marks a transition from the structural to the aesthetic. Coffers first created to conceal the *lacunae* between intersecting rafters in trabeate architecture are now highlighting the vaulted space derived from the Romans' capitalized art of cement casting in concentric patterns. Although engineers might argue to some extent that the conception of vault-coffering began as a practical structural consideration in diminishing a concrete ceiling's overall weight, principally in domes, nonetheless, here at Praeneste and in later imperial buildings, coffers are now also part of a new visual function: to imply motion - a sensation that is also reflected in the hemicycle with its sweeping curve of columns and walls within.¹¹² What even accentuates this novel visual energy of the coffers is the element of surprise, for the decorated vault is concealed until the visitor enters the hemicycle itself. This parallels the organized ascent of the terraces

¹¹⁰ Ibid., 176-77.

¹¹¹ Ibid., 190.

¹¹² MacDonald, Architecture, 8.

of Praeneste from one architectural grouping to another where each superior zone is invisible until the observer progresses to the next level. Hence, the coffers and the hemicycles reflect as well as contribute to the experiential and visual surprise of the Sullan opus.

Another late Republican example of concrete vaulting appears in the private *nymphaeum* of the so-called 'Villa of Cicero' at Formiae.¹¹³ Here, ziggurat-shaped coffers spring above flanking columns supporting a barrel vault. The coffer ribs in the *nymphaeum* appear to correspond to the structural columns below, thus creating vertical alignment throughout the structure and design. Running the central length of the upper vault are rectangular panels inscribed with large diamonds bordered by smaller triangles. The subordinate square coffers highlight the shape of the vault and force the viewer to trail the concentric design to the central rectangular panels. The *nymphaeum's* curvilinear background, like all vaulting, provided a new canvas for exploring geometric patterns of different shapes and sizes, just as the round roofs of Greek *tholoi* granted an opportunity for sculptors to venture with unconventional polygons. Regrettably, no archaeological evidence of concrete coffering after Sulla and the *nymphaeum* appears until the reign of Domitian.¹¹⁴

¹¹³ Ling, "Stucco Decoration," 24-26, considers this concrete coffering because the original frames were set in concrete. Lugli, 1:693, has considered the *nymphaeum* an example of stucco coffering. ¹¹⁴ Lugli, 1:679; 693.

Stucco Coffering

Fortunately, experimentation with geometrical designs and the development of decorative moldings and various central motifs are preserved in stucco vaults of the 'coffer style,' contemporary with and after Sulla. In these vaults, which are considerably smaller than the bold edifices assembled in Imperial times, the stylistic progression appears to evolve more rapidly and thus influence, in some degree, concrete and stone coffering in later Imperial structures. Stucco vaulting involved the application of a superficial plaster layer to the underside of concrete surfaces either with a wooden mold of a desired shape, a strip of molding previously set, by free hand in a manner comparable to the Hellenistic Greek practice of imitating stone of wooden coffering, or combination thereof.¹¹⁵ Several stucco coffered ceilings commissioned in the private sphere during the 1st century B.C. have been tentatively linked and dated by technique, layout, and ornamentation.¹¹⁶ In the Casa dei Grifi in Rome (c. 110 – 70 B.C.), unadorned coffers, like those in Praeneste, appear in one vault in a basic grid of traditional squares and in another as a band of squares and rhomboids.¹¹⁷ A ceiling from the so-called 'villa of Galba' in Ager Tusculanus (second quarter of 1st century B.C.) furnishes the earliest known western examples of decoration. An ovolo molding, which has been contoured by the application of light plaster to an initial thick layer of mortar for the coffer framing,

¹¹⁵ Wadsworth, Emily L. "Stucco Reliefs of the First and Second Centuries still Extant in Rome." *MAAR* 4 (1924): 20.

¹¹⁶ Ling, "Stucco Decoration,"11-57, documents the following cases and several others.

¹¹⁷ Ibid., 28, pl. 7, a.

creates a chiaroscuro effect.¹¹⁸ Various motifs also festoon the central panels in relief, some of which contain laurel wreaths, horses, *peltae*, and *paterae*.¹¹⁹

Even more dramatic are the various polygonal coffers that have been carefully plotted in the vaults throughout the Casa del Criptoportico in Pompeii (third quarter of 1st century B.C.). In a reconstruction of the vault decoration in the eastern half of the north wing (Fig. 9), the original square coffers have combined to form larger compartments of alternating squares and rectangles with dimensions dependent on the original grid blueprint.¹²⁰ Each field showcases a repertoire of various shapes and patterns: lozenges and smaller triangles form a reticulate pattern; hexagons with and without diminutive lozenges create a honeycomb arrangement; and a unique positioning of lozenges generates an accordion-like effect. In addition, single diamonds are inscribed in rectangles; circles are framed by squares. In the center of the vault, lozenges radiate in a star-like pattern, drawing partial attention, but not detracting focus from the vault's overall equilibrium.¹²¹ Grooves with egg-and-dart and waterleaf decoration delineate the separate compartments.¹²² Motifs resembling those from the villa at Galba embellish the coffers but with images distinctive to a coffer's shape: hexagons surround various rosette forms; large lozenges frame thunderbolts, smaller ones outline leaf accessories; triangles contain dolphins, and squares display an assortment of plant and military subjects.¹²³ However, as elegant and detailed as these reliefs appear to be in comparison to their

¹¹⁸ Ibid., 37.

¹¹⁹ Ibid., 38. Other motifs include lyres, quivers, baskets with fruit, *kraters*, and traces of possible fillets and plant motifs.

¹²⁰ Ibid., 34, fig. 3.

¹²¹ Ibid., 41.

¹²² Ibid., 31.

¹²³ Ibid., 31-32, pls. 11 and 12.

antecedents in the villa of Galba, their small scale and wide distribution still limit themselves to a minor role in the collective visual experience.¹²⁴

The complexity of the cryptoportico's signifies a 'loosening' effect in stucco coffering schemes from the rigid orthogonal formula established in trabeate architecture to a melding of different layouts and experimentation with varied geometric shapes due in part to the new curvatures created by vaulting.¹²⁵ Aside from the Tomba dei Volumnii in Perguia (2nd century B.C.), which contains a square coffer inscribing a diamond, which in turns frames a medallion, no other shapes except those of squares appear before the cryptoportico.¹²⁶ A combination of square coffers as rectangles with inscribed lozenges also appears in a tomb in Auximum, tentatively ascribed to the last quarter of the 1st century B.C. or later.¹²⁷ However, unlike the Pompeian cryptoportico, a central field delineated by two broad moldings measuring three by two coffer squares dominates the ceiling's design. Traces of stucco figures appear in the square coffers, but the central panel has deteriorated significantly. We can assume that some type of figural scene occupied the central panel, which shifts the emphasis of the stucco vault design away from geometric fields to reliefs with figurines, thus forcing the coffers into a subordinate role.¹²⁸ The stucco material, the compartmentalization of coffers, and the central motifs in the tomb of Auximum all indicate a direct advancement in scheme from its antecedent, the cryptoportico.129

- ¹²⁴ Ibid., 44.
- ¹²⁵ Ibid., 55.
- 126 Ibid., 51.
- ¹²⁷ Ibid., 39-42, fig. 5, pl. 14, a.
- ¹²⁸ Ibid., 44.

¹²⁹ Ibid., 41.

Both concrete coffering and stucco vaulting appear to have emerged almost concurrently in the 1st century B.C. incorporating checkerboard layouts. Although it is generally assumed that the private sphere adopted décor visible in public concrete monuments, as was commonly practiced in other architectural traditions,¹³⁰ it is possible that stucco vaulting, like concrete coffering, imitated wooden and marble coffers of raftered ceilings as prototypes. The difference between the two media lies in the refinement of decorative trimming and the rate of stylistic evolution. The texture of stucco afforded more detail than concrete would allow. The development from a uniform grid of unadorned squares evolved rather swiftly in stucco design, due in part to the size and scope of modestly scaled ceilings in addition to the economical cost and easy application of stucco itself.¹³¹ The evolution of coffered concrete ceilings, however, progresses at a much slower rate, possibly due in part to the extensive height of the vaults and the laborious process of fabricating designs via wooden molds, which were probably modeled in whole or prefabricated into sections on the ground before their attachment onto lagging.¹³² As gradual as the stylistic transformation may be, concrete vaulting appears to have evolved in similar fashion to the process of stucco vaulting outlined above, as will be exemplified in the Baths of Trajan, Hadrian's Pantheon, Maxentius' Temple of Venus and Rome, and Constantine's Nymphaeum and Basilica in following chapters. In addition to concrete coffers, there is strong evidence that stucco vaulting

¹³⁰ Ibid, 48. Ling states that stucco coffers in the *Casa dei Grifi* are delineated by a red painted 'groove,' suggesting the appearance of separate coffers or coffer lids that were common in marble and wooden coffered ceilings. The same stucco coffers are also incised at the corners, perhaps to indicate clamps of some sort.

¹³¹ Ibid., 49.

¹³² Lugli, 1:678; Taylor, 179.

perhaps influenced the coffering schema and ornamentation adorning other impressive monuments in early imperial architecture: *fornices*.¹³³

<u>Fornices</u>

The tradition of coffered vaulting in the *intrados* of free-standing arches not only adopts stylistic elements of stucco coffering, but possibly translates them into a use in Roman official architecture that has yet to be considered in its direct connection to the design and symbolism of the Pantheon's coffered dome. The custom of erecting *fornices* appeared in Rome as early as the 2nd century B.C. The first *fornices* were temporary independent monuments of wood bedecked with spoils of military battle. Although most arches were dedicated to the Emperor or members of the Imperial family, quite often towns, municipalities, and divinities were honorees. The earliest examples of coffered vaulting in the inner *fornix* appear to occur in private funerary arches used as cenotaphs in the Early Empire. Outside the *pomerium* of Verona on the *Via Postumia*, square coffers with rosette bosses adorn the soffit and frame three larger panels of *gorgoneia* on a funerary arch erected by the *gens Gavia*, the date of which is still questionable.¹³⁴ Quadratic coffers with rosettes decorate the *intrados* of the funerary Arch of the *Sergii* in Pola, commissioned privately by Salvia Postuma to venerate her family members, one of

¹³³ Ling, "Stucco Decoration," 54.

¹³⁴ Giovanna Tosi, *L'arco dei Gavi* (Rome: «L'Erma» di Bretschneider, 1983), figs. 48-51. Fred. S. Kleiner, *The Arch of Nero in Rome: A Study of the Roman Honorary Arch Before and Under Nero* (Rome: Giorgio Bretschneider Editore, 1985), 37; *CIL*, V. 3464.

whom served in the battle of Actium.¹³⁵ Although scholars continue to dispute the dating of the arch, placing it between 29–10 B.C. or after A.D. 2, this monument appears to be one of the first in Roman imperial architecture to feature a coffered vault with sculpted figures as the central focal point - the antecedent of which first appears in the stucco coffering in the tomb at Auximum.¹³⁶ Here, a large square frame bordered by dolphins features an eagle with spread wings carrying a serpent aloft. Griffins, sphinxes, and dolphins are also presented in framed panels. The relief certainly evokes propagandized images of the Battle of Actium with victorious Octavian and vanquished Cleopatra portrayed as Jupiter/eagle and a snake respectively.

More importantly, the central panel in the Arch at Pola visibly represents a scene of apotheosis, an apropos decoration in a funerary context.¹³⁷ Magnifying the allusion of heavenly ascension is the actual placement of the panel itself in the center of the inner *fornix* at the highest possible position above the viewer passing underneath. In this context, the petaled rosettes, which had a history of being gilded, exaggerate the celestial effect by their star-like shape and appearance. A similar treatment of coffered ceilings as celestial baldachins in a sepulchral setting was observed previously in Etruscan tumuli.¹³⁸ Romans too apparently perceived the structural form of the arch and vault as a projection of heaven; Cicero cites Ennius' metaphor, *'coeli ingentes fornices*,' *"the vast vaults of heaven," while Vitruvius refers to the under surface of vaults as the sky, 'caelum.'*¹³⁹

¹³⁵ Giorgio Gualandi, "L'apparato figurative negli archi augustei," in *Studi sull'arco onorario romano* (Rome: «L'Erma» di Bretschneider, 1979), 117-18, and pl. 10. An inscription identifying Salvia Postuma Sergi was added to the attic after her death. *CIL*, V, 50; Kleiner, 36.

¹³⁶ See section on stucco coffering *supra*.

¹³⁷ Kleiner, 37.

¹³⁸ Karl Lehmann, 11. See Etruscan *tumuli supra*.

¹³⁹ Cic. De ort. 3.40.162; Vitr. De arch. 7.3.3; and 8.2.4.

Thus, the actual shape of the arch, coupled with the astral imagery of rosette coffers, and an illusory aperture in the sky, becomes both a physical and symbolic visualization of a heavenly canopy.¹⁴⁰

Consequentially, the convention of coffering in later triumphal arches combines the symbolic elements of pomp and military pageantry with the material and transcendental expressions of the celestial realm, specifically in two arches erected in Italy: the Arch of Titus in Rome ca. A.D. 81-82, and the Arch of Trajan in Beneventum, ca. A.D. 114-118. Supposedly commissioned by Domitian, the Arch of Titus celebrates the victory of the emperors Vespasian and Titus in Judea, their destruction of the temple in Jerusalem in A.D. 70, and the triumphal march performed in Rome in A.D. 71. In the inner *fornix*, a marble panel depicts the triumphal parade entering Rome through the *Porta Triumphalis* in the Campus Martius, the place of customary commencement, with clearly identifiable images of the menorah and silver trumpets from the Jerusalem temple as described by Josephus (Fig. 10).¹⁴¹ Its opposite panel displays the emperor Titus riding a *quadriga* in triumphal procession crowned by Victory floating above him. Scenes of pageantry continue in a narrow band that runs along under the outer cornice.

Above the two inner panels of the triumphal procession, a cornice delineating the wall from the curved ceiling underscores an orthogonal grid of square coffers with rosette bosses ascending into the expansive vault.¹⁴² In the apex of the *intrados*, a square relief bordered by laurel festoons displays the apotheosis of Titus with the emperor flying into

¹⁴⁰ Karl Lehmann, 27.

¹⁴¹ Neils Hannestad, *Roman Art and Imperial Policy* (Århus: Jutland Archaeological Society Publications, 1986), 126-27, figs. 79-81; Joseph *BJ* 7.5.122-156.

¹⁴² Michael Pfanner, Der Titusbogen (Mainz: Philipp Von Zabern, 1983), pl. 25, 1-4.

the heavens on the back of an eagle (Fig. 11).¹⁴³ Rows of seven coffers define the breadth of the decoration while the central panel embodies the shape of a square with each side measuring three coffers. Each coffer is carved into three tiers; the outer panel consists of an egg-and-dart molding, while the middle leaf-and-dart tier surrounds an undecorated inner square frame.¹⁴⁴ A band of cable on the same plane as the egg-and-dart frame outlines each coffer, giving definition to the checkerboard design. Jutting from the coffers' back panel are six and seven-leafed rosettes, many of which are incised with stars with four or five points. The refined and opulent ornamentation of the coffered vaulting certainly enhances the aggrandizement of Titus as *victor triumphalis* and his divine status. From Pliny's perspective, a Roman *arcus* functioned like a column base for statuary by elevating the honoree above all mortals.¹⁴⁵ The placement of images in and above a coffered vault, with its sculpted rosettes so prominently evoking the image of a star-studded heaven, furthered this image of imperial glorification both physically and symbolically.¹⁴⁶

The apotheosis relief and the reference to Titus as *Divus* on the monument's inscription possibly date the arch to Domitian's reign a year after his brother's death. However, some scholars have incorrectly suggested that Trajan erected the arch because of its resemblance to the Arch of Trajan at Beneventum.¹⁴⁷ As unpopular as this premise may be, the two monuments do share comparable stylistic features, including their

¹⁴³ Franz Josef Hassel, *Der Trajansbogen in Benevent. Ein Bauwerk des Römischen Senates* (Mainz: Zabern: 1966), pl. 33, 1-2.

¹⁴⁴ Pfanner, pls. 26-29. Ling, "Stucco decoration, 26; 39. Undecorated inner frames are seen for the first time in hexagonal coffers in stucco in a house on the Palatine in the beginning of the 1st century BC. ¹⁴⁵ Plin. *HN* 34.12.7.

¹⁴⁶ Hannestad, 34, considers the form of arch as a sign of hubris, because it functioned like a yoke when anyone passed underneath it.

¹⁴⁷ Ibid., 126. Hannestad summarizes this theory but soon dismisses it.

coffered vaults. Constructed between A.D. 114-118 on the *Via Appia*, the Arch of Trajan commemorates Trajan's conquest of Dacia, the political installation of his *alimentaria*, and his return to Rome from his tour in Germania in A.D. 99.¹⁴⁸ Like the Arch of Titus, a narrow band of the triumphal procession in bas-relief travels around the arch under the cornice, but here it is a scene of marching soldiers, who are celebrating Trajan's Dacian campaigns.¹⁴⁹ However, the twin panels in the inner passageway of the *fornix* do not enlarge the same event; one depicts a scene of a state sacrifice, perhaps representing the emperor's *pietas*,¹⁵⁰ the other a portrayal of Trajan's alimentary program, signifying his new security and welfare for the Roman state.

Directly above the cornice appears the coffered vault, designed and ornamented in the same fashion as its Flavian predecessor. Different forms of rosettes etched with three, four, and five-arm stars protrude prominently from the familiar three-tiered square coffers.¹⁵¹ The molding ornamentation follows the same framing patterns of the vault of Titus, but the spiral cable and the egg-and-dart decoration appear to be more pronounced with deeper indentations.¹⁵² The only discernable difference is the subject matter of the central square panel, which depicts the coronation of Trajan in military garb by an upright winged Victory bordered by weapons, armor, and helmets – an illustration of *virtus* that was commonly typified in imperial coinage (Fig. 12).¹⁵³

¹⁴⁸ Ibid., figs. 114-15.

¹⁴⁹ Mario Rotili, *L'Arco Di Traiano a Benevento* (Rome: Istituto Poligrafico Dello Stato, Libreria, 1972), pl. 20.

¹⁵⁰ Hannestad, 179-80.

¹⁵¹ Ibid., pl. 21, 1.

¹⁵² Hassel, pl. 33, 1-2.

¹⁵³ Rotili, pl. 21, 2, provides an illustration of the crowning scene. Hannestad, 181.

The coffering executed in the Arch of Titus and Arch of Trajan at Beneventum continues the traditional ornamentation associated with the imperial doctrine of conquest and victory. Likewise, the allusion of a star-studded heaven, subordinate to a scene of apotheosis in the funerary arch at Pola, is adapted into the imperial iconography on the Triumphal Arch of Titus. The coronation scenes with winged Victory in the passageway panel of the Arch of Titus and in the *intrados* of the Arch of Trajan echo similar elements of deification when taking into account the customary practice of triumphal celebrants donning the guise of the god Jupiter as they pass through the Porta Triumphalis - a gateway that incorporated the *fornix* into its structure, as depicted in the inner panel on the Arch of Titus. Hence, the astral imagery manifested in the coffered *fornix* would symbolically serve to promote this act of metamorphosis.

The free-standing form of the *fornix* itself was prominent and identifiable in another Roman ceremony that embodied elements of deification: the Roman adventus, which was fully established in Imperial protocol by the 2nd century A.D. This welcoming ceremony at an arcuated city-gate echoed elements of the Hellenistic Epiphany, a religious custom celebrating the manifestation and seasonal appearance of a god at a city gate.¹⁵⁴ According to E. Baldwin Smith, all three welcoming ceremonies, the Roman Triumph, the Hellenistic Epiphany, and the Imperial *adventus* bestowed a "celestial content to the arcuated portal" because of the rites of deification associated with them.¹⁵⁵ Scenes of the Roman *adventus* may be discerned in separate reliefs on the west façade of the Arch of Trajan because an *arcus* is represented in the background of each. The first,

¹⁵⁴ E. Baldwin Smith, Architectural Symbolism of Imperial Rome and the Middle Ages (Princeton: Princeton University Press, 1956), 19, n. 34.

which is located in two panels on the bottom right base, depicts the *praefectus urbis* welcoming Trajan into the city of Rome, perhaps in front of the Curia Julia (Fig. 13).¹⁵⁶ The second relief spread over two panels in the right attic illustrates an analogous reception for Trajan by the city's two consuls and a figure that has been identified as Hadrian in front of a triumphal arch (Fig. 14). However, it is the relief-counterpart in the left attic that completes this scene and proclaims it to be one of divine sanction by the depiction of an assembly of gods with the Capitoline triad in the foreground, welcoming Trajan, and Jupiter bequeathing his sovereign thunderbolt to the triumphant general.¹⁵⁷

Here, the chiseled images of *arci* or *fornices* serve as visible architectural symbols of the city of Rome and perhaps the institution of the Triumph itself, while at the same time evoking deification rites associated with the Imperial *adventus*. These scenes are necessary components of a divine metaphor within the visual catalogue of Trajan's accomplishments, for unlike the Arch of Titus, an explicit portrayal of Trajan's future 'apotheosis' and the inscription of the *post mortem* title, *Divus*, are lacking. Thus, alternative images promote his divine mien and sanction through architectural form, the artistic representation of the arch itself, and more importantly, the coffers' ornamentation. The starry canopy of rosette-studded coffers becomes an explicit reminder of what the arch symbolized in the ceremonies of the Roman triumph and Imperial *adventus*: imperial glorification.

To what extent might this imperial tradition of decorating the upper archway of *fornices* have influenced the coffering in Hadrian's Pantheon? We can assume that

¹⁵⁶ Rotili, pl. 84; Hannestad, 181. The relief on the bottom left corresponds to the *adventus* scene as well. Pliny describes perhaps this same *adventus* made by Trajan in A.D. 99 in Plin. *Pan.* 22.1-2; and 23.3. ¹⁵⁷ Rotili, pl. 129; Hannestad, 185.

Hadrian and his architects, like the Roman public, were familiar with the imperial iconography expressed in the Arch of Titus for it stood prominently next to Hadrian's personal project, the Temple of Venus and Rome.¹⁵⁸ At first inspection similarities appear between the coffering and symbolism of the *fornices* and the decoration of the Pantheon's dome. First and foremost is the aspect of celestial imagery produced in both structures. The Pantheon's coffers were part and parcel of the visual experience of the vaulted roof, which Dio clearly likens to the heavens. Secondly, the layout of the Pantheon's coffering design resembles the organization of coffers in the arches at Pola, Rome, and Beneventum; quadratic coffers frame a central focal point and compel attention towards it because of how the linear coffered rows appear to soar upward into the vault. The Pantheon's concentric rings of coffers encompass its oculus - a shape that is commonly associated with central celestial representations, usually in the likeness of a god or winged creature.¹⁵⁹ Apertures in ceilings, both illusionistic and at times unanticipated, appear concurrently with the alighting of winged creatures as early as the Julio-Claudian age, such as in the stucco reliefs of the basilica near Porta Maggiore.¹⁶⁰ Thus, the appearance of an oculus in a coffered tableau might allude to an imperial expression of divine ascension, as exemplified on the arches previously cited. If a bronze or marble eagle did in fact adorn the Pantheon's pediment as L. Cozza has reconstructed from the

¹⁵⁸ Cass. Dio 39.4 recounts Apollodorus' fatal criticism over Hadrian's design of the Temple of Venus and Rome. We can only speculate whether Hadrian had any role in overseeing the Beneventum arch or completing it before he traveled east in A.D. 114 to oversee Syria before his succession and commencement of the Pantheon in A.D. 118. We can more likely assume that Hadrian was familiar with Trajan's arch when he traveled to the East in A.D. 121.

¹⁵⁹ Karl Lehmann, 2.

¹⁶⁰ Ibid., 6.

revetment holes, then this assertion of imperial iconography might be augmented further even if it was not the intent of the architect.¹⁶¹

Imperial Coffering

By the early Empire, coffering fully establishes itself as a symbol of luxury in imperial domestic architecture. Not only were they fashioned in private imperial palaces, such as Nero's *Domus Aurea* and Domitian's residences in Albano and on the Palatine, but they also began to embellish the ceilings of Rome's wealthiest citizens, most likely in wood and stucco.¹⁶² An opening couplet of an Horatian ode begins a lamentation on the perseverance of a poor poet amidst the flamboyant lifestyle of his Roman patrons by comparing the decoration of a coffer: *Non ebur neque aureum / Mea renidet in domo lacunar*: "Not of ivory nor of gold, in my house does my coffer shine."¹⁶³ Gilded coffers, like Greek antecedents, drew the most attention. Pliny was undoubtedly acquainted with them for he cites their earliest appearance in Rome around 146 B.C., as well as likening their decoration to vases etched in gold (Plin. *HN* 33.57):

Laquearia, quae nunc et in privatis domibus auro teguntur, post Carthaginem eversam primo in Capitolio inaurata sunt censura L.!Mummi. inde transiere in camaras quoque et parietes, qui iam et ipsi tamquam vasa inaurantur...

Now coffered ceilings are covered in gold even in private homes; they were first gilded on the Capitoline after Carthage was overturned during

¹⁶¹ L. Cozza, 'Le Tegole del Pantheon,' in *Città e Architettura nella Roma Imperiale: atti del seminario del* 27 ottobre 1981 nel 25° anniversario dell'Accademia di Danimarca (Copenhagen: Odense University Press, 1983), 109-18.

¹⁶² Ling, 25, identifies stucco coffers in the House of the Griffins. Ling, 26, also identifies another house on the Palatine with hexagonal stucco coffers.

¹⁶³ Hor. *Carm.* 2.18.1.

the censorship of Lucius Mummius. From there it passed over onto vaults and also walls, which themselves now too are gilded like vases.

In the middle of 1st century A.D., innovative coffering designs become part of the

visual spectacle in Nero's imperial palace, the Domus Aurea (A.D. 64-68). From

Suetonius, we learn that Nero had at least two dining rooms with conspicuous ceilings.

One ceiling showered flowers and perfume through water pipes located behind adjustable

ivory coffers; and in the main rotunda cenationum, which might refer to the octagonal

hall, a revolving ceiling of some kind rotated to resemble the heavens (Suet. Ner. 31):¹⁶⁴

cenationes laqueatae tabulis eburneis versatilibus, uti flores, fistulatis, ut unguenta desuper spargerentur; praecipua cenationum rotunda, quae perpetuo diebus ac noctibus vice mundi cicumageretur:

There were dining-rooms with fretted ceilings of ivory, whose panels could turn and shower down flowers and were fitted with pipes for sprinkling the guests with perfumes. The main banquet hall was circular and constantly revolved day and night, like the heavens.

The word, *versatilibus*, which describes the coffers is unclear. *Verso* means both "to turn" and "turn over."¹⁶⁵ Could this be a system of reversible coffer lids similar to the removable coffer lids observed in the Hephaisteion? Seneca cynically provides a more detailed picture of *cenationes laqueatae* in describing a banquet that may have taken place in Nero's dining hall (Sen. *Ep.* 90.15):¹⁶⁶

Hodie utrum tandem sapientiorem putas qui invenit quem ad modum in immensam altitudinem crocum latentibus fistulis exprimat, qui euripos subito aquarum impetu implet aut siccat et versatilia cenationum laquearia ita coagmentat ut subinde alia facies atque alia succedat et totiens tecta quotiens fericula mutentur...

¹⁶⁴ Suetonius *Lives of the Caesars*, Vol. 2, Loeb Classical Library, ed., G.P. Goold, trans. J.C. Rolfe, (Cambridge, MA: Harvard University Press, 1997-1998), 131.

¹⁶⁵ Oxford Latin Dictionary, s.v. "verto," 2042-45.

¹⁶⁶ Karl Lehmann, 22, believes this Senecan passage refers to Nero's dining hall.

Today, which finally do you think the wiser: the one who finds how to sprinkle saffron to great depths with hidden pipes, and fills or dries up canals with a sudden rush of water and constructs a ceiling of movable coffers for dining rooms in such a way that it presents one pattern after another, the roofs changing as many times as the courses do.

We can only imagine the specifics of the versatilia laquearia and its facies. Perhaps the

designs resembled those configurations manufactured in the stucco vault of the Pompeian

cryptoportico by rotating square coffers into reticulate patterns, or perhaps the panels of

one profile were completely removed and exchanged for another shape or central figure.

Petronius, like Seneca, provides social commentary regarding such cultural

excesses in his *Satyricon*, when he describes a coffered ceiling with detachable lids,

diductis lacunaribus, during a banquet scene with Trimalchio (Petron. Sat. 60):¹⁶⁷

...nam repente lacunaria sonare coeperunt totumque triclinium intremuit. Consternatus ego exsurrexi et timui, ne per tectum petauristarius aliquis descenderet. Nec minus reliqui convivae mirantes erexere vultus, expectantes quid novi de caelo nuntiaretur. Ecce autem diductis lacunaribus subito circulus ingens, de cupa videlicet grandi excussus, demittetur, cuius per totum orbem coronae aureae cum alabastris unguenti pendebant.

...suddenly there came a noise from the ceiling, and the whole diningroom trembled. I rose from my place in a panic; I was afraid some acrobat would come down through the roof. All the other guests too looked up astonished, wondering what new portent from heaven was announced. The whole ceiling parted asunder, and an enormous hoop, apparently knocked out of a giant cask, was let down. All round it were hung golden crowns and alabaster boxes of perfumes.

Here, it is interesting to note how Petronius' banqueters visualize the coffered ceiling as

heaven: expectantes quid novi de caelo nuntiaretur. As a member of Nero's literary

circle and the emperor's arbiter elegantiae, we can reasonably assume that Petronius was

¹⁶⁷ Petronius *Satyricon*, Loeb Classical Library, ed. E.H. Warmington, trans. Michael Heseltine (Cambridge: Harvard University Press, 1937), 131.

acquainted with the lavish Neronian dining room cited by Suetonius and the emperor's fixation with the cosmos in a banquet setting. Although the literary and archaeological evidence connecting Nero's *versatilia laquearia* to the celestial *rotunda cenationum* is tenuous, Petronius substantiates how removable coffering conveyed an impression of heaven to the Roman populace.¹⁶⁸

Before the end of the 1st century A.D., concrete coffering appears in and around Rome possibly for the first time under the emperor Domitian (A.D. 81-96) and his architect, Rabirius. In Domitian's villa at Albano, fourteen miles outside of Rome, threetiered square coffers cover the ceiling of the cryptoportico below the villa's second terrace in a checkerboard arrangement with traces of gilding adhering to its concrete *lacunae*.¹⁶⁹ Here, it is possible that Domitian had learned that in great abundance the multi-framed coffers created a chiaroscuro effect.¹⁷⁰ Coffers also appear in the lofty vaults of Domitian's palace, the Domus Flavia, constructed on the southeastern part of the Palatine hill in A.D. 92 by the architect Rabirius, who incorporated the remains of the *Domus Augustana* and the nymphaeum of the *Domus Transitoria*.¹⁷¹ The palace, which remained the imperial residence for over 300 years after Domitian, integrated imperials halls, a private quarter with various shaped triclinia, a hippodrome, and a columned terrace overlooking the Circus Maximus on the southwest side. Like Domitian's Alban villa, evidence of concrete coffered vaulting appears. On the south side of the *ambulacro del pulvinar*, an arcade that ran around the hippodrome supported barrel vaults that were

¹⁶⁸ Plin. *HN* 19.6, also recounts how Nero used a velum over one of his amphitheaters that was purple and studded with stars, thus projecting a canopy of heaven in the public sphere.

¹⁶⁹ Lugli, 1:677, fig.144; 679. Robin Darwall-Smith, "Albanum and the Villas of Domitian," *Pallas* 40 (1994): 150, believes that this cryptoportico is the largest of any Roman villas.

¹⁷⁰ Ibid., 1:678.

¹⁷¹ Mart. *Spect.* 7.56; Sear, figs. 86-88.

ornamented with sunken square coffers with egg-and-dart stuccoed molding.¹⁷² The *carceres* at the northeast end had also been coffered and decorated with glass mosaic.¹⁷³

The type of roof structure over Domitian's chambers in the staterooms on the northeast side is debatable.¹⁷⁴ Coffered rib-arches were among the ruins near the *aula regia*, suggesting that transverse arches spanned a barrel vault.¹⁷⁵ MacDonald believes that the *aula regia*, *basilica*, and other *aulae* were vaulted based on a ratio between wall thickness and roof span.¹⁷⁶ He uses passages from Martial and Statius, contemporary poets of Domitian, to support his claim of vaulting for both poets remark how Domitian's *domus* resembled the heavens.¹⁷⁷ Here, Statius describes one ceiling in a poem written ca. A.D. 93 or 94, that gives the impression of a coffered vault (Stat. *Silv*. 4.2.14-34):¹⁷⁸

Tene ego, regnator terrarum orbisque subacti Magne parens, te, spes hominum, te, cura deorum, Cerno iacens?... ...Tectum augustum, ingens, non certum insigne columnis, sed quantae superos caelumque Atlante remisso sustentare queant. Stupet hoc vicina Tonantis regia, teque pari laetantur sed locatum numina... tanta patet moles effusaeque impetus aulae liberior campo multumque amplexus operti aetheros et tantum domino minor; ille penates implet et ingenti genio iuvat. Aemulas illic mons Libys Iliacusque nitens et multa Syene et Chios et glaucae certantia Doridi saxa

¹⁷² MacDonald, Architecture, 1: fig. 70; MacDonald, Pantheon, 38.

¹⁷³ Frank Sear, *Roman Architecture* (Ithaca: Cornell University Press, 1982), 151.

¹⁷⁴ Sear, 151, provides a summary of the debate between timber ceilings and vaults. E. B. Smith,

Architectural Symbolism, 148, thinks the ceiling of the aula regia was domical.

¹⁷⁵ Rivoira, 103.

¹⁷⁶ MacDonald, Architecture, 1:56-63.

¹⁷⁷ Mart. Spect. 7.56: Astra polumque pia cepisti mente, Rabiri, Parrhasiam mira qui struis arte domum, "Rabirius, you have captured the stars and sky with your pious mind, the one who builds the Parrhasian dwelling with wondrous skill;" 8.36: haec, Auguste, tamen, quae vertice sidera pulsat, par domus est caelo, sed minor est domino, "This palace, Augustus, which strikes the stars with its peak, is equal to heaven, but is smaller than its master." See also Mart. Spect. 9.91.

¹⁷⁸ Trans. MacDonald, Architecture, 1:61.

Lunaque portandis tantum suffecta columnis. longa supra species: fessis vix culmina prendas visibus auratique putes laquearia caeli. hic ... Romuleos proceres trabeatque Caesar agmina mille simul iussit discumbere mensis...

I think I recline with Jupiter in mid-heaven...An edifice, august, huge; magnificent not with a hundred columns but rather enough to support heaven and the gods were Atlas eased of his burden. The neighboring house of the Thunderer [the temple of Jupiter on the Capitoline] views it with awe, and the powers rejoice that you have a like abode...the vast expanse of the building, and the reach of the far-flung hall, more unhampered than a plain, embracing beneath its shelter a cast expanse of air, and only lesser than its lord; he fills the house, and gladdens it with his mighty spirit. Libyan mountain and gleaming Ilian stone are rivals there, and much Syenite and Chian and the marble that vies with the gray-green sea; and Luna also, but only for the columns' weight. The view travels far upwards, the tired vision scarcely reached the summit, and you would think that it was the golden ceiling of the sky. Here ...Caesar has bidden the Roman elders, and the ranks of equites recline together at a thousand tables...

Statius expresses his impression of the soaring heights of the ceiling in what may be considered either the *triclinium* or *aula regia* with the inclusion of *columnae*.¹⁷⁹ To substantiate that this hall was vaulted, Statius uses the term *laquearia*, a coffered ceiling, instead of *tectum*. Likewise, the adjective *aurati* also recalls the image of gilded coffers, which Pliny proved were popular as well as aesthetic.¹⁸⁰ Finally, Statius' description: *longa supra species: fessis vix culmina prendas visibus*, may refer to concentric ribs or coffered rows, like those in a reticulate or grid pattern, that force your eye to soar into the vault as evidenced in *fornices* and the Pantheon itself.¹⁸¹ Since coffers adorned the barrel vaults of the *carceres* and walkway around the hippodrome, and evidently appeared in

¹⁷⁹ MacDonald, Architecture, 1:61-62.

¹⁸⁰ Plin. HN 33.18.57.

¹⁸¹ Hexagonal coffers in a honeycomb, for example, do not have the same visual effect because they lack parallel ribs or delineation that force the eye to follow such a path.

the razed arches amongst the ruins of 1720, there is no reason to dismiss the notion of coffered vaults arcing over one of the regal halls.

In verbalizing the *aula regia* into celestial allegory, Martial and Statius aggrandize Domitian to a quasi-divine state, most likely out of pure flattery. In *Spect*. 9.91, Martial declares that he would rather accept a dinner invitation from his personal Jupiter, Domitian, than the god Jove: *me meus in terris Iuppiter ecce tenet*: "my Jupiter, behold, keeps me on earth." Domitian is both an Olympian (*Mart.* 7.99.1) and lord whose greatness surpasses the height of the heavenly palace itself, *domino minor*.¹⁸² This echoes the symbolism of apotheosis and imperial adulation manifested by the coffered vault and relief under the Arch of Titus, which, having been erected on the *Via Sacra* by Domitian before the completion of his palace, served to mark one of the approaches up the *clivus Palatinus* towards the *Domus Augustana*. Thus, the coffering in the Arch of Titus might be considered a prelude to the conception of the coffered vault as a symbolic emblem of imperial glorification and exaltation of the emperor to a divine or semi-divine status as perceived by the guests in Domitian's *aula regia*.

<u>Thermae</u>

As early as the 2nd century B.C., Roman domes and vaulted ceilings began to be fabricated in residential and public bathing complexes of Pompeii and Herculaneum, specifically in the *caldaria* and *frigidaria*, which were often decorated in paint or stucco. In the Stabian baths of Pompeii, a *frigidarium*, reconstructed after A.D. 62 supports a

¹⁸² For domino minor, c.f. Mart. Spect. 8.36 and Stat. Silv. 4.2.14-34 supra.

domed ceiling, painted blue and bedecked with ornamental stars.¹⁸³ The celestial theme here is obvious and might have been expected on spherical shapes because of their resemblance to the arc of heaven,¹⁸⁴ but it is also important to consider the effect of lighting, or lack thereof, in these thermal halls. *Frigidaria*, which required no heat, were usually stationed towards the north; hence the rooms were often dim.¹⁸⁵ Seneca observes this phenomenon when comparing a dark bath in the villa of Scipio Africanus with the well-lit *thermae* of contemporary Rome.¹⁸⁶ Thus, a twilight backdrop on a ceiling might have reflected the atmosphere created by the architecture itself.

To alleviate the darkness, more windows or *oculi* were added, especially in *caldaria*, which tended to be erected on the south side to absorb solar heat. The dome of the 'Temple of Mercury,' a *caldarium* connected with Augustan *thermae* in Baiae, incorporates a central *oculus* with four inferior square windows on the cross-axes.¹⁸⁷ With no traces of décor still extant, the *oculus* served alone as a symbol of the sun.¹⁸⁸ Another *caldarium* in the Forum Baths in Pompeii integrates windows into a ribbed barrel vault that extends to a hemispherical roofed apse.¹⁸⁹ In its apse is an *oculus*, slightly offset from the room's dominating central axis, which allowed a sunbeam to highlight a *schola labri*. The stucco decoration, which has been attributed to a fourth-style reconstruction (A.D.

¹⁸³ Karl Lehmann, 21, fig. 59; L. Richardson, Jr., *Pompeii: An Architectural History* (Baltimore: John Hopkins Press, 1988), 100–05. Richardson believes that the Stabian baths were probably redecorated after the earthquake in A.D. 62.

¹⁸⁴ Cic. *De or*. 3.40.162.

¹⁸⁵ Sear, 39, states that *caldaria* were usually situated on the south side during this time period.

¹⁸⁶ Sen. *Ep.* 86.

¹⁸⁷ Karl Lehmann, fig. 60.

¹⁸⁸ Ibid., 21. Lehmann believes that the shape and position of the windows and central oculus will influence other stuccoed vaulting that depict a divinity in a round central panel supported by four decorative elements on the diagonal axes.

¹⁸⁹ Sear, 114, fig. 65.

50-79), is compartmentalized into various frames in the shape of a spoke wheel.¹⁹⁰ *Putti*, dolphins, and female figures are framed throughout, while a flying Icarus, who appears around the *oculus*, alludes to the upper atmosphere. The radiating wheel design is reminiscent of a sundial found in the Stabian Baths, which illustrates the importance of the sun's placement in a thermal setting (Fig. 15).¹⁹¹ What is of particular interest is this sundial's design incised on stone: it consists of a circular field of radiating lines intersecting with concentric ones, which not only reflects the stucco decoration in Pompeian *caldarium*, but also the earlier Etruscan fan-shaped dome and the later design of the Pantheon's coffering. This radial motif also resonates somewhat in a semicircular black and white fan mosaic that lies directly underneath a hemicyclic apse in the *frigadarium* of the Forum Baths in Herculaneum.¹⁹²

To what extent did Romans perceive such celestial themes on the ceilings of thermal halls? From Vitruvius we learn that vaulting in *caldarium* became associated with the image of heaven when he equates the inner surface of its vaulted ceiling with the word, *caelum* (Vitr. *De arch.* 8.2.4):¹⁹³

Nullae enim camerae, quae sunt caldariorum, supra se possunt habere fontes, sed caelum, quod est ibi ex praefurniis ab ignis vapore percalefactum, corripit ex pavimentis aquam et aufert secum in camararum curvaturas et sustinet, ideo quod semper vapor calidus in atlitudinem se trudit.

For the vaulted chambers which enclose a hot bath cannot have springs above them, but the ceiling which is there heated with hot air from the

¹⁹⁰ Karl Lehmann, 13, n. 94, and fig. 35.

¹⁹¹ Werner Helmut Heinz, *Römische Thermen: Badewesen und Badeluxus im Römischen Reich* (Munich: Hirmer, 1983), 14, fig. 3.

¹⁹² Heinz, 35, fig. 25.

¹⁹³ Vitruvius, *On Architecture*, Vol. 2, Loeb Classical Library, ed. E.H. Warmington, trans. Frank Granger, (Cambridge, MA: Harvard University Press, 1983), 145-47; Cic. *De or*. 3.40.162, relates Ennius' likening the arc to heaven.

furnace, takes up water from the pavement, and carrying it up to the curved surface of the vaulting, supports it, because warm vapour always thrusts upward.

Thus, both in form and decoration, the vaulted ceilings in thermal halls appear to be synonymous with heavenly motifs.

By the 2nd century A.D., *thermae* had become part and parcel of an imperial architectural protocol, and its vaulting was no less essential, for the apse, evolving in size from its Pompeian predecessors, became a visible framing element in large vaulted spaces and its decoration equally conspicuous. Among the archaeological finds at the Baths of Trajan (A.D. 104-109), three apses, paralleling the dimensions of the Pantheon, appear with their lower range of concrete coffers still intact. The outermost eastern hemicycle (Fig. 16) and its mirror counterpart (of which little remains), which flank the main entrance into the *natatio*, are considered to be *nymphaea*.¹⁹⁴ The surviving concrete hemispherical vault contains impressions of coffers in a honeycomb pattern with large hexagons and small diamonds - a design that first appeared in the Republican cryptoportico at Pompeii in stucco.¹⁹⁵ The hexagons incorporate three stepped frames while the triangles consist of only two; the only traces of decoration include red paint.¹⁹⁶ In de Fine Licht's reconstruction, the apse contains a span of fifteen vertical rows of hexagons in six ranges. In the concave wall below appear eleven niches, alternating in rectangular and apsidal shapes. Only three of the fifteen hexagonal coffered rows align vertically with the niches below on the central and diagonal axes. None of the fourteen

¹⁹⁴ Ibid., 31; Inge Nielson, *Thermae et Balnea: The Architecture and Cultural History of Roman Public Baths*, Vol. 1 (Aarhus : Aarhus University Press, 1990), 51, n. 103.

¹⁹⁵ Kjeld de Fine Licht, *Untersuchungen an den Trajansthermen zu Rom* (Copenhagen: Munksgaard, 1974), 11, fig. 8; 29, figs. 29 and 30;

¹⁹⁶ Ibid., 29.

triangular rows corresponds to any of the niches below. A second *exedra* (Fig. 17), which backs against the wall near the western corner, reflects a scheme similar to the *nymphaeum* but modifies its decorative elements. Its vault features only coffered hexagons with one vertical row of coffers aligning with the dominating rectangular niche on the central axis. The remaining vertical rows of coffers fail to align with the minor square niches on the secondary axes. The entire apse has been identified as one of the bath's two libraries.¹⁹⁷

In the central eastern half of the *thermae Traianae* is an apse, comparable to the Pantheon in structure, size, and coffering, which incorporates square coffers in concentric rings (Fig. 18). Its curved wall is similar to the Pantheon's drum with a hollow inner core housing stairwells ascending on either side.¹⁹⁸ Each of the three-tiered square coffers in the lower circuit measures 8 ft across, but de Fine Licht estimates that they constrict into a trapezoidal shape to conform to the perfect shape of a hemisphere.¹⁹⁹ In his reconstruction, the apse's inner concrete face delineates sixteen columns of coffers arrayed in four ranges. Like the apsidal *nymphaeum*, there are vertical alignments over niches of alternating shapes: coffer columns correspond to the diagonal axes, but unlike the diagonals, a rib alights over the central niche. The function of this *exedra* and its counterpart relates to its placement on the long side of a rectangular *palaestra* on the same axis as the *frigidarium*. There is the possibility that these *exedrae* were heated because of the discovery of round terracotta pipes in the walls, which, in addition to other evidence, leads Nielson to propose that *palaestrae* were roofed with timber ceilings; thus,

¹⁹⁷ Ibid., fig. 53.

¹⁹⁸ De Fine Licht, *Trajansthermen*, 38, fig. 44.

¹⁹⁹ Ibid., 37; 44, fig. 57; and pl. 3.

she suggests that the connecting apses be called *basilicae thermarum*.²⁰⁰ Because of their shape and similarity to future basilican aspes, it is most likely that all the half-domed apses were places of gathering.²⁰¹

²⁰⁰ Nielsen, 50. Nielson also basis her claim on 1) the bathers would have to "pass through an uncovered area in order to reach the heated rooms from the changing-room, and likewise from the *frigidarium* back to the *apodyterium*;" 2) the rainy weather characteristic of Rome would promote roofed structures; Plin. *Nat.* 26.16 emphasizes cold and wet climates; and 3) equivalent spaces in baths of North Africa were also roofed.

²⁰¹ Paul Godfrey and David Hemsoll, "The Pantheon: Temple or Rotunda?" in *Pagan Gods and Shrines of the Roman Empire*, eds. A. King and M. Henig (Oxford :Oxford University Committee for Archaeology, Institute of Archaeology, 1986), 208, n. 62.

CHAPTER 2

INTERPRETATION:

CONSTRUCTION, AESTHETICS, AND SYMBOLISM

Soon after Trajan's baths, the Pantheon's building campaign commenced in A.D. 118. The architect of the Pantheon encountered a wide range of coffering precedents and symbolism. The traditional square marble coffer of classical Greece with its ziggurat frames, rosette bosses, and elaborate moldings had been standard décor in planar ceilings of Greek temples, often evoking an image of a star filled heaven. At the same time, Etruscan tombs simulated simple coffering in paint or carved rock in a variety of patterns, one of which included a fan-shape concentric design in chambers with domical roofs. Romans translated coffering onto vaulted surfaces in wood, stucco, marble, and concrete. Experimentation in various shapes and patterns in a compartmentalized tableau emerged in stucco coffering at the end of the Republic, but failed to occur in concrete coffering until the 2nd century A.D., when apses of Trajan's baths, coffered in a variety of polygons, began to 'loosen' its rigid alignment of coffers and ribs to the niches in the inferior walls.

In private imperial architecture, specifically in the palatial Roman dwellings of Nero and Domitian, coffers were not only icons of luxury and decorative excess, but also may have been instrumental in promoting an emperor's divine attributes by their celestial connotations. Romans had adopted Greek coffer prototypes to bedeck the inner vault of imperial *fornices*, which in turn fused together the image of an apotheosis canopy of heaven created by the astral-like rosettes with symbolic proclamations of imperial glorification depicted in the central panels in the inner passageway. In addition, there appeared to be a tradition of likening vaults and domes of Roman *thermae* to the heavens because of their inherent shape and association with the sun. Radial designs discovered on thermal vaults and their mosaics, like the Pantheon's coffering scheme, may have developed from projections depicted on Roman sundials.

To further our understanding of the Pantheon's coffering design, this study necessitates a thorough investigation into the architectural process of its coffered dome, a clear reading of the Rotunda's interior in aesthetic terms, and a review of modern scholars' interpretations as to the symbolism and effects of the Pantheon's coffering scheme. Did the architect draft 140 coffers into 28 vertical rows in five concentric bands for structural reasons or purely for aesthetic design? How did numerical symbolism and geometrical principles apply to the coffering and the Pantheon's overall design? Did the coffering represent a time-calendar function based on the lunar cycle or depict planetary orbits of a classical orrery? Were the coffering design also evoke images of apotheosis and imperial glorification?

Construction

Techniques commonly employed in Roman concrete vault construction were applied to the fabrication of the Pantheon's coffered dome: master carpenters built a

timber centering which was topped with wooden lagging to form a continuous surface that shaped liquid mortar into the desired vault.¹ Although the buttressed centering initially supported the dead weight of the concrete, the casting of fast drying plaster in horizontal layers beginning at the bottom of the framework ensured the greatest increase in strength and cohesion of the concrete and at the same time significantly reduced its weight onto the centering before the pouring of the next higher stratum.² Even the incomplete vault could exist apart from the centering after it hydrated or hardened if cement was applied incrementally.³ Such a technique was employed as early as the Flavian era.⁴ Engineers of the Pantheon combined the properties exhibited in layered casting with their knowledge of a compression ring in the form of an *oculus*, which served to buttress the circumferential or hoop stresses produced from the dome itself.⁵ Domes with *oculi* had already appeared in the baths of Pompeii in the early first century BC and in the Augustan "Temple of Mercury" at Baiae. The sheer void created by the Pantheon's oculus, which measures 30 Roman ft. (8.30 m) in diameter, certainly decreased the dead weight of the dome at the most vulnerable section of the cupola and visibly provided the *cella* with its only source of light, but the significance of its compressive strength most likely made its inclusion a structural necessity rather than an aesthetic one.

¹ Sear, 80; Taylor, 185, fig. 105, shows the imprint of centering in the Basilica of Maxentius; fig. 106 illustrates patterns of lagging boards imprinted in the Tor de' Schiavi.

 $^{^{2}}$ De Fine Licht, *Rotunda*, 141; Taylor, 176. Sear, fig. 96, shows the different strata of concrete layers up to the second row of coffers.

³ Taylor, 176.

⁴ E.g., the Domitianic nymphaeum at Albano, now S. Maria della Rotunda, De Fine Licht, *Rotunda*, 206.

⁵ Taylor, 53-56.

Because of the sheer size and weight of the Pantheon's 150 Roman ft. (43.2 m) dome, Roman engineers had to consider additional ways to lighten the spherical vault's load.⁶ Materials in the concrete fill were carefully graded: the heaviest materials, travertine and tufa, comprise the foundation and walls of the drum; a lighter stratum of brick corresponds to the first two fascias of interior coffers; the concrete fill in the third range of coffers consists of brick and pumice; and the lightest overlay of pumice composes the remaining two rings of coffers and upper dome.⁷ These findings substantiate the casting of the dome in gradual layers. Engineers also decreased the thickness of the concrete shell from 5.9 m. at the first layer to 1.5 m. at the oculus.⁸ To diminish the structural load of the rotunda further, the designers fashioned 140 trapezoid coffers set into five concentric rings containing 28 vertical coffered rows and ribs that do not completely align with vertical elements that punctuate the drum in divisions of four, eight, and sixteen.

The Pantheon's present day ceiling reflects the shape and size of the original Hadrianic coffering (Fig. 19). Each coffer in the four lower concentric bands houses four trapezoid lacunars, each diminishing in size, one inside the other. Those in the

⁶ According to Mark Wilson Jones, *Principles of Roman Architecture* (New Haven & London: Yale University Press, 2000), 187, the diameter of the oculus measures 30 ft., while the diameter of the dome from the attic cornice measures 150 ft. but the interior diameter of the cylinder measured from the columns equals 147 ft. Wilson Jones uses Pelletti's calculated value of the Roman foot as .2956 m., which in turn creates a diameter of 147 ft.; Marco Pelletti, "Note al rilievo del Pantheon," *Quaderni dell'Istituto di Storia dell'Architettura* 13 (1989): 12. D.M. Jacobson, "Hadrianic Architecture and Geometry," *AJA* 90 (1986): 84, and De Fine Licht, *Rotunda*, 195, believe the Roman foot in the Pantheon to be .2958 m., thus producing 148 Roman feet. Most Imperial buildings are based on a foot of .29476 m., the 100th part of the Cestius pyramid, Sperling, *Quadrivium*, 141, n. 5.

⁷ Sear, 167, fig. 96.

⁸ Steinby, s.v. "Pantheon," by A. Ziolkowski, 4:54-61.

uppermost ring accommodate only three. The back panels are deeply set into concrete 0.73m from the horizontal bands and vertical ribs that border them.⁹ The surfaces of the coffers, unlike those on flat ceilings, are of double curvature.¹⁰ The coffer's shape might be described as the base portion of an oblique pyramid whose apex reaches above the roof of the cupola. Asymmetrical tiered coffers comparable to the Pantheon's did appear in vaulting as early as the Republican era in the Sanctuary of Fortuna Primigenia in Palestrina and later during Imperial times in the *Thermae Traianae*.¹¹ The use of 28 radial coffered rows and distinct asymmetrical frames prompts the question: did the construction of the Pantheon's vaulted dome dictate its unique coffering design?

The construction of cement coffers, like those in Palestrina, depended on negative wooden molds attached to the wooden centering from which the liquid aggregate took shape as it hardened. However, the hypotheses as to how the overall centering was fabricated vary. Violett-le-Duc's centering scheme, which had been widely accepted from the nineteenth century, suggested that wooden lacunars were nailed to a wooden grid that extended from the upper cornice, joining 28 ribs and circumferential rings of struts, which were then covered with *bipedales*.¹² Modern restoration on the Pantheon revealed that bipedales set upon the centering formed the framework of the 28 ribs at least in the lower two ranges of coffers, but there is no visible indication that bricks covered the horizontal rings as Violett-le-Duc had proposed.¹³ Loerke suggests that these

⁹ De Fine Licht, *Rotunda*, 80; Loerke, 42.

¹⁰ De Fine Licht, *Rotunda*, 276, n. 32, cites various interpretations illustrating the directions of the coffers' inclined planes, but agrees that the main purpose was for optical correction. ¹¹ Ibid.

¹² E.E. Viollet-le-Duc, Dictionnaire Raisonné de l'architecture Français du XI^e au XVI^e siècle, Vol. 9

⁽Paris: B. Bance, 1867), 465-75; Taylor, 196, fig. 113.

¹³ Loerke, 33-34, fig. 13.

bricked ribs furnished a ragged surface for stucco and perhaps created the contour of the coffers, but did not deliver any diagonal thrust.¹⁴ Over the drum's eight *exedrae* are two sets of arches, the highest of which extend from the middle of the lowest coffers to the middle of the coffers in the second range (Fig. 20). Here, the recession of coffers and inner brickwork of arches do not converge. However, three relieving arches below the upper arches do intersect with ribs and a majority of the frames in the bottom range of coffers, especially over the six lateral *exedrae*; thus, bricks of these relieving arches had to blend together with the bricks of the ribs and positioned to accommodate recessed coffer frames.¹⁵ With this evidence, Loerke concludes that nothing in the structural aspect of the dome dictated 28 ribs or coffered rows.¹⁶

Rowland Mainstone describes the centering as progressing upward simultaneously with the Pantheon's dome. He proposes that the Pantheon's coffers were used to house timbers that footed higher centering.¹⁷ This seems rather unlikely considering the shallow edges of the lower frames. Rabun Taylor, in his study of architectural process, adopts a progressional approach like Mainstone's, but unlike Violett-le-Duc's hypothesis, focuses on the sequence of construction and dismantling of

¹⁴ Ibid., 34.

¹⁵ Ibid., 36, figs. 20 and 21.

¹⁶ Ibid., 37. Loerke states: "So far as I know, the juncture between the bases of the eight great vaults above exedras and the bases of those ribs which coincide with them has not been observed, or at least reported. Since their [the ribs'] spring points lie about at the level of the crowns of the triple relieving arches just mentioned, they would pose less of a problem. The eight lesser vaults, whose brick faces appear on the exterior between the eight great vaults, probably posed no problem of juncture for the workmen...Their inner faces would lie well behind the coffers of the second range. Nothing in this system of arches and vaults demanded 28 ribs or precluded 32 or more ribs. With free choice before the architect, we may seek elsewhere for his decision to have five ranges of coffers divided by 28 ribs."

¹⁷ Rowland J. Mainstone, *Developments in Structural Form* (Cambridge, MA: M.I.T. Press, 1975), 119.
the Pantheon's centering.¹⁸ He suggests the use of cranes stationed on the solid surface of the rotunda at the inner cornice level to hoist and position a prefabricated framework. The cranes also secured the framework until the entire circuit was complete and fastened with horizontal struts.¹⁹ He dismisses the permanent fastening of wooden lacunar molds to the centering of the Pantheon because they would impede the disassembly process and theorizes that molds could move about freely on the centering before being attached with removable wooden pegs.²⁰ Once the concrete had begun to harden, the coffer molds were dislodged, cranes removed, and the brick crews commenced the outside wall of the drum.²¹ Eleven meters above the cornice level, at the height of the first outer step ring, the second phase of construction began in similar fashion but with fewer cranes in place, thus completing the upper three rows of coffers and the area around the oculus.²²

In character with the compromises purported on the Pantheon's design and meaning, Taylor offers a clue about the architect's peculiar choice of 28 coffered rows based on his hypothetical course of construction: perhaps the engineers determined that 28 was the maximum number of cranes that could fit around the drum's ledge at the inner cornice; therefore, the structural process might have established the 28 prefabricated ribs as guidelines for the coffers.²³ Although Taylor's incremental approach does have some merit, there is no evidence of the use cranes or for their common dimensions left in the Pantheon. Taylor's elaborate hypothesis can carry only theoretical conviction. The

¹⁸ Taylor, 196-211.

¹⁹ Ibid., 203, fig. 118. On p. 204, Taylor states that this scenario explains why the Pantheon's porch and south annex were added later – they would have interfered with the radial rigging.

²⁰ Ibid., 196. Taylor does not appear to acknowledge any brickwork on the ribs based on Loerke, fig. 13.

²¹ Taylor, 205.

²² Ibid., 205-208, fig. 120.

²³ Ibid., 204.

inclusion of coffers in the Pantheon's decorative scheme was in fashion with contemporary aesthetic taste in vault ornamentation. Their presence was perhaps salutary to the Pantheon's architectural achievement by reducing the dome's overall weight; however, their distinctive layout does not appear to conform to any structural limitations or demands imposed by the dome's fabrication.

Although today the Pantheon's vaulted ceiling reveals a shabby ashen plaster, it is highly probable that during Hadrian's reign the coffers were decorated. The display and expense of various imported marbles that were incorporated in the floor, columns, and attic wall veneers could hardly have been capped with a ceiling of stark coffer frames. The question of how the ceiling was adorned has been debated. The discovery of mortise holes above the cornice and in the ribs, and of three square holes below each coffer, in addition to t-shaped clamps exposed in the middle of the coffers, suggest the use of bronze ornamentation (Fig. 21).²⁴ This evidence and the remains of 36 bronze plates molded into right-angle hooks around the oculus support the reconstruction of a ceiling bedecked with bronze plates since remnants of paint and stucco are undetectable.²⁵ In the same vein, some have suggested that the ceiling was festooned with silver, lead, or gold plating.²⁶

Nonetheless, others have ignored or reinterpreted the archaeological evidence. Those who believed that the Pantheon's vaulting could not endure additional weight of

²⁴ De Fine Licht, *Rotunda*, 146.

²⁵ Steinby, s.v. "Pantheon," by A. Ziolkowski, 4:60, suggests that bronze plating possibly extended from the edge of the oculus to the top row of coffers. De Fine Licht, *Rotunda*, 146, states that you cannot rule out the possibility of bronze plating due to the archaeological evidence and the fact that all bronze roof tiles were gone prior to the Renaissance.

²⁶ De Fine Licht, *Rotunda*, 145, n. 10, gives a full account of the 19th century interpretations.

metal facing, proposed decoration only in stucco and painting.²⁷ Taylor translates the mortise holes pictured in Fig. 21 as evidence of putlogs, not from Roman centering, but from scaffolding constructed during early modern times for restoration as depicted by Piranesi and Panini.²⁸ Furthermore, he proposes that eyelets in the dome could have secured scaffolding and assisted in the removal of timbers with rope harnesses, even suggesting the appropriate placement of these hooks in the center of the second row of coffers.²⁹ Although Talyor's hypothesis is logical, it lacks proof and fails to address the theory of the ceiling's decoration.³⁰

MacDonald's restoration of the Pantheon's coffers is the most plausible. He proposes that the edges of the coffers were embossed with egg-and-dart stucco moldings similar to those in Domitian's Hippodrome on the Palatine and that a gilded bronze rosette was anchored into the center of each coffer.³¹ This follows the traditional imperial ornamentation of the coffers in the vaults of the Arch of Titus in Rome and the Arch of Trajan at Beneventum where rosettes were enclosed by frames with classical ovolo and leaf-and-dart moldings. Augustus also incorporated rosettes in coffers framed with classical moldings: those carved in the marble remains of the Temple of Mars Ultor in the *Forum Augustum* and those simulated in a painted ceiling over the ramp connecting his

²⁷ De Fine Licht, *Rotunda*, 145 and n. 12.

²⁸ Ibid., 143, and fig. 199; Taylor, fig. 27.

²⁹ Taylor, 198-201, and 210.

³⁰ James C. Anderson, Jr., review of *Roman Builders: A Study in the Architectural Process*, by Rabun Taylor, in *Classical Outlook* 81, no. 3 (Spring 2004): 127, states: "No building as expensive and as much a showplace as Hadrian's Pantheon would have been left with a vaulted ceiling of coffers in plain, unadorned cement, and while Taylor does not state that this was so, he does permit the unwary reader to draw the conclusion that it might have been so from the very logical hypothesis he has advanced, since he does not modify its implications."

³¹ MacDonald, *Pantheon*, 38; and fig. 39.

domus on the Palatine to the Temple of Apollo.³² In Cassius Dio's impression of the Pantheon, he clearly alludes its vaulted roof to the heavens, θολοειδὲς ὄν τῷ οὐρανῷ προσέοικεν, which echoes Statius's description of Domitian's palace on the Palatine: *auratique putes laquearia caeli*.³³ As recorded earlier, rosettes, which had a history of being gilded, signified astral imagery. With the implications of Cassius Dio's literary allusion, archaeological evidence indicating the attachment of decoration in the mortar of the Pantheon's dome, and earlier Augustan precedent, it is most conceivable that Hadrian not only adopted traditional rosettes out of traditional imperial decorative protocol, but also for their celestial connotations in the context of the Pantheon's dome whose shape resembled the firmament and whose oculus symbolized the sun.

<u>Aesthetics</u>

Architects of the Renaissance and later have disputed the placement and number of the Rotunda's vertical rows of coffers via critical statements and have attempted to "amend' the coffering in corrective sketches. Several have pointedly expressed their dissatisfaction with the incongruity between the ceiling's 28 radial axes and the formal, articulated system of the drum, which was orchestrated into four, eight, and sixteen radials.³⁴ According to Antonio da Sangallo, the cupola's design was flawed because the current vertical alignment placed vertical ribs over attic windows and the

³² Ibid., fig. 96, shows the detail of the marble coffering in the ceiling which connected the *cella* of the Temple of Mars Ultor to its flanking colonnade; Roger Ling, *Roman Painting* (Cambridge: Cambridge University Press, 1991), pl. IVB.

³³ Cass. Dio 53.27.2-3; Stat. *Silv*. 4.2.14-34.

³⁴ Wilson Jones, fig. 9.13.

intercolumnar space screening the diagonal *exedrae*, thus creating solids above voids. To create vertical elements connecting all three zones, such as solids above solids or voids above voids, Sangallo proposed that the dome be affixed with 32 or 48 coffers, which in turn would comply with the drum's eight-fold axial pattern.³⁵ Francesco di Giorgio also believed that "as a general rule to be observed without exception…every element should sit in a straight line over its like."³⁶ His Renaissance corrective drawing depicts coffers sitting above revised attic windows and lower *aediculae* and increases the number of horizontal bands leading up to the oculus.³⁷ In a similar vein, 19th century architect J. Dell claimed that an archetypal system of 32 vertical rows of coffers with a pair of coffers flanking each of the sixteen vertical axes of the drum was the original proclivity of the Pantheon's architect.³⁸ Thirty-two rows would adhere to the drum's schema and provide uniformity throughout the structure, even if it meant placing a solid rib above a void.³⁹

However, Kjeld de Fine Licht's 1968 diagram of the Pantheon's interior sequence illustrates that there is in fact a certain relationship between the 28 vertical ribs of the dome and the eight axes of the drum (Fig. 22). One vertical row of coffers aligns over each middle axis of the four cardinal *exedrae*, hence fulfilling the aesthetic demand with respect to voids over voids, while one vertical rib falls axially over each middle axis of the four secondary square *exedrae* and attic windows in the diagonal direction (Fig. 23). None of the rows or ribs falls over tertiary radials of the smaller *aediculae* and their

³⁵ Ibid., 189-90; fig. 9.19.

³⁶ Ibid., 189, n. 50.

³⁷ Ibid., fig. 9.18.

³⁸ J. Dell, "Das Pantheon in Rom," *Zeitschrift für bildende Kunst*, Vol. 4 (Leipsig: E.A. Seemann, 1869): 277.

³⁹ Loerke, fig. 18.

corresponding attic windows or pilasters. If the dome is divided into eighths along the cardinal and diagonal axes, a set pattern emerges: three and one-half coffers per 1/8th of the Rotunda's circumference -- as if the dome had its own independent rhythm.⁴⁰

Howard Saalman uses de Fine Licht's diagram to propose his own theory as to why the Pantheon's architect fashioned 28 vertical rows.⁴¹ Based on the current design of three and one-half coffers per $1/8^{th}$ of the dome's circumference, Saalman calculates a formula that drafts four different coffering layouts using this algebraic equation: [(1 coffer + x) + 1/2 coffer] x 8, with $x = \{0 - 3\}$.⁴² Saalman's specifications of 1 1/2, 2 1/2, 3 1/2, or 4 1/2 coffers per 1/8th of the dome render 12, 20, 28, and 36 vertical coffered rows respectively.⁴³ Considering the aesthetics of a 20 radial layout generating coffers too large and a system of 36 yielding coffers too small, Saalman deems 28 to be a proper median within the tallied results; thus, he rejects Dell's earlier call for 32 radials because it fails to meet his formulaic and aesthetic requirements.⁴⁴

MacDonald, in his 1976 monograph on the Pantheon, asserts that if a sixteen or 32-coffer layout were to follow the numerical series instituted by the groundplan, then the aesthetic experience of the dome would be fixed and static.⁴⁵ He acknowledges the congruity between the vertical elements of the lower two zones and how it is virtually

⁴⁰ De Fine Licht, *Rotunda*, 141.

⁴¹ Howard Saalman, "The Pantheon Coffers: Pattern and Number," Architectura 18

^{(1988): 121-22.}

⁴² Ibid., 121.

⁴³ Ibid., 122, table 1.

⁴⁴ Loerke, 35, n. 41, describes and then disclaims Saalman's attempt: "H. Saalman, in an unclear note ...dismissed without explanation Dell's point. Saalman postulated a choice between 20 and 36 coffers, 20 yielding coffers too high, as well as wide (c. 6m. square), 36 yielding coffers too low, as well as narrow (c. 3m. square); hence, 28, which creates coffers c. 4 m. square in the bottom range. But 32 would produce a coffer c. 3.63 m. square, about 11/12ths the size of the present set. It seems unlikely that the Roman architect would have flipped this kind of coin in making his decision."

⁴⁵ MacDonald, *Pantheon*, 72.

abandoned in the dome with synchronization only occurring on the four major axes, thus producing a certain "restlessness" in the design.⁴⁶

Visual impressions of architectural space can easily be overlooked when studying two-dimensional drawings of artists and architects. MacDonald begins to tap into the aesthetic experience of the Pantheon by acknowledging the 'restlessness' of the dome; but what specific visual effects did the architect achieve by his choice of a 28-segment dome with asymmetrical lacunars? Mark Wilson Jones provides a detailed analysis of the dome's visual experience by identifying local asymmetry and axial symmetry within the cella.⁴⁷ He, like MacDonald, sees how the discordance of the Pantheon's coffering avoids a static and heavy impression by creating a dome that seemingly floats over the cella.⁴⁸ The small dimensions and configuration of the attic pilasters add to this impression of the dome's detachment, as well as the red porphyry in both friezes that distinctly divides the interior zones with a horizontal band.⁴⁹ Wilson Jones cites several examples that depart from the traditional vertical alignments of trabeate architecture, such as two city gates in Verona, the Porta dei Leoni and Porta dei Bosari, which not only encompass three separate compositional orders like the Pantheon, but also demonstrate a conspicuous change in scale.⁵⁰ Likewise, the *aediculae* of the *nymphaeum* at Miletos and the Library of Celsus at Ephesos depart from the 'Vitruvian straightjacket, where lower elements

⁴⁶ Ibid.

⁴⁷ Wilson Jones, 195.

⁴⁸ Ibid., 191.

⁴⁹ Ibid., 192.

⁵⁰ Ibid., 6.12 and 6.14; 192. For illustrations of the gates in Verona, see Gunnar Brands, *Republikanische Stadttore in Italien*, B.A.R. International Series 639 (Oxford: B.A.R, 1988), 218, figs. 254-58.

correspond to similar upper architectural features at a 45° angle as though they "crisscross over one another," thus demonstrating axial symmetry rather than vertical.⁵¹

More importantly, Wilson Jones provides illustrations of Roman coffering arrangements that are analogous to the Pantheon's ceiling design immediately prior to and after its construction. He asserts that coffers of both the barrel vault of the Hadrianeum and, later, of Maxentius' reconstruction of the Temple of Venus and Rome clearly fail to align with the pattern of the subordinate walls.⁵² More direct examples of parallel coffering arise in the three hemicycles of Trajan's Baths (A.D. 105) previously cited in Chapter One. Their 100 ft. diameters and coffer alignment in orthogonal and diagonal directions parallel the Pantheon's.⁵³ These examples of axial symmetry and local asymmetry that are unique to Trajanic and Hadrianic architecture define new principles in coffering design that break away from traditional standards.

Nonetheless, emphasis on the entire design of the Pantheon's interior is both appropriate and pertinent in fully defining the coffering's aesthetic effects. Pelletti's scaled drawing illustrates the axial symmetry in all three zones (Fig. 24).⁵⁴ In the attic, of which only a portion of the original Hadrianic decoration has been restored, accentuation is actualized by aligning void over void on the cross-axis, i.e., coffer over window over *exedra*. On the diagonal axis, emphasis occurs in the arrangement of vaulting ribs over attic windows that are directly above trapezoidal *exedrae*. Finally, to stress the eight minor axes, blind attic windows fall directly over the smaller *aediculae*, which respectively flank the cardinal axes.

⁵¹ Ibid., 192; fig. 6.9.

⁵² Ibid., 192 and n. 71.

⁵³ Ibid., fig. 9.22.

⁵⁴ Pelletti, 13; fig. 3.

There is also congruity between the layout of the coffers and the pattern of the marble floor. Bands of white marble align with contiguous ribs in the dome in the cardinal directions on the east-west and north-south axes (Fig. 23).⁵⁵ The uninterrupted diagonal layouts of squares inscribed with colored circles extending from the trapezoidal *exedrae* correspond to the four diagonal vaulting ribs. A dominant emphasis on the cardinal axes, a lesser one on the cross-axes, and an even lesser one on the diagonal axes all resonate from floor to ceiling, while away from the axes, random couplings between floor and wall echo the discordance between the attic pilasters and coffers.⁵⁶ Because the Rotunda's coffering, attic, main order and floor cast harmonious convergence on the major and minor axes and discordant couplings everywhere else, a deliberate and calculated visual design emerges.⁵⁷ Wilson Jones has interestingly re-characterized MacDonald's "restlessness" of the Pantheon's interior design as a "syncopated, almost jazzy, rhythm."⁵⁸

Although the presence of such axial symmetry in the Pantheon's coffering contributes to the dome's mobile-like vim and vigor, it is fitting to account for the unique visual effects that the Pantheon coffers' asymmetrical profiles cast. Unlike tiered coffers of traditional flat Greek ceilings and Roman vaults, the Pantheon's coffers are distinguished by their oblique shape. Several conjectures about the purpose and effect of the coffers' asymmetric profile have been offered. Citing structural demands, De Fine

⁵⁵ Loerke, 34; figs.14 and 16.

⁵⁶ Wilson Jones, 194; 196. The various colored marbles probably also accentuated the visual predominance on the cardinal and diagonal axes, although corrosive cleaning in restoration and substitution of certain pillars prevents us from gauging to what degree the effect of the color palette and intensity would have contributed to the overall visual experience.

⁵⁷ Ibid., 195.

⁵⁸ Ibid., 194.

Licht suggests that the Pantheon's architect increased the vertical declivity of the inferior plane for the stability of the concrete casting, assuming that the concrete was poured from the base of the wooden centering up to the oculus.⁵⁹ Wilson Jones addresses the asymmetrical coffering as it pertains to the overall aesthetic logic of the Pantheon by focusing on the Rotunda's continuity: from any part of the Pantheon's floor, each panel of the 140 double curved coffers is visible to the naked eye.⁶⁰

As stated previously, coffers steered for optical correction had already been developed in the Fortuna Primigenia complex and in Trajan's baths.⁶¹ However, the pitched, foreshortened coffers of the Pantheon not only appear to conform to the spherical roof but also draw part of our attention to the dome's zenith, the heavenly oculus. Such a feat clearly demonstrates how the asymmetric coffering adheres to perspective principles adopted by the architect.⁶² Diminishing the coffers' size and depth as they approach the sphere's apex creates visual upward motion toward the oculus, i.e., the distant vanishing point, ⁶³ and produces an illusory effect of magnified elevation.

The coffers' profile also produces another illusion. Since the inferior steps of the coffers are shallower and wider than their superior counterparts, distinct lines contrasting luminous and shaded portions of the coffers' surface emerge when a shaft of sunlight appears: the bottom surface becomes illuminated, the upper portion shaded.⁶⁴ Patterns of light and dark triangles emerge below the coffers diagonals, which create the illusion of a

⁵⁹ De Fine Licht, *Rotunda*, 276, n. 32.

⁶⁰ Wilson Jones, 193-94; figs. 9.10 and 9.24.

⁶¹ De Fine Licht, *Rotunda*, 276, n 32.

⁶² MacDonald, *Pantheon*, 38.

⁶³ Kim Williams, *Italian Pavements: Patterns in Space* (Houston: Anchorage Press, 1997), 129. The opposite effect, when the center appears to be approaching forward towards the spectator, occurs only if edges of the inferior slope appear as the depth of the coffers.

⁶⁴ Wilson Jones, fig. 9.10.

whirling pinwheel. MacDonald compares the ceiling's swirling effect to the circular monochromatic guilloche designs of popular Hadrianic mosaics.⁶⁵ Such mosaics first appeared in classical Greece, including the floor in the *Tholos* at Epidauros.⁶⁶ The Hadrianic designs, like 1st century B.C. Pompeian mosaics, depict a central head, such as those of Medusa or Apollo,⁶⁷ enclosed by a border, which is circumscribed by larger circles, crosscut by arced lines running from central border to the outer edge. This rosette pattern is based mathematically on a logarithmic spiral, allowing the modules to increase in size the farther they advance towards the periphery while maintaining the same proportion.⁶⁸ In the Rotunda, the same perspective principle can be applied: the module that increases from the dome's center towards the cornice is not only the coffer, but also the shaded triangular form above its diagonal. This rosette spiral design of shadow and light creates a swirling motion that attracts the observer's eye to the center, but instead of a mosaic head as the focal point, it is the sun that serves as the Pantheon's godhead.

Here, it is appropriate to bring into context the Pantheon's floor: an orthogonal grid of alternating circles and squares in colored marble that precisely meets the columns and *exedrae* on the perimeter. No perimeter border or central delineation on the floor emphasizes the center of the Rotunda's circular plan. Apollodorus of Damascus used similar marble flooring in Trajan's Basilica Ulpia by adding alternate roundels and breaking away from the traditional alternation of squares and narrower bands in patterned floors of imperial *fora*.⁶⁹ The Pantheon's floor evokes the architecture of Roman *fora*; it

⁶⁵ MacDonald, Pantheon, 74.

⁶⁶ Tomlinson, 62, fig. 11.

⁶⁷ H.P. L'Orange and J.P. Nordhagen, *Mosaics* (London: Methuen and Co. Ltd., 1966), fig. 24a.

⁶⁸ Williams, 123.

⁶⁹ Wilson Jones, 183 and 194.

also recalls the traditional grid-coffered ceilings of Greek temples and monuments. There was an interrelationship between ceiling and floor decorations since both exhibited similar patterns and motifs, although the manner and extent of their influence on each other are difficult to define.⁷⁰ With the illuminated pattern of the dome alluding to rosette floor mosaics and the Pantheon's floor intimating the classical checkerboard ceiling, I would suggest that there was a physical reversal of traditional ceiling and floor designs within the Rotunda structure. Such transposition not only reflected the architect's desire to articulate traditional models in innovative forms, but also enhanced the stirring and changeable visual experience.

MacDonald, who fancifully compares the grid-like appearance of the floor to a surveyor's town plan and likens it to a symbol of the limitless Roman Empire, aptly perceives how the checkered pattern of the floor not only echoes the design of the coffered dome but also unites the whole interior space.⁷¹ Visually speaking, the squares in the floor pattern are similar in size to coffers in the lowest band. Although curved distances cannot parallel straight lines equidistantly, these coffers have the appearance of congruency in terms of size and dimension to the rest of the structure's large scale. Two coffers and a rib in the lowest range measure 8.72 m., a width comparable to the 8.95 m. of the oculus' diameter, the 8.95 m. height of the attic zone, and the 8.95 m. span of the *exedrae*.⁷²

⁷⁰ Karl Lehmann, 5, proposes the possibility that designs first displayed on ceilings were projected onto floors. Ling, 53, believes there is not enough evidence to illustrate the exact relationship between ceilings and mosaics, but suggests that there might have been a common pattern book that influenced both media. ⁷¹ MacDonald, *Pantheon*, 88.

⁷² Loerke, 34. Pelletti, 15, fig. 3, confirms that the pattern of the coffering was conceived in tandem with the main order by illustrating that the measured distance between the center of each *exedra* precisely equals an interval of three and one-half coffers.

From an aesthetic standpoint, the architect's decision to incorporate a 28 radial coffering layout deserves more praise than criticism. The coffers' dimensions correspond to other architectural elements of the interior; their lively design creates unique visual effects that allude to imperial and classical models; their layout echoes the novel coffering of Trajan's baths; and their axial symmetry and local asymmetry define a rhythm that is incorporated throughout the entire structure. Most importantly, the 28 radial rows produce coffers with a size that is visually pleasing⁷³—an observation so simple, but nonetheless fitting.

Number Symbolism

Many scholars have tried to link the importance of the Pantheon's numerical schemata in its coffering with other architectural features and symbolism. As illustrated above, the emphasis on the cardinal axes of the Pantheon's dome naturally divides the 28 vertical rows of coffers into four quadrants composed of seven vertical columns. This numerical layout, which is based on the function of 7, clearly contrasts with the numerical series (4, 8, and 16) incorporated by the ground plan. In addition, there are a total of 28 vertical steps on the recessed lacunars that compose one vertical row: three steps down and three up in each of the four bottom rows of coffers equal 24 steps; and two down and two up in the top row create a total of 28.⁷⁴ However, visual

⁷³ Wilson Jones, 194.

⁷⁴ Alvegård, 17; Sperling, Pantheon, 231.

representations of the numbers 28 and 7 are not just limited to the dome.⁷⁵ There are 28 columns and pilasters in the main order, if the respondent pilasters concealed behind the apse columns are excluded.⁷⁶ 28 panels depicting religious implements, *instrumenta sacra*, bedeck the outer facades of the intermediate block.⁷⁷ Sheltered under the drum's eight titanic vaults are seven apses that, based on Dio's statement, probably housed divine statues.⁷⁸ Seven decorative marbles embellish the first zone and attic, highlighting seven colors: white, yellow, red, purple, green, blue, and black.⁷⁹ Moreover, according to Loerke, the number seven is reflected in the marble pavement after geometrical analysis: seven whole squares in the floor, extending from the middle screening column of a diagonal *exedra* to an adjacent diagonal *exedra*.⁸⁰

Did number symbolism contribute to the message of the Pantheon's rotunda? In his *Introduction to Arithmetic*, Nicomachus of Gerasa considered the number 28 (4 X 7) 'perfect' because it equaled the sum of its factors: 1 + 2 + 4 + 7 + 14 = 28.⁸¹ Only three

⁷⁵ Sperling, *Quadrivium*, 131-32, offers several examples of how 7 and 28 are seen in the Pantheon according to arithemetical principles. In one specific example Sperling, *Pantheon*, 66, fig. 28, states that the relationship 8/7 which is found in the cella/dome pairing, is manifested in the height of the inner column shafts, which are 8 diameters and 7 capital-heights high using Pelletti's scaled drawing, Pelletti, 16, fig. 8. Sperling clearly manipulates his outcome by using a marker thicker than Pelletti's to delinate the capital measurements. By carefully studying Peletti's draft, it can be seen that Sperling is off 1/8 of a diameter. Thus, his ratios and measurements are approximate, which lends less credence to particular aspects of his analyses.

⁷⁶ Wilson Jones, 183, n. 28; Giangiacomo Martines, "Argomenti di Geometria Antica a Proposito della Cupola del Pantheon," *Quaderni dell'Istituto di Storia dell'Architettura* 13 (1991): 7.

⁷⁷ De Fine Licht, *Rotunda*, 200, states that "in this repect we can hardly find reliable motivation for the unusual number."

 ⁷⁸ The entrance occupies the eighth void. For references to statues in the Pantheon, see Dio 53.27.2-3.
 ⁷⁹ Sperling, *Pantheon*, 283. The marbles used were pavonazetto, verde antico, porphyry, giallo antico, green basalt, and bigio africano.

⁸⁰ Loerke, 34-35; fig. 16. Loerke draws a circle through the axes of all screening columns and in it inscribes a square with corners at the diagonal exedras where the coffers' ribs align. Seven pavement squares composing a side of the inscribed square on the pavement correspond to seven coffers in the dome.

⁸¹ Nicomachus of Gerasa, *Introduction to Arithmetic*, trans. Martin Luther D'Ooge (NY: MacMillan Co., 1926), 209. Wilson Jones, 183, n. 29; Martines, 7; Loerke, 37; Sperling, *Quadrivium*, 130-132.

other numbers were known in antiquity to fulfill those terms: 6(1 + 2 + 3), 496, and 8128. Neo-Pythagoreans deemed the number seven perfect as well; not only was it a prime number, but it symbolized the union of the Deity with the universe by combining the number three, the Divine triad or Spirit, with four, the root of material elements. Seven constituted the Pythagorean astrological basis for "Music of the Spheres:" seven planets rotating the same circuit equidistant from each other, the same proportions that composed the harmony of audible sound. Pan's syrinx contained seven pipes; Apollo's lyre consisted of seven strings. In the physical sphere, seven and 28 dominate the periodicity of life: the seventh day in the solar week being devoted to Sol and thus considered the most sacred; 28 days defining both the lunar month and average female menstrual cycle. Celestial iconography continues to manifest itself not only with the association made between the Pantheon's coffered rows and the 28-day lunar calendar cycle, but also between the sixteen radials of the Pantheon's drum, like Vitruvius' radial city plan, and the sixteen components of the Etruscan sky in divination.⁸²

Unraveling the myriad of allusions steeped in number imagery can be both an endless and untenable process. Nonetheless, specific readings involving celestial iconography may be applicable to the astronomical symbolism uncovered later in this chapter.

⁸² Wilson Jones, 183; n. 27. Vitr. De arch. 1.6.13; Cic. Div. 2.18.

Geometrical Symbolism

When considering the symbolic expression of the Pantheon's architecture, our attention turns immediately to its simple geometrical shape, the sphere. In antiquity, basic geometrical figures predominate, specifically those of the circle and the sphere, the former resembling the zodiac band, the latter the shape of the earth.⁸³ Aristotle, in his treatise on the heavens makes a clear definition of the circle and sphere: they both embody perfection because they are bounded by single elements, the circle by a single line, and the sphere by a single surface; thus the circle is placed highest above plane figures and the sphere above solids.⁸⁴ Thus, the physical shape of the Rotunda's spherical dome manifests perfection. With this is mind, one must take a step further and question if other principles of mathematics and geometry manifest themselves in the Pantheon's architecture, specifically in the coffering.

Gert Sperling's works are perhaps the most recent and exhaustive examples of how the Pantheon embodies most of neo-platonic mathematics among the lines and points of the monument's architectural elements, which apparently are visible to the naked eye.⁸⁵ In order to achieve harmony, there is a fusion of integer and irrational numbers displayed in the geometrical shapes and dimensions of the Pantheon's architectural elements. These figures and formulas include π , $\sqrt{2}$, the Pythagorean theorem $c^2 = a^2 + b^2$, the Golden Mean (the Fibonacci series), the Sacred Cut, the *ad*

⁸³ De Fine Licht, *Rotunda*, 199.

⁸⁴ Arist. *Cael.* 286 b. Williams, 17, believes that the Pantheon's perfect sphere represents the cosmos, and the perfect circle of its floor symbolizes the terrestrial domain of the Roman empire.

⁸⁵ Gert Sperling, *Quadrivium*, 127-42; idem, *Pantheon*, especially 21-50.

quadratum, and the three "classical" mathematical problems: the doubling of a cube, the trisection of an angle, and the squaring of a circle.⁸⁶

Although there is a resurgence in studying the relationships between architecture and mathematics in the Pantheon, such as those involving Vitruvian proportions, Euclidian symmetry, and those cited by Sperling above, critics have voiced how problematic it has become when scholars employ highly accurate measurements and proportions to substantiate their own arguments, but disregard them when they do not. With that caveat in mind, this section will focus on two geometrical principles that can be applied appropriately to the Pantheon's coffering.

In 1989, Marco Pelletti published measurements and an analysis of the Pantheon's *cella* using a statistical formula termed the least squared method. His rendering of the interior's three zones provides an architectural plan within a geometrical construct.⁸⁷ He accurately verifies that the plan of the Hadrian rotunda was indeed a geometrical complex that was based on the division of a circle into fourths and sevenths.⁸⁸ His illustrations are extremely beneficial in delineating how the coffers coordinate with the lower two zones when the center axis of a coffer and the rib separating three and half coffers from the center axis equals $\pi/4$ (Fig. 24).

Pelletti's work also validates the geometrical simplicity of the Pantheon: the interior is the fusion of a hemispherical dome and a cylinder of the same height. Vitruvius even notes its geometrical construct by commenting that the great baths are to have the

⁸⁶ Sperling, *Quadrivium*, 128.

⁸⁷ Peletti, 13, fig. 3.

⁸⁸ Ibid., 12

same height as the tallest curvature of the hemisphere.⁸⁹ The structure notably adheres to Archimedes' most perfect geometrical proof, *On Sphere and Cylinder* ($\pi\epsilon\rho$) $\sigma\pi\alpha$ $\tilde{i}\rho\alpha$ s $\kappa\alpha$ $\kappa\dot{i}\kappa\dot{i}\kappa\dot{j}\kappa\delta\rho\sigma\nu$), which states that the surface area of a hemisphere and cylinder with the same radius and height are equal.⁹⁰ Archimedes' universal law was well known throughout the ancient world among the educated as $4/3\pi r^3$. Cicero even comments on this theorem when he discovers its visual representation inscribed on Archimedes' tomb in Syracuse.⁹¹

Wilson Jones applies geometrical principles further by identifying the cubic features of the portico, and thus remarks how the whole Pantheon complex can be simplified to the proportions of a hemisphere, a cylinder of equal height, and a double cube.⁹² How does the coffering enhance this perfect geometrical framework? Loerke identifies the representation of two ideal squares in the coffers' arrangement, specifically the four points where the ribs and diagonal *exedrae* intersect and the coffer/*exedra* alignments in the four orthogonal directions.⁹³ In addition, the ceiling's quadratic coffers, as opposed to lozenges or hexagons, as well as the two-dimensional squares and circles of the pavement, visually allude to the building's fusion of sphere, cylinder, and cube.⁹⁴

⁸⁹ Vitr. *De arch*. 5.10.5.

⁹⁰ Archim. *Method* 41-43.

⁹¹ Cic., *Tusc.* 5.23.

⁹² Wilson Jones, 185. The starting point for relating geometry to the fabric of the building was the 150 ft. (100 cubits) ring defining the axes of the interior columns...the importance of this circle is confirmed by the way a square inscribed in it doubles up to locate the axes of the portico colonnade, fig. 9.11.
⁹³ Loerke, 36.

⁹⁴ Sperling, *Quadrivium*, 132. Although the coffers' shape is indeed a trapezoid, they are square-like.

incorporated shapes that echoed primary forms of architecture;⁹⁵ the Pantheon's vaulted coffering is no different.

The use of 28 radial rows, like Archimides' geometrical proof, also embodies perfection. Pelletti's analysis confirms the degree of high precision in which the dome was constructed by calculating that the angles shaped by the 28 segments of the coffered canopy were in fact irrational angles equaling 12.857°. Dividing the cupola into 28 rows with a compass and straightedge is impossible. Vitruvius adopted polygons with 8, 12, 16, and 32 sides, but in no case did a polygon with 28 sides exist.⁹⁶ According to Sperling, the trisection or division of a right angle into seven parts is only possible using the *trisettrice* of Hippias of Elis or the *conchoide* or spiral of Archimedes.⁹⁷ In a 1989 article, Giangiacomo Martines illustrates how Archimedes was able to use Hippias' method of trisection to create a spiral that could divide a fourth of a circle into equal angles.⁹⁸ He argues that the architect Apollodorus uses this spiral technique to divide the circumference of a circle into seven equal parts, as exemplified in the helical stair of Trajan's column where fourteen steps are constructed per turn.⁹⁹ Martines further suggests that the spiral of Archimedes might have possibly been applied to the coffering layout of the Pantheon's rotunda, since the number 28 is a multiple of seven.¹⁰⁰ Neo-

⁹⁵ MacDonald, Architecture, 173.

⁹⁶ Martines, "Argomenti di Geometria," 5.

⁹⁷ Sperling, *Quadrivium*, 133.

⁹⁸ Martines, "Argomenti di Geometria," 6-7.

⁹⁹ Ibid.; Heilmeyer, W.D. "Apollodorus von Damaskus, der Architekt des Pantheon," *JDAI* 90 (1975): 317-47.

¹⁰⁰ Martines, "Argomenti di Geometria," 8. Likewise, Wilson-Jones, 193 and fig. 8.9, hints at a connection of Apollodorus or an Apollodoran 'circle' as the architects of Trajan's Baths, Trajan's column, and the Pantheon because the same artful syncopation found in the vaults' coffering on the orthogonal and diagonal axes also occurs in the Trajan stairwell. This suggestion is rather unconvincing. Heilmeyer, 317-47, also suggests that Apollodorus constructed the Pantheon by its similar mathematical features to the Column of Trajan and Trajan's markets. L. Haselberger, "Ein Giebelriß der Vorhalle des Pantheon – Die Werkisse vor

Pythagoreans, as mentioned earlier, deem the number 28 perfect since it equals the sum of its factors and displays deep religious meaning. Thus, the Pantheon's spherical shape may symbolize the perfect figure; the drum and dome may represent the perfect union in geometrical form; and the choice of 28 may render the perfect number in mathematical terms.

Astronomical Symbolism

Upon entering the Pantheon, the most dominant feature within this circular edifice is immediate: the effulgence of a sunbeam streaming through the oculus. *Oculi* do appear in bath complexes, such as the 'Temple of Mercury' in Baiae and Domitian's nymphaeum in Albano, and in a few temples, such as those to Sol and Luna specified by Vitruvius as *hypaethra*.¹⁰¹ The Pantheon's oculus is its only source of light, and when the

dem Augustusmausoleum," MDAI (R) 101 (1994): 279-308, proposes that the Pantheon was already half constructed by Trajan in A.D. 115 from the presence of a very few bricks in the Pantheon's walls whose stamps indicate they might have been manufactured a year or two prior to Hadrian's accession. However, the brickstamps found in the substructure date from A.D. 123-125. For the Hadrianic analysis of the Pantheon brick stamps see, H. Dressel, Untersuchungen uber die Chronologie der Zielgelstempel der Gens Domitia (Berlin: Verlag Reimer, 1886); this analysis was reconfirmed by H. Bloch, I bolli laterizi e la storia edilizia romana (Rome: Libreria dello stato, 1947), 14-17, who noted quite specifically that a few bricks in the Pantheon's walls bore stamps also attested in Trajan's Markets and his Forum, but that these were clearly new at the time of their use in the Pantheon at a higher stratigraphic level than stamps in the substructures which could not have been manufactured before AD 123. Alfred K. Frazer, "Hadrian's Teatro Marittimo at Tivoli, and Pantheon," in Architectural Studies in Memory of Richard Krautheimer, ed. Cecil L. Striker (Mainz: V. Philip Von Zabern, 1996): 77-78: states "...like most of my colleagues, I remain unpersuaded of W.D. Heilmeyer's argument of some fifteen years ago that the Pantheon was in fact begun under Trajan." In n. 3, he likewise dismisses Haselberger's dating analysis of bricks found in the Pantheon's walls. See also Steinby, s.v. "Pantheon," by A. Ziolkowski, 4:56 and James C. Anderson, Jr., "Emperor and Architect: Trajan and Apollodorus and their Predecessors," Collection Latomus 270 (2003): 8-9, who also considers that the suggestion of Apollodorus' participation in the Pantheon's design is "extremely speculative and utterly lacks any sort of direct attestation."

¹⁰¹ Vitr. De arch. 1.2.5: Satione, cum Iovi Fulgari et Caelo et Soli et Lunae aedificia sub dico hypaethraque constituentur; horum enim deorum et species et effectus in aperto mundo atque lucenti praesentes vidimus, "Convention is obeyed when buildings are put up in the open and hypethral to Jupiter of the Lightning, to Heaven, the Sun, the Moon; for of these gods, both the appearance and effect we see present in the open,

sun gleams in directly, it strikes elements in all three zones: the floor, *exedrae*, attic, and coffers. Light directed onto coffers must have been both a familiar and impressionable spectacle, for in the *Aeneid*, Vergil describes a similar luminous effect upon a coffered ceiling (Verg. *Aen*. 8.22-25):

sicut aquae tremulum labris ubi lumen aënis sole repercussum aut radiantis imagine lunae omnia pervolitat late loca, iamque sub auras erigitur summique ferit laquearia tecti.

Just as when flickering light, reflected off the water in bronze basins, from the sun or the appearance of the shining moon, flits about everywhere, and now springing upwards strikes the coffers on the high ceiling.

Albeit many scholars have relied rather myopically upon Dio's likening of the vaulted

roof to the heavens in order to support celestial iconography in the dome, the highlight of

the Pantheon's oculus and its visual efficacy forces the architecture to be read or at least

considered in an astronomical context.¹⁰²

The architect's division of the cupola's circumference into 28 radials can be interpreted as having importance on the cosmological level. 28 is considered in the ancient world as one of the accepted numbers in calculating the sidereal month, or the number of days that the moon orbits the earth as measured against the stars.¹⁰³ Vitruvius states (Vitr. *De arch.* 9.1.5):

... tunc per ea signa contrario cursu luna stella Mercurii Veneris ipse sol itemque Martis et Iovis et Saturni ut per graduum ascensionem

the world of light." Translated by Frank Granger, Vitruvius: On Architecture, Loeb Classical Text (Cambridge: Harvard University Press, 1983), 29. Such temples were rectangular in shape. Tert. *De spect*. 8: also states that the Temple to the Sun in the circus was uncovered so that the heavenly divinity would not be obscured.

¹⁰²Cass. Dio 53.27.2.

¹⁰³ De Fine Licht, *Rotunda*, 200; MacDonald, *Pantheon*, 72; Loerke, 38.

percurrentes alius alia circumitionis magnitudine ab occidente ad orientem in mundo pervagantur. Luna die octavo et vicesimo et amplius circiter hora caeli cirumitionem percurrens ex quo signo coeperit ire ad id signum revertendo perficit lunarem mensem.

...Then through these signs in an opposite course, the moon, Mercury, Venus, the sun itself, Mars, Jupiter and Saturn, as though they are ascending, wander in the heavens from west to east in different orbits. On the twenty-eighth day and about one hour, the moon while making her circuit of heaven and by returning to that sign from which she departed, completes the lunar month.

Vitruvius again enumerates how Aristarchus of Samos reckons the lunar cycle, i.e., the synodal month, by focusing on the moon's four phases: the new moon, first quarter, full moon, last quarter; and the moon's four axial positions on its orbit.¹⁰⁴ Aristarchus believes that the moon completes its orbit on the 28th day; thus, the moon proceeds through each quadrant of its orbit in seven-and-a-fraction days. Loerke applies Aristarchus' theory to the Pantheon and attempts to interpret the 28 coffers as a reference to the lunar cycle, by citing the unusual deviation from the drum's eight-fold sequence and equating the shaft of light with celestial motion.¹⁰⁵ Alvegård, who focuses on the Pantheon's metrological system, similarly translates the 28 coffers as a symbol of a time-calendar function; the coffers represent the distance trekked by the moon in its monthly circuit, which is underscored by the 28 vertical steps molded into the multiple recessed casings.¹⁰⁶ However, ciphering the moon's periodicity in antiquity is problematic not only for ancient astrologers because of its irregular phases, but also for modern scholars. Pliny reports that a sidereal month consisted of 27 1/3 days, which closely resembles the

¹⁰⁴ Vitr. *De arch*. 9.2.4-5.

¹⁰⁵ Loerke, 39-41.

¹⁰⁶ Alvegård, 17-18; Sperling, *Pantheon*, 231, states that 28 days equaled one lunar month.

current calculation of 27 and 7 3/4 hours.¹⁰⁷ The synodal month, which Aristarchus estimates at 28 days plus, Wilson Jones approximates closer to 29.¹⁰⁸ Such a wide array of beliefs cause some modern critics to reject scholarly comments centered on lunar connotations.¹⁰⁹

Nonetheless, for the sake of the present argument, if we allow the coffering to represent the moon and the oculus the sun, what do the five horizontal rings of coffering portray? Some suggest that they may symbolize the five circular markings on ancient globes that Manlius delineates in his *Astronomica*: the two tropic circles, two artic circles, and one equator.¹¹⁰ Others suggest a more interplanetary representation, similar to the orrery assembled by Archimedes.¹¹¹ This mobile cosmic simulacrum made of interlocking rings enacts the celestial motion of the sun, moon, and five planets.¹¹² Thus, with the five concentric circles of coffering representing the five celestial planets, the entire solar system known in ancient times is present in the Pantheon's canopy.¹¹³

Furthermore, MacDonald offers the possibility that in the drum's seven *exedrae*, images of the seven celestial deities were displayed: Mars, Venus, Jupiter, Mercury, Moon, Sun, and Saturn.¹¹⁴ The shape of the Pantheon's rotunda, the disk of light, the seven *exedrae*, and astrological preoccupations of the time, according to MacDonald,

¹⁰⁷ Plin. *HN* 2.44; Loerke, 39.

¹⁰⁸ Loerke, 39. Wilson Jones, 241, n.3.

¹⁰⁹ De Fine Licht, *Rotunda*, 200-202: raises and then rebuffs a lunar rendering. Steinby, s.v. "Pantheon," by A. Ziolkowski, 4:60, believes the traditional 'cosmic' interpretations, especially those of Loerke, are widely off base.

¹¹⁰ Man. 1.563-602; Loerke, 42; Penelope Davies, *Death and the Emperor: Roman Imperial Funerary Monuments, from Augustus to Marcus Aurelius* (Cambridge: Cambridge University Press, 2000), 82.

¹¹¹ MacDonald, *Pantheon*, 89; Loerke, 42. McEwen, "Hadrian's Rhetoric I. The Pantheon," *Res: Anthropology and Aesthetics* 24 (1993): 55-66.

¹¹² Cic. *Rep.* 1.16: documents Archimedes' orrery and its relocation to Rome by Marcellus.

¹¹³ Wilson Jones, 183.

¹¹⁴ MacDonald, *Pantheon*, 89. He adds Tyche or Fortuna as possibilities since they were often depicted with globes.

deem his theory probable. It is reasonable to assume that the seven main *exedrae*, as well as the other subsidiary ones, were reserved for divine images. Dio attests to the sculptures of Mars and Venus and many other gods, πολλῶν θεῶν εἰκόνας ἐν τοῖς ἀγάλμασι, τῷ τε τοῦ "Αρεως καὶ τῷ τῆς 'Αφροδίτης.¹¹⁵ Godfrey and Hemsoll dismiss MacDonald's proposal because columns screen six of the seven *exedrae*, thus making it more probable that the eight *aediculae* and the smaller niches in the back wall of the *exedrae* exhibited statuary.¹¹⁶ Occasionally, theories of statue placement conveniently suggest specific ideology behind the Pantheon's rhetoric, such as the suggestion that sculptures representing the Roman gods were distributed among the eight *exedrae* to symbolize the sixteen parts of the Etruscan sky.¹¹⁷ De Fine Licht, like Godfrey and Hemsoll, submits that the eight *aediculae* and main apse lodged divine replicas where they would be more visible.¹¹⁸ Unfortunately, the literary and archaeological evidence is not very substantial.¹¹⁹

The proposal of this cosmic metaphor raises the question: could the dome of the Pantheon have been used as an astronomical device? And if so, how did the coffers function in such an apparatus? Book nine of Vitruvius' *De Architectura* focuses on astronomy and offers an interesting glimpse into the types of classical sundials (Vitr. 9.8.1):

¹¹⁵ Cass. Dio 53.27.2: "among the statues of many gods which decorate it, including Mars and Venus." ¹¹⁶ Paul Godfrey and David Hemsoll, "The Pantheon: Temple or Rotunda? In *Pagan Gods and Shrines of the Roman Empire*, eds. A. King and M. Henig (Oxford: Oxford University Committee for Archaeology, Institute of Archaeology, 1986), 202.

¹¹⁷ McEwen, 55-66, presents a case for the Pantheon as a temple to all the celestial gods of the sixteen-part Etruscan sky.

¹¹⁸ De Fine Licht, *Rotunda*, 200.

¹¹⁹ E.g., no statue bases have ever been reported from or attributed to the Pantheon; see S. B. Platner and T. Ashby, *A Topographical Dictionary of Ancient Rome* (London: Oxford University Press, 1929), 382-86; L. Richardson Jr., A *New Topographical Dictionary of Ancient Rome* (Baltimore: Johns Hopkins University Press, 1972), 283-86.

Hemicyclum excavatum ex quadrato ad enclimaque succisum Berosus Chaldaeus dicitur invenise; scaphen sive hemispaerium dicitur Aristarchus Samius, idem etiam discum in planitia; aracnnen Eudoxus astrologus, nonnulli dicunt Apollonium; plinthium sive lacunar, quod etiam in circo Flaminius est positum, Scopinas Syracusius...aliquae genera et qui supra scripti sunt et alii plures inventa reliquerunt, uti conarchnen, conicum, plinthium, antiboreum.

Berosus the Chaldaean is said to have invented the semicircular dial hollowed out of a square block and cut according to the latitude; Aristarchus of Samos, the Bowl or Hemisphere, as it is said, also the Disk on a level surface; the astronomer Eudoxus or as some say Apollonius, the Spider, Scopinas of Syracuse, the *Plinthium* or Ceiling, of which an example is in the Circus Flaminius...The persons already enumerated and many others left behind them other discoveries, such as the Conical Spider, the Conical Ceiling and the Antiborean.¹²⁰

This text is based on manuscript *Joc*, where the term *plinthium* is used; however, in

manuscript H, panthium is recorded, which Granger believes refers to the Pantheon.¹²¹

Since *plinthium* appears later in the same section for a conical ceiling: *conicum plinthium*,

the Pantheon seems unlikely. Yet, the fact that the *lacunar*, 'coffer' or 'coffered ceiling'

is catalogued with other sundials brings its decorative role into a new context.

Critics maintain that the Pantheon's north-south orientation, which is slightly off

axis, does not synchronize with the alignment of astronomical devices.¹²² Nonetheless,

conjectures continue to be asserted. Alvegård has identified the Golden Mean in the five

concentric circles of coffers and has linked them to points and angles of the sun between

¹²⁰ Vitruvius, *On Architecture*, Vol. 2, Loeb Classical Library, ed. E.H. Warmington, trans. Frank Granger (Cambridge: Harvard University Press), 254-257.

¹²¹ Ibid., 254, n. 4. Warmington disagrees with Granger and keeps *plinthium* in this text; Ingrid D. Rowland and Thomas N. Howe, *Vitruvius: Ten Books on Architecture* (Cambridge: Cambridge University Press, 1999), 116, include *plinthium* without further discussion. If Vitruvius were to identify the Pantheon, it would not have been the Hadrianic reconstruction. For Vitruvius's career under Julius Caesar and Octavian, see *Vitr. De arch.* 10.16.11-12; 2.9.15-16; 8.3.24-25; 1.pref.2; and Anderson, "Emperor and Architect," 4.

¹²² Wilson Jones, 83, n. 32;

the equinoxes and the summer solstice in A.D. 114 (Fig. 25).¹²³ Accounting for the Pantheon's distinct orientation, Alvegård asserts that at the time of the Pantheon's construction, the side walls of the diagonal *exedrae* nearest the East and West apsidal *exedrae* coincided exactly with the angle of sunrise-sunset at summer and winter solstice; and during the equinoxes, the center of the East and West apses represented the angle of sunrise-sunset, and the main door captured the angle of the sun at noon.¹²⁴

Although such angles and points are not easily perceived by the naked eye amid this grand architectural space, Rosenbusch's photographic recordings of the sunlight's various positions within the Pantheon demonstrate a correlation between the coffers' arrangement and the progress of the sun's elliptical image on the north side of the *cella* at noon during a modern solar year.¹²⁵ Here, on the vertical row of coffers directly above the main portal entrance, the centers of ellipses conform to specific horizontal edgings of the coffers and the cornice. The fall and spring equinox coincide with the lower portion of the attic's cornice. A circular impression of the sun falls directly on the first circle-insquare marble floor tile from the entrance at summer solstice. Approximately around the 22nd of both April and August, light from the oculus alights directly on the center of the entrance portal. A similar spectacle seems to have occurred in Nero's *Domus Aurea* because of its north-south orientation.¹²⁶ Although one can surmise that the slight off-axis

¹²³ Alvegård, 17, n. 52; Sperling, *Pantheon*, 231; idem, *Quadrivium*, 128; Sperling believes this fact explains the "supposed uncentered position" (winter solstice) of the *Arcus Pietatis Trajani* in the forecourt, a point of view neglected by De Fine Licht, *Rotunda*, 295 n. 43.

¹²⁴ Alvegård, 14; Sperling, Pantheon, 115.

¹²⁵ Sperling, *Pantheon*, fig. 60.

¹²⁶ Davies, Penelope J. E., 89: "In its famous octagonal room, Severus and Celer translated into architectural terms the self-appointed cosmocrator's inordinate fascination with the sun; on the two equinoxes and at solar midday, the luminous circle from its oculus exactly inscribed the north door onto a nymphaeum, uniting sun, earth, and water." In n. 46 she states, "The whole palace [*Domus Aurea*] was designed astronomically and exactly oriented by the cardinal points."

orientation of the Pantheon seemingly compels such an astrological-calendar phenomenon upon the entryway, the coffers placement in this contrivance does not yet appear to develop seamlessly into an architectural picture of a Roman almanac.

The relationship between astrology and time immediately evokes an association with the Roman sundial. In 9 B.C., Pliny states that Facundus Novius constructed the large sundial in the Campus Martius (perhaps as part of the Mausoleum and/or *Ara Pacis Augustae* complex fabricated to glorify Augustus, exactly one kilometer due north of the site of both the Agrippan and Hadrianic Pantheon).¹²⁷ The astrologer also adapted Psammetichus II's red granite obelisk from Heliopolis into the sundial's giant *analemma*. Topping the obelisk is a sphere and a pyramidion; at its excavated base below the *Via del Campo Marzio* no. 48, celestial signs of the zodiac and different seasons are inscribed.¹²⁸ Like the Pantheon, the obelisk and its marked environs are not only visible proclamations of Augustan ideology, but also a cosmic metaphor.¹²⁹ Even the hemisphere of the rotunda and the coffers' pyramidal-base contour visually may allude to the sphere-pyramidion finial atop the obelisk.

The portrayal of the earth's orbit in architectural form is not novel; it has been attributed to Nero's round dining room in the *Domus Aurea* with Suetonius' description: *praecipua cenationeum rotunda, quae perpetuo diebus ac noctibus vice mundi*

¹²⁷ Plin. *HN* 36.72.73. L. Richardson, *A New Topographical Dictionary of Ancient Rome*, 190, defines the area of the sundial as 160 m. wide by 75 m. deep, bounded by the *Piazza del Parlamento* and *Via dei Prefetti* on the south, *Via del Giardino Theodol*i on the east, *Piazza S. Lorenzo in Lucina* on the north, and *Via della Lupa* on the west.

¹²⁸ For more on the excavations of the horologium, see E. Buchner, "Horologium Augusti. Neue Ausgrabungen in Rom," *Gymnasium* 90 (1983): 494-508. Richardson, 128, remarks that the inscriptions appear to be a Domitianic reconstruction, apparently using bronze letters from the original Augustan mechanism.

¹²⁹ Davies, 78.

circumageretur.¹³⁰ Sperling attempts to apply the theory of gnomonics to the Pantheon. If a globe atop an obelisk symbolizes the motionless earth in a geometric model, then the oscillating shadow of the stele represents a reflection of the sun's orbit; however, in an heliocentric model where the sun is fixed, motion is expressed through the axial rotation and annual orbit of the earth.¹³¹ In reading the Pantheon as a simulacrum of heliocentricity, Sperling suggests that the oculus represents the motionless sun while the movement of the cylindrical sunbeam illustrates the earth's dual revolutions.¹³² Thus, according to Sperling, the Pantheon becomes in architectural form the first reproduction of Plutarch's Greek heliocentric hypothesis recounted in the *Quaestiones Platonicae* shortly before the Pantheon's groundbreaking.¹³³

<u>Music</u>

Sperling appropriates his logic of gnomonics to identify specific architectural lines seemingly based on the declination of the sun at solstice and the equinox, which had been dismissed by De Fine Licht some thirty years earlier.¹³⁴ Subsequent to his lengthy

¹³⁰ Suet. *Ner.* 31. "A particular round dining room, which revolved perpetually day and night according to the rotation of the earth." Axel Boëthius, *The Golden House of Nero: Some Aspects of Roman Architecture* (Ann Arbor: University of Michigan Press, 1960), 118, n. 35, contradicts this reading of the earth's daily orbit: "I believe that the simile *vice mundi* and the whole context must imply globe shaped, vaulted (*sphairoeides*)." Whether the floor or ceiling rotated is under debate. H.P. L'Orange, *Studies on the Iconography of Cosmic Kingship in the Ancient World* (New Rochelle, NY: Caratzas Brothers, 1982), 28-31.

¹³¹ Sperling, Quadrivium, 135-37.

¹³² Ibid.

¹³³ Sperling, *Quadrivium*, 137: "The rotunda is a document of the first Greek heliocentric hypothesis, inaugurated by Herakleides Pontikos, Aristarchos of Samos, and Seleukos of Seleukia, both cited by Plutarch in *Quaestiones Platonicae* shortly before the construction of the Pantheon." However, Sperling provides no literary evidence to support his claims.

¹³⁴ Sperling, *Quadrivium*, 136-37: If one draws lines from the oculus to represent the angles of the rays during the summer and winter solstice during A.D.114, one will find an "exact configuration of the

astrological and geometrical analysis of the entire Pantheon complex and more relevant to this coffering discussion, Sperling further identifies two manifestations of Greek heliocentric theory, according to Pythogoreas and Nicomachus, in reconstructing the double-octave system in architectural lines in the drum and the coffering design of the cupola.

To further our understanding of the "Music of the Spheres," let us turn to Cicero's *Dream of Scipio*. Here, 'Scipio Africanus' describes a solar system of nine spheres founded by Archimedes and Chaldaean astrologers. The outermost ring contains the starry heavens and gives off the highest tone because its movement is the speediest. Seven spheres or planets rotate from west to east in fixed orbits. In the second sphere or orbit is Saturn, below which the planets Jupiter and Mars appear in the next two inner orbs. The sun, which is considered a planet, occupies the fifth orbit, followed by Venus and Mercury. In the eighth sphere resides the moon, which is also considered a planet, followed by the earth, which is fixed at the center of the cosmic array. 'Scipio Africanus' thus recounts to his grandson (Cic. *Somn*. 5.10):¹³⁵

'Hic est' inquit 'ille, qui intervallis disiunctus imparibus, sed tamen pro rata parte ratione distinctis impulsu et motu ipsorum orbium efficitur et acuta cum gravibus temperans varios aequabiliter concentus efficit; nec enim silentio tanti motus incitari possunt et natura fert ut extrema ex altera parte graviter, ex altera autem acute sonent. Quam on causam summus ille caeli stellifer cursus, cuius conversio est concitatior, acuto et excitato movetur sono, gravissimo autem his lunaris atque infimus. Nam terra, nona immobilis manens una sede semper haeret complexa medium mundi locum. Illi autem octo cursus, in quibus eadem vis est duorum, septem efficiunt distinctos intervallis sonos, qui numerus rerum omnium

position, angle, and form of the upper gable upon the intermediate block. The base line is identical with the cornice inside the rotunda, its center point is the navel of the inscribed *Vitruvian Man*, whose dimensions relate to the height of the inner capitals by the factor 28 times the irrational value of the Golden Mean," see fig. 4. Sperling's theory here is very questionable; see De Fine Licht, *Rotunda*, 199.

¹³⁵ Cicero On the Good Life, trans. Michael Grant (London: Penguin Group, 1971): 348.

fere nodus est; quod docti homines nervis imitati atque cantibus aperuerunt sibi reditum in hunc locum, sicut alii qui praestantibus ingeniis in vita humana divina studia coluerunt.

'That,' he replies, 'is the music of the spheres. They create it by their own motion as they rush upon their way. The intervals between them, although differing in length, are all measured according to a fixed scheme of proportion; and this arrangement produces a melodious blend of high and low notes, from which emerges a varied harmony. For it cannot be that these vast movements should take place in silence, and nature has ordained that the spheres utter music, those at the summit giving forth high sounds, whereas the sounds of those beneath are low and deep. That is to say, the spheres containing the uppermost stars, comprising those regions of the sky where the movements are the speediest, give out a high and piercing sound, whereas the Moon, which lies beneath all the others, sends forth the lowest note.

'The ninth of the spheres, the earth, fixed at the centre of the universe, is motionless and silent. But the other eight spheres produce seven different sounds on the scale – not eight, since two of these orbs move at identical speeds, but seven, a number which is the key to almost all things that exist. Clever men, by imitating these musical effects with their stringed instruments and voices, have given themselves the possibility of eventually returning to this place; and the same chance exists for others too, who during their earthly lives have devoted their outstanding talents to heavenly activities.'

Seven tones correspond to 8 planets when Mercury and Venus are fused with equal

orbital speeds; earth, the lowest sphere, is inaudible.¹³⁶

These consonant symphonic ratios, based on a geocentric model, have been interpreted and applied to the architecture of the Pantheon by Sperling, who uses a reconstruction of the double-octave system to assign basic tones in the Pythagorean tradition.¹³⁷ These musical proportions can be identified along the horizontal lines in the rotunda's structure when the sunrays pass through the *oculus*. The height of the cornice

¹³⁷ Rowland, 255, provides an illustration of the Harmony of Spheres.

¹³⁷ Sperling, *Quadrivium*, 138.

divides the sunbeam 2:1 (double-octave/octave); the base of the attic marks a fifth (3:2), and the ledge above the columns divides the ray into proportions of a fourth (4:3).¹³⁸

Sperling also applies interval harmonics and the heliocentric hypothesis of Nicomachus to the entire coffering layout.¹³⁹ Here, the planetary array differs from order of the Pythagorean spheres; the *oculus* represents the sun and the six circular rings between the concentric rows of coffers represent the planets. Beginning with Mercury, as the closest ring to the oculus, the following planetary arrangement is formed: Mercury, Venus, Earth, Mars, Jupiter, and Saturn above the cornice. The sunbeam continues to reflect Sperling's gnomon theory by representing the earth's movement; thus the ceiling symbolizes the harmonious union between the solar year and the daily axis of rotation.¹⁴⁰ Sperling ascribes interval tones for each planet on the coffering and then diagrams the musical sequence of four octaves and a diminished seventh through fixed points located in the 6 rings separating the 5 concentric rows of coffering:¹⁴¹

Octave	1 coffer in 1 st large ring around oculus = Mercury
Octave	2 coffers in 2^{nd} ring = Venus
Diminished Seventh	4 coffers in 3^{rd} ring = Earth
Octave	7 coffers in 4^{th} ring = Mars
Octave	14 coffers in the 5^{th} ring = Jupiter
	28 coffers in the 6^{th} ring = Saturn
	Octave Octave Diminished Seventh Octave Octave

Sperling's fixed points result in a depiction of the spiral of Archimedes.¹⁴²

Sperling's gnomonic and heliocentric hypotheses are unsettling. Martines dismisses the supposition of the Pantheon as an astronomical device by declaring that the

¹³⁸ Ibid., 138-140.

¹³⁹ Sperling, *Pantheon*, 271-73; fig. 140. Renaissance architects Leon Battista Alberti and Andrea Palladio also applied neo-Platonic musical proportions to their constructions.

¹⁴⁰ Ibid., 271.

¹⁴¹ Ibid.

¹⁴² Ibid., 272.

Pantheon's *oculus* was too small to be an astronomical observatory and too large to be gnomonic hole since the gnomonic hole of the meridian in San Petronio, Bologna, is only 27 mm. wide.¹⁴³ Moreover, chronology contradicts the application of gnomonic and Nicomachean principles to the Pantheon's creation: the father of gnomonica scientia is ascribed to Ibn Yunis, a Muslim astronomer in Cairo who died in A.D. 1009; others date Nicomachus to the middle of the 2nd century, post-Hadrianic construction. With the wide range of interval combinations, a plethora of architectural relationships abound, some rather contrived. Sperling uses both geocentric and heliocentric models and doesn't account for Mercury and Venus adopting the same tone. However, Sperling's analysis of gnomonics and sphere-harmony has opened the door into further investigations, including the acoustical effects that the Pantheon's coffers generate.

George Izenour in his study on roofs from classical theaters includes wooden coffers in many of his hypothetical restorations because of how coffered ceilings reduced spatial volume and provided appropriate surfaces for acoustical reflections - a benefit especially suitable for auditoria.¹⁴⁴ Furthermore, Izenour deems that there is no compelling evidence to assume that engineers intended the inclusion of coffering for acoustical returns, rather that the enhanced resonance was a byproduct of aesthetically inspired ornamentation.¹⁴⁵

In 2002, Sperling conducted acoustical experiments by recording harmonious chords in the Pantheon to further assert the claim that the Hadrianic rotunda may be

¹⁴³ Giangiacomo Martines, "The Relationship Between Architecture and Mathematics in the Pantheon," *Nexus Network Journal*, vol. 2, no. 3 (July 2000). Available from http://www.nexusjournal.com/Martines.html; Internet; accessed January 15, 2004.

¹⁴⁴ George C. Izenour, *Roofed Theaters of Classical Antiquity* (New Haven; Yale University Press, 1992), 165-66.

¹⁴⁵ Ibid.

considered "an architectural image of the Pythagorean cosmos" with unchanging "consonant-symphonic ratios," as part of the ancient *quadrivium* that incorporated arithmetic, geometry, astronomy, and music.¹⁴⁶ From the center of the floor, he directed acoustic vocal waves towards the dome producing in succession three separate tones of the harmonious triad, C-E-G. The coffers' asymmetrical shape and fusion into a hemispherical canopy reflected sound waves that not only magnified the volume of the original notes, but also synthesized them into a completely new sound dimension: a polyphonic chord, ringing in unison distinctly after all three tones had been played one by one.¹⁴⁷

Two conclusions can be reached: the acoustical effects of the Pantheon's coffering either bolster Sperling's earlier application of sphere harmonic intervals to the Rotunda's architectonic lines, perhaps providing an original score for the production of polyphony on architecture in Western European culture, ¹⁴⁸ or more likely validate Izenour's earlier deduction that such resonation from coffered ceilings in general was a result of an aesthetically motivated or geometrically arranged ceiling design.

Imperial Iconography

The impression of the Pantheon as an auditorium, both in design and sound, forces us to question the role of coffering in Imperial audience halls. *Aulae regiae*,

¹⁴⁶ Sperling, *Quadrivium*, 129.

 ¹⁴⁷ Theorie, Forschungsarbeiten, Reden und Aufsätze, "Pantheon"; available from
 http://www.lambertrosenbusch.de/startseite/Theorie/01text-bildschirm1/01text-bildschirm/1.htm; Internet;
 accessed 15 January, 2004.
 ¹⁴⁸ Ibid.

whose titanic vaults were most likely coffered, are quite often associated with celestial representation.¹⁴⁹ Martial and Statius both had remarked how Domitian's vaulted audience chamber in the *Domus Augustana* on the Palatine resembled the heavens.¹⁵⁰ Presumably, this is the same hall bedecked with astral images both painted and in relief that Dio describes when Septimius Severus is holding court (Cass. Dio 77.11.1):¹⁵¹

Ό δὲ δὴ Σεουῆρος ἐπὶ Βρεττανίαν ἐστράτευσε τούς τε παῖδας ἐκδιατωμένους ὁρῶν καὶ τὰ στρατεύματα ὑπὸ ἀργίας ἐκλυόμενα, καίπερ εἰδὼς ὅτι οὐκ ἀνακομισθήσεται. ήδει δὲ τοῦτο μάλιστα μὲν ἑκ τῶν ἀστέρων ὑφ᾽ ὧν ἐγεγέννητο (καὶ γὰρ ἐς τὰς ὀροφὰς αὐτοὺς τῶν οἴκων τῶν ἐν τῷ παλατίῳ, ἐν οῖς ἐδίκαζεν, ἐνέγραφεν, ὥστε πᾶσι, πλὴν τοῦ μορίου τοῦ τὴν ὥραν, ὥσ φασιν, ἐπισκοπήσαντος ὅτε ἐς τὸ φῶς ἐξήει, ὁρᾶσθαι· τοῦτο γὰρ οὐ τὸ αὐτὸ ἑκατέρωθι ἐνετύπωσεν)...

Severus, seeing that his sons were changing their mode of life and that the legions were becoming enervated by idleness, made a campaign against Britain, though he knew that he should not return. He knew chiefly from the stars under which he had been born, for he caused them to be painted on the ceilings of the rooms in the palace where he was wont to hold court, so that they were visible to all, with the exception of that portion of the sky which, as astrologers express it, "observed the hour" when he first saw light; for this portion he had not depicted the same way in both rooms.

We can assume that Hadrian, too, meted out judgment in the same palatial court.¹⁵²

Whether or not the intent of Rabirius, Domitian's architect, or the Pantheon's draftsman

was to aggrandize celestial imagery through aesthetic or architectural manifestations,

there is a tradition of likening vaulted spaces to the heavens. Such instances include

Ennius' analogy of the vault, fornix, to the heavens; two like comparisons voiced by

¹⁴⁹ Godfrey and Hemsoll, 204.

¹⁵⁰ Mart. Spect. 7.56; 8.36; 9.91. Stat. Silv. 4.2.18-34.

¹⁵¹ Cassius Dio, *Roman History*, Vol. 9, Loeb Classical Library, eds. E. Capps, T.E. Page, W.H.D. Rouse, trans. Earnest Cary (NY: G.P. Putnam's Sons, 1927), 261.

¹⁵² Godfrey and Hemsoll, 204; Dio 69.7.1.

Vitruvius; and Suetonius' simile equating Nero's dining hall to celestial motion.¹⁵³ In any case, the vaulted *aula*, whether painted, stuccoed, or coffered, forms an aesthetic archetype of imperial ceremony with its space exalting the emperor to the heavens, and thus likening him to the gods in the upper sky.¹⁵⁴

The precedent for the vaulted coffered ceilings of Domitian's *aula regia* comes from the Hellenistic era, when decorated ceilings divided into coffer-fields appear in the private architecture of Corinth.¹⁵⁵ Vitruvius describes *curva lacunaria* and *lacunariis ornantur* as part of the Corinthian and Egyptian halls (*oecus*) respectively.¹⁵⁶ In the same passage it appears that Vitruvius also provides evidence that coffers in *oeci* were fashioned out of wood or stucco, *ex intestino opere aut albario*. Hence, it is theorized that Rabirius not only incorporated the *oecus* of the Hellenistic king into the state banqueting room of the *Domus Augustana*, but also may have translated customary wooden or stucco coffering into concrete in the vaulted ceiling or semi-circular apses.

What literary sources further this association between the imperial *aula* and the Pantheon? Besides drawing parallels to the heavenly allusions that impress Dio both in the Pantheon and the Domitianic court, Dio cites the only other documentation, apart from the references to the meetings of the Arval Brethren in A.D. 59,¹⁵⁷ as to the purpose and function of the Hadrianic Pantheon (Cass. Dio 69.7):

Επραττε δε και δια βουλευτηριου παντα τα μεγαλα και απαγκαιο ατα, και εδικαζε μετα των προπων τοτε εν τω παλατιω τοτε δε επ τη αγορα τω τε Παντηειω και αλλοθι πολλαχοθι, απο βηματος, ωστε δημοσιευεσθαι τα γιγνομενα.

¹⁵³ Cic. De orat. 3.40.162; Vitr. De arch. 7.3.3; 8.2.4; Suet. Ner. 31. 2.

¹⁵⁴ E.B. Smith, Architectural Symbolism, 107-51.

¹⁵⁵ Plut. Vit. Lyc. 13; Ebert, 369-74.

¹⁵⁶ Vitr. De arch. 6.3.9.

¹⁵⁷ Acta Fratrum Arvalium, CIL VI. 2041.

He [Hadrian] completed with the help of the senate all the significant and pressing business, and he held court with the aid of prominent men, now in the palace [Domitian's prior residence], now in the Forum or the Pantheon or various other places, seated upon a tribunal, so that whatever was taking place was made public.

Here, the Pantheon is like a basilica or imperial *aula*, an alternative place for Hadrian to conduct business, as Dio clearly illustrates. Considering the architectural elements of the Pantheon's interior, one can easily paint a picture of the rotunda's interior as if it were a basilica enclosed by statuary in the *exedrae*. The main *exedra* opposite the entranceway is unlike the form of the other six, not only is it taller, but its more pronounced *pavonazzetto* columns flank rather than screen the semi-circular space. It is here that Godfrey and Hemsoll argue that Hadrian could have most likely erected his tribunal.¹⁵⁸

From literary and architectural testimony, Godfrey and Hemsoll persuasively assert that the Pantheon was neither a sacred *aedes* nor *templum* because of its round shape, but an *aula regia*.¹⁵⁹ In A.D. 368 or 370, it appears to be used in the same manner when an imperial *constitutio* was read *in Pantheo*.¹⁶⁰ Likewise, the *Historia Augusta* does not consider it part of the *sacras aedes plurimas* that Hadrian established, but lists it separately: [Hadrian] *Romae instauravit Pantheum, Saepta, Basilicam Neptuni, sacras aedas plurimas, Forum Augusti, Lavacrum Agrippae*.¹⁶¹ In attempts to distance the

¹⁵⁸ Godfrey and Hemsoll, 202: "Assuming that one very much larger statue did not occupy this end *exedra* – unlikely as no single prominent scultpure in Hadrian's Pantheon is mentioned by Dio – this would seem an appropriate location for the 'tribunal' ($\beta \dot{\eta} \mu \alpha$) upon which Hadrian would sit, while the magistrates and audience would stand or sit in front. Indeed, there are difficulties in it having been anywhere else; if under the oculus it would be exposed to the elements, and while it might seem attractive to imagine it placed in a pool of light projected onto the interior paving, the position of the light would not remain static and it would be awkwardly close to the entrance."

¹⁵⁹ Ibid., 196-202; Steinby, s.v. "Pantheon," by A. Ziolkowski, 4:61, also agrees.

¹⁶⁰ Cod. Theod. 14.3.10.; Steinby, 4:61.

¹⁶¹ SHA *Hadr.* 19.10
building from religious ideology associated with the misinterpretation of the Pantheon's name meaning 'to all the gods' and its function as a temple of the entire Roman political universe because its round space symbolized the cosmos,¹⁶² Godfrey and Hemsoll further contend that the Greek word, $\theta \epsilon \tilde{\iota} o \varsigma$, could mean 'superhuman' or 'excellent,' a term that would promote emperorship.¹⁶³ Thus, as lofty ceilings of imperial *aulae* and basilicas were conceived to impress the populace and elevate the title and position of emperor, so too did their coffering with sculpted or painted embellishments enhance imperial pomp and circumstance, in an edifice whose purpose most likely aggrandized the Imperial cult.¹⁶⁴

How do the architectural elements of the Pantheon and its coffered dome reflect imperial ideology or iconography? McEwen parallels the perimeter of the dome to those frontier boundaries that Hadrian oversaw and defined by reinstating Augustus' policy: *consilium coercendi intra terminos imperii*.¹⁶⁵ MacDonald in a different vein believes the perfect dome, which is sanctioned by the gods, is the metaphor for the universal pretensions of the Roman Empire over its limitless terrestrial domain, which is symbolized by the uncentered orthogonal pattern of the floor.¹⁶⁶ Divine sanction is often represented in imperial art as a cosmic representation of a divinity with a billowing cloak, which at times is star-studded. On the Column of Trajan in the scene of the Battle of Tapae, Jupiter Tonans is depicted with a surging mantle, arching like a dome with rib-like

¹⁶² MacDonald, *Pantheon*, 86-92.

¹⁶³ Godfrey and Hemsoll, 198.

¹⁶⁴ De Fine Licht, *Rotunda*, 198-202; MacDonald, *Pantheon*, 77-84; Henri Stierlin, *Hadrien et l'Architecture Romaine* (Fribourg: Office du Livre, 1984), 110-11.

¹⁶⁵ McEwen, 62-63; SHA Hadr. 5.1: "the plan to enclose the Empire between its boundaries."

¹⁶⁶ MacDonald, *Pantheon*, 88.

folds.¹⁶⁷ Van Keuren perceives in the Prima Porta statue of Augustus the figures of *Caelus* with billowing cloak and Helios in his chariot as a possible inspiration for the sun-lit Pantheon dome as a symbolic manifestation in architectural form.¹⁶⁸ This motif continues in a Claudian copy in Cherchel, Algeria with Mars Ultor dominating the top of the cuirass with a celestial mantle.¹⁶⁹

With the coffered ceiling as an image of the cosmos and divine sanction, two additional metaphors may be ascribed in relation to the design and layout of the Hadrianic coffers by considering the Pantheon's topographical relationship with various monuments and mausolea in or near the Campus Martius. These interpretations possibly define the coffers, firstly, as emblems circumscribing an image of cosmocrator or solarkingship; secondly, as astral elements in a heavenly canopy that promote divine succession and apotheosis.

Karl Lehmann, in his attempt to trace the concept of the Christian 'dome of heaven' by classifying the various designs of decorated ceilings and vaults includes the Pantheon as an ensample of his study by acknowledging its astronomical implications, but fails to identify or classify the themes of the ceiling's organization. One of the classifications characterized in his article includes the central circular panel representing the pantokrator or cosmocrator.¹⁷⁰ The concentric design of the Pantheon's coffers portrays -- as well as outlines -- the image of cosmocrator, represented here by the oculus or sun, in much the same manner that an Imperial stucco ceiling, apparently from the

¹⁶⁷ Hannestad, 167; and fig. 103.

 ¹⁶⁸ Frances Van Keuren, "Cosmic Symbolism of the Pantheon on the Cuirass of the Prima Porta Augustus," *The Age of Augustus*, ed. Rolf Winkes (Louvain-La-Neuve: Publications d'Histoire de l'Art et d'Archéologie de l'Université Catholique De Louvain, 1985), 184.
¹⁶⁹ Ibid., 185.

¹⁷⁰ Karl Lehmann, 4-9.

Domus Aurea, illustrates this concept (Fig. 26).¹⁷¹ An analogous relationship can be construed to the Neronian ceiling if we read the entire Pantheon from floor to oculus incorporating the attic and the cella's columns. The dome's coffers would correspond to the Neronian panel in the eight-point canopy encircling the figure of Zeus, the Pantheon's attic's pilasters and columns flanking the *exedrae* resemble the supporting figurines of the Neronian ceiling, and the cella's four main apses parallel the four circular elements on the diagonal axes of the stucco. The entire Pantheon's design viewed from this perspective illustrates recognizable characteristics of ceiling design as defined by Lehmann that emphasizes a concentric schema.¹⁷² Similar radial treatments occur in another stuccoed vault in the *Domus Aurea* where twelve trapezoidal reliefs border a central representation of Bacchus, unconnected to the any corners or axes.¹⁷³ Radial compartments also encircle Hercules and Bacchus figures in a stuccoed ceiling in Hadrian's villa.¹⁷⁴

Penelope Davies also reiterates this metaphor by characterizing Hadrian as the 'sun's implicit associate, co-cosmocrator,' because of the celestial imagery already implied by its architecture.¹⁷⁵ She further expounds upon the image of cosmocrator and solar king by linking the mausolea of both Hadrian and Augustus. Reconstructions of Hadrian's tomb have reinforced this connection with proposals of hypothetical doors on the east and west representing sunrise and sunset as well as a conjectural depiction of

¹⁷¹ Ibid., fig. 27, Lehmann identifies this ceiling as belonging to Nero's *Domus Aurea*, since the inscription underneath reads *Thermarum Titi*. However, Harald Mielsch, "Zur stadtrömischen Malerei des vierten Jahrunderts nach Christi," *MDAI* (R) 85 (1978): 154, n. 14, and pl. 80 cites that this ceiling belongs to the Domitianic Tor de' Schiavi.

¹⁷² Karl Lehamann, 7.

¹⁷³ Ibid., fig. 28.

¹⁷⁴ Ibid., fig. 29.

¹⁷⁵ Davies, 82.

Hadrian as a sun god atop the mausoleum's apex.¹⁷⁶ Moreover, the anti-clock wise circuitous ambulatory around the emperor's body, which is customary in funerary ritual, can be construed as an image of the cosmos because of its heliocentricity.¹⁷⁷ Davies also believes that the topographical relationship between the Pantheon and Augustus' tomb and sundial also encourages the solar king allegory, for a person exiting the Pantheon would inevitably be struck by the sight of the Augustan tomb to the north, encompassed by smaller obelisks mirroring the giant gnomon slightly to the east (Fig. 27).¹⁷⁸ Hadrian also connects himself to Augustan ideology by ascribing the Pantheon's original erection to Agrippa in the inscription on the Pantheon's outer architrave. Augustus' associations with Apollo the sun god are well documented, as many of his portrait coins depicting him with solar attributes testify.¹⁷⁹ In a similar vein, so do certain Hadrianic coins, which portray the emperor donning a radiate crown on the obverse and imprints an image of Sol on the reverse.¹⁸⁰ Couldn't one fancifully purport that the numismatic image of Hadrian as solar king sporting five fillets of the radiate crown represents - or at least suggests -the Pantheon's dome with its five circles of coffers, just as "Cratinas compared the cupola of the Odeon at Athens to the helmet which Pericles wore in public?"¹⁸¹

Linking the Pantheon to Augustan ideology and the mausoleum itself also promoted Hadrian's legitimacy and claims of divine succession, which were questioned

¹⁷⁶ T. Squadrilli, "Il Mausoleo di Adriano," *Capitolium* 50, no. 7-8 (1975): 20-31.

¹⁷⁷ Davies, 83-85, states that similar connotations of heliocentricity have been frequently applied to the configuration and circular motion of the Roman circus.

¹⁷⁸ Ibid., 140-41, fig. 94. We can only speculate whether this sightline was truly visible during the 2^{nd} century A.D.

¹⁷⁹ M. Bergmann, *Die Strahlen Der Herrscher: Theomorphes Herrscherbild und Politische Symbolik im Hellenismus und in Der Römishcen Kaiserzeit* (Mainz: Philipp von Zabern, 1998), 3-98, exhaustively deals with all these visual metaphors.

¹⁸⁰ Mattingly–Sydenham *RIC* 2:340, no. 16, and 345, no. 43.

¹⁸¹ E.B. Smith, *Dome*, 78, expounds upon the metaphor of the dome as a celestial helmet; Plut. *Vit. Per*. 13.43.

after his adoption by Trajan on his deathbed.¹⁸² By celebrating and restoring the concept of the Agrippan "Pantheon," Hadrian was perhaps imitating the function of the original model, which used images of Venus, Mars, Julius Caesar, Agrippa and Augustus to propagandize divine descent.¹⁸³ Hadrian's Pantheon even applauds Augustus by incorporating the tumulus' size and dimensions into the rotunda's architectural draft, for Augustus' mausoleum's diameter of 104 Roman feet equals the height of the external cylinder of the Pantheon. Furthermore, the square circumscribing the circle of the tumulus has a diagonal of 147 feet, which corresponds to the diameter of the rotunda.¹⁸⁴

The rhetoric of divine succession and apotheosis, according to Davies, may also relate topographically by a direct sightline from Hadrian's mausoleum through the Pantheon to Trajan's column (Fig. 28).¹⁸⁵ The Pantheon's spherical dome and coffering as a symbol of the heavens may serve as a symbolic link to Hadrian's divine father and political legitimacy - an image that is also manifested on a *sesterce* struck in A.D. 117 a year before the Pantheon's construction. It depicts deified Trajan handing a globe to his heir, Hadrian, as a symbol of world dominion.¹⁸⁶ If the topographical correlations between the Augustan and Hadrianic mausolea, the statue of Trajan apotheosized atop his column did exist, then it is possible that the Pantheon and its coffering would have embodied and promoted this imperial motif of deification.¹⁸⁷ Subtly, the coffers evoke the convention of funerary coffering in Greek *heroä* at Olympia and Delphi, and in Etruscan

¹⁸² SHA *Hadr.* 4.10; Cass. Dio 69.1.3.

¹⁸³ Cass. Dio 53.27.2-3.

¹⁸⁴ Sperling, *Quadrivium*, 132.

¹⁸⁵ Davies, 162 and fig. 111. Again, Davies' suggestion is hypothetical since we cannot determine how clear these sightlines were during Hadrian's reign.

¹⁸⁶ Hannestad, 191and fig. 118.

¹⁸⁷ Davies, 162.

tumuli, in the same manner that the Pantheon's dome echoes mausolea's rotund form. They parallel the star-studded cloaks worn by Faustina the Elder and Faustina the Younger in numismatic images of their individual apotheoseis.¹⁸⁸ More importantly, the coffers frame the dome's oculus - a shape that is commonly associated with central celestial representations, usually in the likeness of a god or winged creature - recalling in Chapter One how coffers framed scenes of apotheoseis in three *fornices*: the Arch of the Sergii in Pola, which illustrates a mirage-like opening through which an eagle raises a snake aloft; the 'apotheosis of Titus,' in the central vault of the Arch of Titus in Rome, which displays the emperor on a winged eagle on a square background bordered by rosette-studded coffers, each incised with a five arm star; and the scene of *virtus* in the Arch of Trajan in Beneventum. Although Hadrian chose not to celebrate the customary triumph, the coffering of imperial *fornices* in scenes of apotheosis and divine sanction seem to reappear in the coffering scheme of the Pantheon's cupola.

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¹⁸⁸ BM Coins, Rom. Emp. 4: pls. 34.3, 9; and 86.9.

CHAPTER THREE

TRADITION AND CONCLUSION

Tradition

Ample attention has been focused on the influence of the Pantheon's unique fusion of rotunda and portico. Its scheme of a temple-like facade and dome translates into later imperial mausolea such as the Tor de' Schiavi and those erected by Diocletian at Spalato, Galerius at Thessalonica, and Maxentius on the *Via Appia*.¹ Unfortunately, the tradition of the Pantheon's coffering is not as widespread, although it seems to have some influence on concrete vaulted edifices constructed in Rome through its coffering scheme, chiaroscuro effects, celestial allusions, and connotations of imperial glorification.

¹ It is apposite to draw attention to reticulate patterns and other designs in memorial coins minted by Maxentius (Fig. 29) in honor of Romulus, Constantius Chlorus, Maximian, and Galerius in Alfred Frazer, "The Iconography of the Emperor Maxentius' Buildings in Via Appia," Art Bulletin 48 (1966): 389, figs. 13-15; Linear illustrations are also furnished by E. Baldwin Smith, Dome, figs. 17-21. Obverses portray the respective divi but the majority of reverses depict architectural renderings of rotundae with one door partially opened and an eagle either flying away from the oculus or perched on top. Although there is some variation in the designs, the majority of them contain geometrical patterns on the front façade. A reticulate pattern occurs directly above the door and on either side beneath lateral niches on a coin of Divus Romulus struck after his death in A.D. 309. Three circles crown the doorframe of a coin dedicated to Maximianus, and circular figures adorn the dome of a coin commemorating Constantius Chlorus. The remaining coins contain squares and rectangles arrayed in horizontal rows. Could Maxentius be alluding to an interior decor of coffers in stucco, concrete, or paint? There appear to be no archaeological remnants of concrete coffers in any Roman mausolea; stucco and painting predominate in the vaults of catacombs and later Roman sepulchers, but in patterns that break away from the rigid 'coffer style.' The designs delineated on the walls of the minted rotundae may represent brick facing laid in courses or a reticulate pattern, while circular patterns may signify tondi or overlapping tile roofing. Nonetheless, these designs, which are incorporated into clear manifestations of apotheosis and architectural features of the Pantheon prototype, do echo in some fashion coffering patterns.

In A.D. 145, Antoninus Pius erected and dedicated to his deified predecessor the Hadrianeum in the Campus Martius - an octostyle temple with at least eleven peripteral columns on each side. From the outside this traditional rectilinear temple façade would have masked a barrel vault inside, coffered with square, tiered lacunars, which did not align with the pattern of its subordinate walls and columns.² We first witnessed this 'loosening' of coffering schemes in stucco a century and a half earlier, but it did not manifest itself in concrete until the time of Trajan in the apses of his *thermae*. The Hadrianeum, like the Trajanic Baths and Hadrianic Pantheon, demonstrates how even in architectural ornamentation, architects were breaking away from the constraints of classical orders.

After Antoninus Pius, concrete coffering seems to have been less frequent until the beginning of the 4th century and the Tetrarchy. During the intervening time span, the decorative tradition of coffered soffits in stone *fornices* continued in the Arches of Septimius Severus (A.D. 204) in the Roman Forum and at Leptis Magna circa A.D. 207. The forum monument aggrandized Septimius Severus' triumph over the Parthians a year before its erection, yet the familiar scenes of triumphal procession were de-emphasized. The customary friezes that had been so prominently displayed in the soffit below the coffering in the Arch of Titus in Rome, now greatly reduced into narrow bands below the four large outer panels, depicted a procession that appeared to march aimlessly in no direction.³ Although the vault is devoid of a central relief, the arch follows the same coffering conventions established by predecessors a century earlier, featuring square

² Wilson Jones, 192, and n. 71.

³ Hannestad, 274-75.

coffers in a grid-like canopy with rosette bosses, but with simpler framing.⁴ In the arch at Leptis Magna, rosette studded coffers encrust the four barrel vaults that constitute the quadrifons, but their depth and detail are not as pronounced as the earlier imperial *fornices*, and the number of frames has been reduced to one tier.

In addition to the strain of economic hardship, which would have limited the elaborate productions of imperial art and decoration, it is suggested that idealized motifs had exhausted their value in the oppressed state of the Severan era, and had became so conventional that less attention was given to their reproduction.⁵ This certainly can be applied to the miniscule bands in the forum arch, and in the four long attic triumphal friezes dominating the Leptis Magna arch, which not only vary in their quality of workmanship, but also fail to depict an actual historical event -a reflection that a standard motif of the emperor as semper triumphator had taken root in imperial propaganda. The coffering may have also become fairly prosaic – the rich Flavian baroque ornamentation exhibited in varied rosette bosses, moldings, and frames had reached its height in the arches of Titus in Rome and Trajan in Beneventum, and now were becoming simpler and less significant. Although the Severan arches continued the authoritative tradition of coffering and its symbolic associations with triumphal procession and imperial glorification, they appear to mark the beginning of a decline of coffered imperial *fornices* in the city of Rome. Coffering was conspicuously absent from the Arch of Constantine a century later, but so were traditional images of the emperor parading in his triumphal chariot and sacrificing at the steps of the Temple of Jupiter with

⁴ Richard Brilliant, *The Arch of Septimius Severus in the Roman Forum*, Memoirs of the American Academy in Rome, Vol. 29 (Rome: American Academy in Rome, 1967), 84.

⁵ Hannestad, 270.

the onset of Christianity because of there associations with pagan Jupiter.⁶ Did Constantine eliminate coffering ornamentation because it had become directly synonymous with the king of the pagan gods? That seems unlikely, but it is possible that the evolution of new coffering schemes and shapes in concrete during the Tetrarchy had overshadowed the overused Greek stone coffer, and that the social and economic conditions had so deteriorated that skilled carvers were few and far between, as evidenced by Constantine's pillaging of relief sculptures for the monument.⁷

Décor simulating coffering reemerges in imperial architecture in Rome a century after the Severan arch in the Baths of Diocletian (A.D. 298-306) in vaults painted to imitate concrete coffers in multiple tiers with egg-and-dart and leaf-and-dart moldings on a smooth ceiling surface.⁸ H. Mielsch considered these compositions analogous to the deeply recessed concrete coffers of subsequent projects in Maxentius' reconstruction of the Temple of Venus of Rome and the Basilica Nova.⁹ Considering that polychrome mosaics, which embellished the vaults of the Diocletian *frigidarium*, involved a lengthy application process, the architect's choice of painted décor does not necessarily reflect a faster and cheaper means of ornamentation than the process of concrete coffering would entail.¹⁰ Their selection seems to be another stylistic expression of the traditional coffered ceiling motif, which, in this case, created perspective through painted renderings.

⁶ Ibid., 326.

⁷ Ibid., 323.

⁸ McNally, 64-65, n. 87. In the Temple of Jupiter at Diocletian's palace at Spalato (A.D. 300-306), coffers are chiseled in the stone barrel vault of its portico. McNalley believes the square grid layout and multiplicity of the coffers' five frames at Split evoke the imperial grandeur of the triumphal arches of Titus, Trajan, and Septimius Severus, but their display of a variety of bosses is more consistent with the Eastern traditions in Syrian and Asia Minor from the 1st century A.D.

⁹ Mielsch, 158 and fig. 3, uses a Renaissance sketch of the painted coffers to reach his conclusions. ¹⁰ Lugli, 1:678, suggests that examples of concrete coffering were limited because of their expense and the time required.

When touring the city of Rome in A.D. 356, Constantius marveled greatly at two buildings: the Pantheon, which was speciosa celsitudine fornicatam, "vaulted in lofty splendor;" and the *Templum Urbis*, the Temple of Venus and Rome, reconstructed by Maxentius in A.D. 307 after a destructive fire.¹¹ The soaring vaults of these two edifices unquestionably awed the populace, but the enriched coffers must have enhanced their beauty or speciosa. Maxentius incorporated the twin cellae of Hadrian's original plan for the temple of A.D. 121, but the conception of vaulted apses may be purely his, since there is no evidence that the Hadrianic roofing contained vaults.¹² The Maxentian apses stand back to back and feature a reticulate pattern of lozenges with three deeply recessed inner frames – the first record of this pattern in concrete (Fig. 30). The lozenges, like Trajanic and Hadrianic coffering, diminish in size as they ascend into the vault, which manipulates the perspective of the vault's height by giving the allusion that it is taller. Underneath, the walls are punctuated with a central apsidal niche flanked by rectangular aediculae. Although the central row of lozenges corresponds to the subordinate central niche, the crisp definition of the diagonal arching ribs does not align with any of the lower components, and thus generates an impression of a detached canopy. The ornamentation of the apse contrasts the coffering of the barrel vaults: traditional square lacunars, deeply hollowed into three casings that, like those of the Hadrianeum, did not correspond to its inferior walls.¹³ Both types of coffers contained small amounts of stucco molding, some of which was sculpted into small astragals. The lozenges appear to contain traces of

¹¹ Amm. Marce. 16.10.14.

¹² Richardson, *New Topographical Dictionary*, 410, states that Hadrian's original had a flat roof with no apses. For Apollodorus' criticism of the Hadrianic design, see Cass. Dio 69.4.4.

¹³ Wilson Jones., 192 and n. 71. Remains of the coffered barrel vaults are depicted in Charles Daremburg, *Dictionnaire Des Antiques Grecques et Romaines d'apres les Textes et les Monuments*, Vol. 3, pt. 2, eds. Saglio and Pottier (Paris: Hachette, 1904), 902, fig. 4322.

some type of a central boss; thus we can assume that the square coffers followed the same tradition.¹⁴

The *thermae Traianae* displayed a variety of coffering schemes in a number of vaulted apses, but each was considerably set apart from the rest. The Temple of Venus and Rome appears to be the first structure to combine two coffering patterns within the same enclosed structure in concrete. We are reminded once again of the various coffer fields, including diamond grids, fashioned in stucco in the late Republican Pompeian cryptoportico on a continuous barrel vault; but in the Maxentian blueprint, two distinct shapes, the vaulted apse and barrel vault, dictate the delineation of coffering patterns. The combination of coffering schemes and their lack of precise alignment to subordinate elements continue and hence amplify the 'loosening' effect inaugurated in Trajanic and Hadrianic ornamentation. The coffer's frames, which are more pronounced than any of their predecessors, also intensify the contrast between the deflection and reception of light– a chiaroscuro effect that was perhaps inspired by the visual experience of the Pantheon's foreshortened coffers.

Underneath the coffered apses, statues of Venus and Roma would have been enthroned. Coins minted late in Hadrian's reign depict both goddess types with a variety of attributes, but only after his death did they continually appear: *Roma Aeterna* was helmeted with a Palladium in her right hand, spear in her left, and a shield by her left side; *Venus Felix* held a Victoria in her right hand and a scepter in her left.¹⁵ Numismatic images and imperial sculpture depicting enthroned divinities like these had been adopted

¹⁴ McNally, 64-65, n. 87 states that the coffers lack central bosses, but a photograph of the apse in Lugli, 2: pl. 209, 3, shows holes in the center of the lozenge-shaped coffers, which strongly indicates the attachment of stucco or metal ornaments, such as rosettes.

¹⁵ BM Coins, Rom. Emp. 3: pls. 49. 18-20; 53. 17-19; and 57. 12.

and adapted into imperial ideology from the time of Hadrian.¹⁶ The representation of a canopy with a reticulate lozenge pattern in a religious setting emerged earlier on a Severan coin as a domical tent shrine over the Altar of Zeus at Pergamum.¹⁷ Maxentius appears to adapt both archetypes into an architectural context in his restoration of Hadrian's Temple of Venus and Rome, also referred to as the *Templum Urbis*, or *Templum Urbis Romae*, which undoubtedly served as one of his most important buildings in his campaign as *Conservator Urbis Suae*, since personified Roma herself was seated beneath a sacred canopy of heaven.¹⁸

The last of the great imperial basilicas on the *Via Sacra* was begun by Maxentius and completed with some modifications by Constantine after A.D. 313 (Fig. 31). Its three grand cross vaults emulated the *caldarium* and *frigidarium* of Diocletian's baths rather than the traditional basilicas in the imperial *fora*. Renaissance sketches foster the assumption that these cross vaults were coffered in the same style as the transverse barrel vaults on both side aisles, the northern of which currently remains, since a many concrete coffers were depicted in the basilica's rubble. Extending up into each barrel vault are five arcing columns of uniform octagons separated by smaller squares, with the central row of paneling alighting over the entranceway to the next barrel vault. In construction, masons laid bricks edgewise to line the surface of the intervening ribs before applying mortar and

¹⁶ *Dea Roma* is enthroned in the triumphal bands on the arch of Septimius Severus in the Roman forum, Hannestad, 266, and on the column base of Antoninus Pius, Lise Vogel, *The Column of Antoninus Pius* (Cambridge, MA: Harvard University Press, figs. 3-5.

¹⁷ E.B. Smith, *Dome*, fig. 106.

¹⁸ The goddess Roma obviously eclipsed her counterpart because her *cella* faced the Roman Forum and the temple's nomenclature became synonymous with hers. Marcell. 16.10.14; SHA *Hadr.* 19.12; and Serv. *Dan.* 2.227.

sequentially held back those bricks which obstructed the frames of coffered squares (Fig. 32). It appears that bricks also constituted the frames of the octagons perhaps to facilitate the fabrication process and provide a less adhesive surface during the dismantling of the wooden centering.

Moreover, the frames of the Basilica's coffers, like those of the Temple of Venus and Rome, were deeply recessed in three orders and rendered in small stucco moldings, paint, and gold leaf with no traces of central bosses.¹⁹ The considerable depth of the back panel, which might have been a product of the brick linings, must have hampered the full appearance of any central décor; hence, the chiaroscuro effects dominate the overall aesthetic design of the basilica's ceiling.

The constrictions imposed by large-scale scaffolding forced the carpenters and masons to work incrementally, hence generating a propensity for compartmentalized designs.²⁰ The separate framework for vaulted apses, like the Temple of Venus and Rome, allowed some freedom in alternative designs. In the northern apse added by Constantine, the honeycomb pattern perseveres, but with some variation: nine columns of hexagons divided by smaller lozenges rise up into the vault, each row diminishing in size, thus creating an elevated perspective.²¹ Two zones of smaller square niches, four in each zone, sixteen in all flank a main round-head niche in the apse's lower wall.²² The central row of coffering and main niche correspond vertically, while it is unclear if the diagonal axes align with any of the smaller niches; the remaining rows had no correlation with the

¹⁹ Richardson, 52. McNalley, n. 87.

²⁰ Taylor, 220.

²¹ Ibid., fig. 22: This illustration of the Basilica's reconstruction depicts the hexagonal coffers in the apse extending four coffers high.

²² Ibid.

vertical elements below. Thus, the coffering scheme of the basilica's apse continued to echo both the perspective techniques and modulating layouts of vaults in Trajan's Baths, the Pantheon, and the Temple of Venus and Rome. Correspondences between coffering and *exedrae* occur on the main axis, a possibility of alignment may occur over the diagonal axes, and discordant couplings emerge everywhere else.

From the beginning of the Severan age, depictions of the emperor enthroned gradually began to emerge on both coins and sculpture as a symbol of *auctoritas* – an obvious derivation of and integration with the image of the enthroned divinity.²³ Like, Maxentius, Constantine inserts a specific image into an architectural context. The representation of a god emperor seated under a celestial cloak of heaven is fully exploited by the physical embodiment of Constantine. It is presumed that the western apse housed the mammoth statue because its northern counterpart incorporated two screening columns and was relatively smaller.²⁴ In accordance with the decoration of the ceiling and northern apse, the western apse was most likely coffered. Hence, the building's benefactor, Rome's emperor and god's elect, literally becomes both *dominus et deus*, perhaps underneath an illusion of a geometrically woven baldachin similar to the northern apse, which served to frame the statue functionally, create visual motion aesthetically, and idealize physical apotheosis symbolically.

In addition to utilizing concrete coffering in order to amplify the grandeur and celestial atmosphere of the Temple of Venus and Rome and the Basilica Nova, both

²³ Hannestad, 268-269; fig, 164. The Severan relief in the Palazzo Sachetti in Rome depicts Septimius Severus on a *sella curalis* with sons and counselors addressing the senators. Fig. 165 displays an *aureus* with Caracalla on the obverse and Septimius Severus and sons enthroned on the reverse. ²⁴ Richardson, 52.

Maxentius and Constantine appear to have incorporated concentric coffering designs in their private residences. The palace of Maxentius on the *Via Appia* (A.D. 312) contains a small portion of a coffered apse with square lacunars in a long hall that extended to the *pulvinar* of the hippodrome.²⁵ The structure was faced in *opus vittatum*, which appears to have extended into the vault.²⁶ Insufficient evidence prevents any reading of how the coffering related to subordinate architectural elements of its supporting wall. A Renaissance sketch reveals that square lacunars also adorned the domed portion of a *caldarium* in Constantine's bath complex on the on the south side of the Quirinal hill circa A.D. 315 (Fig. 33). Reminiscent of the Pantheon's design, the coffers appear to diminish in size in the customary fashion towards the top of the vault. In its supporting lower wall, large arched windows are inserted underneath double arches of *bipedales*, which resemble relieving arches. The customary *aediculae* or niches are lacking, thus there is no visible alignment with any of the radial patterns in the ceiling and the dominating windows in the drum.

Conclusion

Hadrian's architect had an extensive coffering tradition from which to draw upon for the decoration of the Pantheon's immense dome in A.D. 118. What the Greeks had invented as purely structural coverings in wood and stone on planar ceilings with interlocking timbers, the Romans adopted and refashioned onto vaulted surfaces in wood, stucco, stone, and concrete for aesthetic reasons, and perhaps partially for structural

²⁵ Lugli, 1:693 and 2: pl. 195, 2.

²⁶ Ibid., 2: pl. 195, 2.

reasons in order to minimize the load of cement vaulting. Quadratic coffers in orthogonal grids appear to be the standard rhetoric for planar ceilings in Greek temples, but as ceilings embraced circular or vaulted forms, as in Greek *tholoi* and the Pompeian cryptoportico, coffers evolved into new shapes and patterns but still within a compartmentalized framework. The trapezoidal coffers and ribs molded into the concrete of the Pantheon's cupola, although similar to the concept of the coffered barrel vaults in Praeneste and *nymphaeum* at Formiae, might be a translation of Etruscan or Roman wooden coffered domes since rafters in domical roofs typically produce concentric and radial bands in addition to trapezoidal voids suited for coffering.

Furthermore, it appears that concrete coffers, perhaps because of cement's incremental application process and the constrictions imposed by wooden centering, did not evolve as quickly as stucco coffering, so that by the 2nd century A.D., concrete vaulting still lacked divided fields of coffers variously disposed in numerous shapes, sizes, and patterns. Instead a 'loosening' effect emerged, which produced less restrictive alignments between vertical rows of coffers with intervening ribs and subordinate architectural elements, primarily smaller apsidal niches. Unquestionably, the coffers of the *exedrae* in the Baths of Trajan, in terms of their size, shape, and coffering scheme served as the Pantheon's direct predecessors. Correspondence was emphasized between vertical coffer rows or ribs and the center niche on the main axis, less so on the diagonal axes, and were non-existent everywhere else. These disjointed couplings marked a beginning in breaking away from classical standards of trabeate ceiling design.

The symbolic and metaphorical traditions that coffers and their embellishments generated are equally extensive. In Greek temples of the 5th century B.C., the ornamentation of coffer lids originally consisted of gold stars on a painted blue background to recreate a night sky. Rosettes and leaf-motifs emerged simultaneously and later developed into rich décor with elaborate moldings, such as those festooning the coffers of the *Tholos* at Epidauros. Rosettes retained an astral appearance in form and when gilded or fashioned in metal, and thus continued the celestial metaphor in religious buildings and particularly in the *tholoi* at Epidauros, Delphi, and Olympia, the latter two of which may also be considered Greek heroä. With the introduction of sculpture into the coffering order during the 4th century B.C. in Asia Minor, coffers became more symbolic; in the Mausoleum in Halicarnassos, they proclaimed adulation and apotheosis by framing heroic iconography in a funerary context. In a presumably separate tradition, coffers were hewn out of several Etruscan tombs into concentric fan-shape designs, similar to the Pantheon's, although none of these ceilings show any traces of traditional Greek decorative molding or stepped frames. They might be construed as an architectural reproduction of a wooden domical room with coffered panels or a temporary funerary shelter, such as a heavenly baldachin. Thus, the Greek heroä, eastern mausolea, and Etruscan tombs conceivably demonstrate a tradition of fashioning coffers upon round funerary edifices.

In the imperial private sphere, it appears that both Nero and Domitian exploited the opulent spectacle and celestial content generated by coffering and perhaps the astral imagery of rosette bosses in their grand palaces in Rome. Nero with ostentatious indulgence contrived elaborate coffering schemes, most likely with removable coffer lids that would change pattern or shower garlands and perfume during different dinner courses, perhaps in the same frequency as his revolving astrological *cenatio*. Domitian acquired a divine mien when sitting under lofty "vaults of heaven" in his *aula regia* or basilica on the Palatine, which was most likely coffered with rosettes. The architectural ornamentation of coffers and their ethereal quality most likely amplified an emperor's divine mien in the eye of the Roman audience.

In imperial public architecture, the Romans chose to adapt the traditional elements of classical Greek coffers to enhance official *fornices*. Soon the coffers' extravagant embellishments, multiple framing, chiaroscuro effects, and interlocking geometrical designs began to emerge as readily identifiable décor associated with triumphal architecture and imperial glorification. The coffering enhanced the metaphor embodied by the physical form of the arch as a vault of heaven. More importantly, it amplified the celestial content in two Roman ceremonies, the imperial triumph and *adventus*, ceremonies in which the emperor was exalted to a divine realm. At the same time, coffers circumscribed reliefs of apotheosis or divine sanction in the center of vaulted passageways in the funerary Arch of the Sergii at Pola, and the triumphal arches of Titus in Rome and Trajan at Beneventum.

The Pantheon's architect certainly displayed a clear understanding of the architectural process in fabricating a concrete dome of such magnitude. The inclusion of an oculus not only illuminated the *cella*, but also furnished the circular vault with an indispensable buttressing component. Likewise, the tensile strength exhibited by the incremental layering of concrete augmented the dome's stability. All this could not have been completed without a carefully pre-arranged wooden centering that included wooden

molds for the dome's coffers. Architectural restoration of the Pantheon's dome in the early 1900's revealed no structural hindrances that dictated a specific coffering scheme. The architect had full authority to formulate the exact shape, number, and layout of the Pantheon's coffers.

The deliberate choice of 140 foreshortened coffers arranged in 28 radial rows, capping a drum comprised of four, eight, and sixteen radials, depended primarily on the recent aesthetic trend displayed in the semi-domed apses in Trajan's baths that was distancing itself from the strict guidelines, described by Vitruvius, that dictated symmetrical arrangements of vertical elements. In three different Trajanic apses, vertical rows of coffers align only with smaller *aediculae* in the inferior concave wall on the dominant axis and occasionally on the diagonal, while non-alignment occurs everywhere else. Similarly, the Pantheon's coffers align with the four main apsidal *exedrae* and attic windows on the cardinal axes, four ribs align with the square *exedrae* and attic windows on the diagonals, while the remaining twenty ribs and coffer rows are randomly distributed. This created palpable, visual energy rather than a static and uniform appearance. Hence, aesthetics appears to be the fundamental factor behind the coffering layout.

Why did the architect adopt the 28 coffered rows and ribs when other numbers could possibly produce the same schematic design? Although all theoretical readings of the Pantheon's geometry are hypothetical, Hadrian's rotunda might have actualized Archimedes' proof that a hemisphere and cylinder with the same radius and height have equal surface area. In accordance with executing this Archimedean principle, the architect may have been inspired to apply Archimedes' spiral, which accomplished the previously impossible task of dissecting a circle into seven parts or multiples thereof. Twenty-eight also had symbolic meaning among Greek philosophers, who considered it one of a few perfect numbers that equaled the sum of its factors. If the Pantheon's structure embodied the union of two perfect geometrical forms according to Archimedes, it is possible to theorize that the coffering symbolized perfection in the arena of mathematics also by Archmidean means. However, in the Trajanic apses of comparable size, engineers displayed both the knowledge and technique of dividing a circle into a various number of radials. The semi-circular apses contain 15, 16, and 19 vertical rows, which if applied to a dome would double and yield 30, 32, and 38 radials respectively. Clearly, Roman engineers in the Trajanic and Hadrianic era had the ability to divide a circle into a multitude of integers. The archaeological evidence strongly suggests that the number 28 was more an aesthetic choice than a symbolic one.

The Pantheon's coffering and oculus, although clearly alluding to *Caelus* and *Sol*, may be considered more of an artistic archetype consistent with vaulted ceiling of Roman *thermae*, such as the *caldarium* of Constantine's baths, than a direct representation of astronomical principles. Applications of a lunar calendar, heliocentric models, and the Pythagorean 'Music of the Spheres,' seem ambiguous. However, the aesthetic scansion first witnessed in Trajan's Baths and Hadrian's Pantheon does translate into future designs of coffered apses, specifically in Maxentius' reconstruction of Hadrian's Temple of Venus and Rome and Constantine's remodeling of the Basilica Nova. These apses differ in design from their main ceiling, perhaps because separately constructed centering provided an opportunity for alternative patterns. Chiaroscuro effects produced by deep

recessions in the coffers' frames echo the interplay between light and shade that the Pantheon's asymmetrical coffers so notably generated.

These later apses, as images of celestial canopies, housed enthroned figures: statues of goddesses, Venus and Rome, and the colossal Constantine, *dominus et deus*. Both Maxentius and Constantine appear to express their personal ideology with permanent images in an architectural framework. Maxentius, in circumstances similar to Hadrian, needed to legitimize his divine succession and authority. By reconstructing Hadrian's Temple of Venus and Rome, he perhaps evoked the traditional divine lineage associated with Augustan precedent with the goddess Venus and elevated Rome's position as it competed in grandeur and political power with Constantinople. Constantine's colossus, on the other hand, created a definitive expression of *auctoritas* and apotheosis– its titanic size literally reached the coffered heavens in this physical embodiment of both emperor and god. These coffered apses and their celestial impressions, although secondary architectural elements, thus have an important physical and metaphorical role in framing these images of imperial propaganda.

Martial and Statius provide the earliest evidence of likening an emperor to a god – *dominus et deus* -- in an *aula regia* or basilica because of the celestial contents in the ceilings of Domitain's palace. If Godfrey and Hemsoll's interpretation of the Pantheon as an *aula regia* and expression of the imperial cult is correct, then Hadrian's appearance in the Pantheon develops into an imperial motif of an emperor or god enthroned under a coffered ceiling that incorporated a visual pattern of discordant couplings and vanishing lines, which in turn becomes part of an Imperial decorative protocol in Maxentius' reconstruction of the Temple of Venus and Rome and the Basilica of Constantine. Thus,

the Pantheon's coffering, originally designed for aesthetic purposes, appears to have influenced identifiable décor in later Imperial architecture that both glorified and elevated an emperor god enthroned.

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APPENDIX A

ILLUSTRATIONS



Fig. 1. Ceiling of the Hephaisteion with removable coffer lids. In K. Tancke, "Deckenkasseten in der Griechischen Baukunst," 1989, figure 2.



Fig. 2. A Reconstruction of the coffered ceiling of the *Tholos* at Delphi. In K. Tancke, "Deckenkasseten in der Griechischen Baukunst," 1989, figure 8.



Fig. 3. A Reconstruction of the coffered ceiling of the Tholos at Olympia. In K. Tancke, "Deckenkasseten in der Griechischen Baukunst," 1989, figure 10.



Fig. 4. Umbrella-style ceiling of the Tomba Campana I at Cerveteri. In Prayon, 1975, pl. 38.



Fig. 5. Fan-shaped ceiling of the *Tomba degli Animali Depinti* at Cerveteri. In Prayon, 1975, pl. 33, 1.



Fig. 6. Plan of *Tomba degli Animali Dipinti* (Tomba del Vestibolo Rotondo) at Cerveteri with radiating fan pattern, designed by Canina. In G.T. Rivoira, 1972, figure 214.


Fig. 7. Vesta Aedes. Aureus of Titus. In E.M. Steinby, 1995, Vol. 5, figure 75.



Fig. 8. Wall painting depicting wooden coffered dome in House of Caecilius Jucundus at Pompeii. In K. Lehmann, 1945, figure 58.







Fig. 10. Triumphal procession past the *Porta Triumphalis*, inner panel of the Arch of Titus in Rome. In N. Hannestad, 1986, figure 79.



Fig. 11. Apotheosis of Titus in the *intrados* of the Arch of Titus in Rome. In Pfanner, 1983, plate 25, 1.



Fig. 12. Coronation of Trajan in the *intrados* of the Arch of Trajan at Beneventum. In Hassel, 1966, pl. 33, 1.



Fig. 13. *Adventus* scene of Trajan arriving into Rome in the bottom west side of the Arch of Trajan at Beneventum. In Hassel, 1966, pl. 7, 1-2.



Fig. 14. *Adventus* scene of Trajan being welcomed by the gods in the attic of the west side of the Arch at Trajan at Beneventum. In Hassel, 1966, pls. 14-15.



Fig. 15. Sundial from the Stabian Baths at Pompeii. In Heinz, 1985, figure 3.



Fig. 16. Coffered apse of '*nymphaeum*' in Trajan's Baths. In K. De Fine Licht, *Trajansthermen*, 1974, figure 57, D.



Fig. 17. Coffered apse of 'library' in Trajan's Baths. In K. De Fine Licht, *Trajansthermen*, 1974, figure 57, L.



Fig. 18. Coffered apse of '*basilica thermarum*' in Trajan's Baths. In K. De Fine Licht, *Trajansthermen*, 1974, figure 57, H.



Fig. 19. Photo of the Pantheon's coffers. In MacDonald, *The Architecture of the Roman Empire*, Vol. 1, 2nd Edition, 1982, plate 109.



Figure 20. Drawing of the structural components in the wall of the Pantheon by De Fine Licht. In De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, 1968, figure 110.



Figure 21. Section of the Pantheon's coffered dome without the top layer of plaster. Photo by De Fine Licht, 1962. In De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, 1968, figure 143.



Fig. 22. Diagram of the arrangement of the Pantheon's interior. In De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, 1968, figure 204.



Fig. 23. The Pantheon: coffers, main apse, and surrounding elements. In MacDonald, *The Architecture of the Roman Empire*, Vol. 1, 2nd Edition, 1982, plate 107.



Fig. 24. Sketch of the Pantheon's vertical alignments. In Pelletti, 1989, figure 3.



Fig. 25. Arrangement of Pantheon's coffers according to the seasons and the Golden Mean by Alvegard, 1987. In Gert Sperling, *Das Pantheon im Rom*, 1999, 114, figure 62.



Fig. 26. Stuccoed vault in Nero's Domus Aurea. In K. Lehmann, 1945, figure 28.



Figure 27. Sightline from the Pantheon to the Masoleum of Augustus in the Augustan Period. In Penelope J.E. Davies, 2000, figure 94.



Fig. 28. Sightline from Hadrian's mausoleum to the Pantheon and Trajan's column. In Penelope J.E. Davies, 2000, figure 111.









c.



Fig. 29. Memorial Coins of Maxentius: a. Memorial of Maximianus; b. Memorial of Divus Romulus; c. In honor of Constantius; d. Memorial of Maxentius; e. Tomb of Maximianus. In E.B. Smith, Dome, 1956, figs 17-21.



Fig. 30. Coffered apse in the Temple of Venus and Rome reconstructed by Maxentius. In C. Daremberg, ed., Dictionnaire Des Antiques Grecques et Romaines, 1904, figure 4322.



Fig. 31. Piranesi's sketch of the Basilica of Constantine. In J. Wilton Ely, ed., *Giovanni Battista Piranesi: The Complete Etchings*, Vol. 1, 1994, figure 247.



Fig. 32. A drawing of the coffers in the Basilica of Constantine. In Lugli, Vol. I, 1957 figure 151.



Fig. 33. Sketch of the Baths of Constantine. In E. Nash, *Pictorial Dictionary of Ancient Rome*, 1968, Vol. 2, figure 1242.

APPENDIX B

GLOSSARY

- *Aedicula* (Aedicule). An ornamental niche that is framed by architectural elements such as pilasters, columns, and a pediment.
- Annular vault. A barrel vault that has been curved to form a ring-shape.
- Apse. A roofed room-like alcove that is usually semicircular in shape.
- Architrave. The horizontal element that spans between columns at the lowest part of the entablature.
- Astragal. A rounded molding usually decorated with the bead-and reel motif.
- Barrel vault. A vault, sometimes referred to as a tunnel vault, whose semicircular roof extends in length.
- Bead-and-reel. A molding that consists of horizontal ovals alternating with smaller vertical lozenges or ovals.
- Bipedales. Roman square bricks with sides each measuring two Roman feet.
- *Carceres.* The starting gates in a Roman circus.
- *Cella*. The central room of a temple where the statue of the divinity is displayed.
- Centering. The wooden framing that supports arches or vaults during their fabrication.
- Coffer. A geometric, recessed or sunken panel found in ceilings or vaults and formed from either stone, wood, stucco, or by depressions in concrete.
- Cornice. A molding that usually projects from a wall, usually as the top part of the entablature.
- Cryptoportico. A barrel vaulted corridor, usually subterranean, that is often lit by windows.
- *Cyma*. A molding that is double curved with the concave edge joining a convex one,

Egg-and-dart. A molding that consists of vertical ovals alternating with dart shapes.

Exedra. A recess that is either semicircular or rectilinear in plan.

Fornix, pl. fornices. The Republican term for a free-standing arch.

Intercolumnar. An adjective referring to the space between columns.

- Intrados. The lower surface or underside of an arch or a vault. Also called a soffit.
- Lacunaria. A coffered ceiling.
- Lagging. Continuous or spaced wooden planks that form a surface for the mold of a concrete vault or dome.
- Niche. A small recess or hollow in a wall that houses statues. Their tops or heads were either rounded or square.
- Oculus. A circular aperture at the apex of a dome.
- *Oecus.* The main room in a Greek house used for dining and entertaining. Roman architecture adopted its form and function.
- *Opus incertum.* A concrete facing that consists of irregular shaped stones arranged randomly.
- *Opus vittatum.* A concrete facing that alternates between bands of brick and irregular patterns of stones.
- Ovolo. A convex molding whose profile is about a quarter of a circle.
- Pediment. A curved or triangular gable crowning a portico, temple, or ornament such as the *aedicula*.
- Peripteral. A term for a *cella* or building surrounded by a continuous row of columns.
- Peristyle. A continuous colonnade around a courtyard.
- Pilaster. A false pillar or column set in low relief to suggest a structural component.
- Portico. A porch in front of a building that usually contains columns.
- Putlog. A wooden log that supports the floor of a scaffold from the wall to the scaffold's ledger. It is often inserted into the wall for more support.

Relieving arch. Any arch fixed in the inner wall to deflect weight on either side.

Revetment. A sheathing or covering of a wall or floor, often consisting of marble.

- Rotunda. A circular building with a dome.
- Soffit. The underside of an architectural element such as an arch, architrave, or trabeate ceiling.
- Trabeate. Having horizontal beams or lintels, as in unvaulted and unarched constructions.
- Transverse arch. An arch that spans a barrel vault. Several transverse arches back-toback may construct a barrel vault.