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## *Roman Afterlives*

WHAT Giotto did for the human body and the Christian story, only a century later another Florentine would do for architecture. Filippo Brunelleschi (1377-1446) found his archetypes in the monuments of ancient Rome. In 1401, luckily for Western architecture, the twenty-four-year-old Filippo did not win the competition to make the bronze reliefs for the doors of the Baptistery of San Giovanni in Florence. The judges announced a tie between him and Lorenzo Ghiberti (1378-1455) and urged the two to collaborate. When Brunelleschi refused to work except on his own terms, the commission went to Ghiberti, and Brunelleschi left Florence in pique. "So he went to Rome where at the time one could see beautiful works in public places," his contemporary biographer Antonio Manetti (1423-1491) reported. He would give a brilliant new afterlife to the Roman arts of building.

A Florentine background more different from that of Giotto would be hard to imagine. Brunelleschi's father, of a respectable old family, prospered by supplying the army of the city. Apprenticed as a goldsmith, Brunelleschi soon showed remarkable talent. Despite his youth, he received a commission to sculpt a wooden crucifix for the church of Santa Maria Novella, and his advice was sought on public buildings. If he had won the commission for the Baptistery doors, he might have remained only a prosperous sculptor in Florence and Western architecture might not have borne his mark.

His friend Donatello (1389?-1466), who would play for sculpture the pioneer role that Giotto played for painting, accompanied him, and, according to Manetti, "together they made rough drawings of almost all the buildings in Rome and in many places beyond the walls, with measurements of the widths and heights as far as they were able to ascertain by estimation, and also the lengths, etc. In many places they had excavations made in order to see the junctures of the membering of the buildings and their type—whether square, polygonal, completely round, oval, or whatever...they estimated the heights...of the entablatures and roofs from the foundations. They drew the elevations on strips of parchment graphs with numbers and symbols which Filippo alone understood." The puzzled Romans called them "treasure hunters," for they could imagine no other motive for all the digging and measuring.

Brunelleschi had no difficulty finding the treasure he was seeking, which was the dignity and elegance of the ancient Roman buildings. "He found a number of differences among the beautiful and rich elements of the buildings—in the masonry, as well as in the types of columns, bases, capitals, architraves, friezes, cornices, and pediments, and differences between the masses of the temples and the diameters of the columns; by means of close observation he clearly recognized the characteristics of each type: Ionic, Doric, Tuscan, Corinthian, and Attic. As may still be seen in his buildings today, he used most of them at the time and place he considered best."

Giotto, Brunelleschi, and their fellows pioneered the Renaissance recreation on which we have built modern times. Celebrated as "inventors and discoverers of many methods that had been buried for about six hundred years," they also unwittingly conjured up a "Middle Ages" between two ages of classic excellence. Without them it might have been unnecessary to imagine the cultural hiatus that has plagued us ever since.

From Rome Brunelleschi brought back to Florence the vocabulary and the grandeur of the Roman style with some of the secrets of Roman building technology, and gave them new life. Just as Dante had translated Christian mythology from Latin into the Italian vernacular, and as Giotto had translated painting from the Byzantine ("Greek") into the Latin (Roman), Brunelleschi revived a Tuscan order in architecture. He aimed to prove that "the years between" were not a gulf but only an interruption, as he adapted the grandiose Roman forms to Florentine buildings on a smaller scale with a new grace and light elegance.

What is called the first true Renaissance building, and the first in Brunelleschi's own style, is the Foundling Hospital (1419-24) in Florence (right), built by his own guild of silk merchants and goldsmiths. The facade of the loggia shows how far he has come from the Gothic, how much he has depended on the classical motifs, and how boldly he has adapted them. A light series of rounded arches is supported by slim columns with a dominant horizontal element above, covering a vault of small domed bays in a square plan. The interior of his chapel for the Chapter House attached to Santa Croce and built for the Pazzi banking family (c.1430) also uses columns, pilasters, and arches for a Pompeian grace. Blank white walls subdivided by gray pilasters are quite unlike the high windows, carved pillars, and infiltrating light of the Gothic. The classical orders lend a touch of elegance to a modest interior. He also uses his Roman vocabulary for grander buildings like the basilical churches of San Lorenzo (c.1419) and of Santo Spirito (c.1434, below left) in the shape of a Latin cross, or the church of Santa Maria degli Angeli, a central-domed octagon.



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Brunelleschi learned more than a style and a set of motifs from the ancient Romans. His triumph as a re-creator would be posthumous and worldwide, for the archetypes of Roman architecture, its columns, domes, and architraves, would be revived in new combinations in buildings on every continent, and celebrated in America in countless county courthouses and post offices, on the facades of ambitious community builders, in Monticello and on Capitol Hill. In his own time he created a unique monument of architecture that was as eloquent of Renaissance Florence as the Pantheon was of Hadrian's Rome or Hagia Sophia of Byzantium. Using Roman techniques and a bold engineering imagination he built the dome of the cathedral of Florence, which dominates the skyline and still charms twentieth-century visitors.



The citizens of Florence had begun their cathedral back in 1296, a century before Brunelleschi made his first trip to Rome. In 1334 Giotto had been honored by the commission to design the bell tower, but work on the main structure had proceeded slowly. By the early fifteenth century the nave was completed and work began on the great octagon at the east (altar) end. As the walls of the complex octagon rose, overseers of the works found themselves confronted with a vast opening 138.5 feet across, which had to be covered by a dome. They had no choice. But how to do it? How their urban rivals—Pisa, Siena, Milan, Padua—might have enjoyed the spectacle of an ambitious city that could not even roof its own cathedral! But successive supervising architects had evaded the problem by focusing on every other part of the work. By about 1413 the walls of the octagon drum at the east end had risen to their full 180 feet and the challenge had to be faced.

Brunelleschi had been eagerly anticipating the assignment. By 1417 he had already been paid for some drawings and had made a wooden model of his design. In 1418 the overseers of the works finally announced a public competition. The other leading competitor was Ghiberti, Brunelleschi's *bete noire*. The tactless judges trying to bring these two together, as they had vainly tried once before, gave the supervisory assignment of building the dome to

them jointly, with a master stonemason working under them. Construction was begun on August 7, 1420, and completed all the way up to the base of the lantern on August 1, 1436. A Brunelleschi-Ghiberti team was designed for trouble. Brunelleschi, who had never forgotten losing to Ghiberti the commission for the bronze Baptistery doors, would leave a series of invective sonnets as his literary legacy. During work on the dome Brunelleschi seized every opportunity to show up his rival's incompetence. He would even pretend to be ill at crucial moments so Ghiberti would have to face the most difficult problems alone. Luckily Ghiberti was dismissed in 1425 and completion of the work was left to Brunelleschi.

The problem, engineering and aesthetic, was of unprecedented difficulty. How Brunelleschi solved it was still a mystery to Vasari, who wrote his biography a century later (1550). Vasari reported that the baffled citizens of Florence, desperate for a way to dome their cathedral, recalled the ancient Roman expedient. Perhaps they, like the builders of the Pantheon, should fill the structure with earth to support the dome as it was being built. And by sprinkling coins randomly in the dirt they too would give the children of the town an incentive for clearing the earth away.

Brunelleschi's ingenuity saved them from this and other harebrained schemes. He amply earned his fame by his original plan and by the machines he devised for carrying on the work. The large size of the opening, its height aboveground, and the advanced stage of the building when Brunelleschi was enlisted for the job all added to the normal difficulties of constructing a dome. The method of building a dome or arch usual at the time was first to construct a wooden framework (called the centering) to support the bricks or stones as they were put in place. When the wedge-shaped keystone was inserted in the center, the wooden centering could be removed. The stones would then be held together by the force of gravity, and the dome or arch would remain stable by a constant downward thrust. But the size of such a dome was plainly limited by the length and strength of the timbers for the centering. And no trees could be found to make the centering for an opening of 138.5 feet. Even if such trees could be found, the expanse was so broad that the weight of the timbers themselves would break the centering even before being loaded with the stone covering.



In 1418 the octagon stone drum on which the dome would rest had already been built. Its eight symmetrical sides of slim vertical walls were penetrated by circular windows carrying out the design of the nave. They would collapse if subjected to a sideward thrust from a dome above. Intended only to support the dome, these sides were not capable of bearing any but a vertical thrust. So a Gothic solution, a dome exerting an outward thrust supported by flying buttresses like those of Notre-Dame in Paris, seemed out of the question. Also, flying buttresses would violate the cathedral's exterior design, even if the structure had provided a place on which to rest them, which it did not. On the other hand, the dead weight of a solid concrete dome like that of the Pantheon would have crushed the fragile walls of the octagon drum on which it rested. Thus it was impossible for Brunelleschi to gratify his taste for things Roman.

Force of circumstances drove the reluctant Brunelleschi back to a pointed dome in the Gothic spirit. Seeing the octagon drum on which to place his dome, with only its eight strong corner supports and thin walls in between, Brunelleschi would build on these limitations. Since the usual centering was impossible he had to find another way to support the stone structure as it was being built. By designing his dome of two shells, an inner and an outer, he would reduce the weight of

each shell, and yet increase the grandeur of the outer shell. He would make a pointed dome supported in sections, with each of the eight sides of the octagon held up by major stone ribs at the angles. There would be two minor ribs within each stone section, and horizontal arches would connect the major and minor ribs. By 1425 Brunelleschi had raised the dome to the point where it curved sharply inward, and then the lack of centering posed what seemed an insuperable problem.

Now he had to take advantage of the freedom that he had secured from the building committee to make changes in materials and methods as the work required. To make up for the lack of centering, his dome was built in horizontal courses on the sectional supports. Each course was bonded to the one below to carry its own weight and also support the next ring above it. When Brunelleschi reached the perilous inward curve of the dome, he had to change his materials. Since the stone he was using might be too heavy for the uncentered structure, he took a leaf from the ancient Romans, substituting brick for stone, and laying the bricks in the herringbone pattern he had seen in Rome. Separate brickwork was laid for the inner and the outer domes as the work proceeded, reducing the thickness of each as the dome went up. The result was a cellular system, with an increasing space between the layers till the space between the layers became six feet at the crown. For this unusual work, Brunelleschi had to invent new cranes and derricks for lifting the stone and bricks. To avoid wasting the workmen's time in descending for meals, he provided a high canteen at their workplace on the dome.

Brunelleschi's close and strenuous study of the ancient archetypes had borne fruit. When all eight sections and the horizontal brick courses binding them were in place, this left an open eye at the top like that in the Pantheon. The eye of the Pantheon dome, a solid structure of artificial stone (concrete) could be left open to the sky. But the ribs of Brunelleschi's dome tended to pull back at the top and open the ring. There had to be a heavy decorative "stopper" to press down on the ribs and hold them together at the top. This explains the surprisingly large size of the existing lantern. In 1436, when the need was apparent, a competition was held for the stopper design, which Brunelleschi naturally won with his model for a functional lantern of classical elegance. His octagonal turret of tall arched windows would tie the eight ribs of the dome to the corners of the lantern by ingenious classical flying buttresses. Each graceful buttress was topped by an inverted curled classical bracket (console), terminating the reluctantly Gothic dome with an unmistakable tribute to Roman antiquity. The pinnacle was an undulating conical turret surmounted by a crucifix on an imperial orb. What more succinct symbol that the Renaissance, in Emile Male's aphorism, was "Antiquity ennobled by the Christian faith"!

Construction of the lantern began in 1446, only a few months before Brunelleschi's death. His design was carried out by his friend and disciple Michelozzo (1396-1472) and still dominates the Florentine townscape with a monument to a great re-creator.

There were countless other ways of re-creation, of giving new life to archetypes. Giotto found his own way by breathing humanity into the Madonna, Christ on the Cross, the biblical story, and the tales of the saints. Brunelleschi drew on the ancient Romans to reshape the buildings of his Florence. Leon Battista Alberti (1404-1472), the prototype of the "universal man" of the Renaissance, achieved his fame by giving a new afterlife to Vitruvius. The illegitimate son of a wealthy merchant banker family that had been exiled from Florence by their rivals, Alberti was born in Genoa, where his father was managing the family interests. As a child he lived with his family in Venice until he was sent to a boarding school in Padua, where he had a solid classical Latin education. A precocious Latin stylist, at twenty Alberti wrote a comedy that the experts mistook and published for an authentic Roman work. At his father's death, relatives swindled him out of his inheritance and left him a penniless student in Bologna. By 1428, when his family's exile had been revoked, he went to Florence, where he used his versatile talents to widen the Florentine revival. A papal dispensation allowed him despite his illegitimacy to take holy orders, which provided him with a steady living. He held two Tuscan benefices in absentia while he was still living in Rome and entered the papal civil service, but he was a most unsanctimonious cleric.

Pope Eugenius IV introduced Alberti to the Florentine galaxy of Donatello, Ghiberti, and Brunelleschi who stretched his interests to include all the arts and sciences. On returning to Rome in 1447 he became architectural adviser to Pope Nicholas V (1447-1455) on urban renewal and the restoration of churches. Yet he remained in close touch with his friends in Florence, where his literary interests were a perfect complement to the engineering concerns of Brunelleschi. In contrast to the practical Brunelleschi, who discovered how the Romans had fitted their stone corners and laid their bricks, Alberti's passion was for the mathematics in which his father had trained him. He never ceased to be interested in the rational order of things: the ratios of the dimensions of columns and architraves, the "order" in the Italian language which he dignified with its first grammar, the "science" of cryptography where he provided the first known frequency tables and cipher wheel, or the design for a great city.

Alberti, like Brunelleschi, embellished the palazzi of his time with columns, pediments, and cornices from ancient temples and forums. Following the style of the Colosseum, his classic work for the merchant princes was the three-story Palazzo Rucellai (1446-1451) in Florence, where he gave a fortresslike stone palazzo a classical elegance with pilasters of the Roman orders. The Christian church in his time, a high central nave with lower aisles on either side, posed an aesthetic problem for the facade. The Arch of Constantine in Rome with its three arches offered Alberti a solution that he seized for the Tempio Malatestiano in Rimini (C.1446) and the Sant' Andrea in Mantua (1470, following page).

Alberti's interests in architecture grew along with his passion for Roman antiquities. In Ferrara, as a guest of the Estes, he built a miniature triumphal arch to hold the statue of Leonello's father. When Leonello urged him to rationalize architecture by "purifying" the text of Vitruvius, Alberti took up the project with enthusiasm. At the papal court in 1443, he studied the Roman remains and then advised the ambitious Pope Nicholas V on reconstructing St. Peter's and the Vatican Palace. Alberti's Roman interests led him to try to refloat the ancient galleys on Lake Nemi, about which he wrote a treatise.

Talent and experience now superbly qualified Alberti to provide a bible for Renaissance architects with his revival of Vitruvius, whose Ten Books of Architecture had never been forgotten but was not available. Then about 1415 Poggio Bracciolini (1380-1459), the tireless searcher for classical texts, luckily turned up a manuscript of Vitruvius, which Alberti would be the first to use. And following Vitruvius, Alberti wrote his own *Ten Books* in Latin, and called it *De re aedificatoria* (*On Building*), destined to be the standard architectural handbook for centuries to come. To preserve the Roman flavor, Alberti called his churches "temples," where people worshiped "the gods," by which, of course, he meant God, Christ, and the saints. Completed and dedicated to Pope Nicholas V in 1452, it was published in print by his brother Bernardo in Florence in 1485, thirteen years after his death.



Widely translated, Alberti's book lived on as a modern guide to recreating the classical architecture that Vitruvius had canonized. Alberti gave new coherence to the five classical orders, surveyed materials and designs for walls, bridges, castles, and waterworks and for houses appropriate to different social classes, and finally offered a city plan. With Pythagorean orthodoxy he explained the relation of architectural proportions to the musical harmonies, and insisted that beauty was not a matter of personal taste but was governed by mathematics and reason. Beauty had to be distinguished from mere ornament, of which oddly enough he made the column his example. So he showed how far he had come from the ancients.

Vitruvius had an inexhaustible capacity for afterlives. About 1530 an eccentric wealthy scholar, Count Gian Giorgio Trissino (1479-1550), in Vicenza in northern Italy undertook to rebuild his own villa in the classical style. A fanatical follower of Vitruvius, in this villa he would house a kind of monastic academy for disciples who were to study mathematics, music, and philosophy on a Vitruvian plan. Among the stonemasons working on his villa was the talented young Andrea di Pietro della Gondola, whom he adopted as a disciple and christened Palladio after Pallas Athena. This Palladio (1508-1580) did not disappoint his godfather—he became an apostle of purism in the rebirth of classical architecture. He provided the standard guidebook to the antiquities of Rome (*Le antichità di Roma*, 1554), and reconstructed Roman buildings for the plates in a new Venetian edition of Vitruvius (1556). Then in 1570 Palladio published his own *Four Books of Architecture*, taking "Vitruvius for my master and guide," following the Pythagorean harmonies updated to the musical intervals in use in Palladio's day. Palladio's classical re-creations would shape the architecture of Inigo Jones in England and Georgian architecture on the American side. Here the "Palladian" became not only a style but a cult, of which Thomas Jefferson was a devoted disciple.