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Author(s): Michael Hill
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Practical and Symbolic Geometry in Borromini's San Carlo alle Quattro Fontane

MICHAEL HILL
National Art School, Sydney

The Importance of Geometry

In 1634, the barely solvent Spanish Trinitarians commissioned the as yet untested Francesco Borromini to design a new convent in Rome, along with a church dedicated to San Carlo Borromeo and the Holy Trinity.[1] The result had an immediate and seismic impact: no matter how the Baroque is defined, one of the starting points is always San Carlo alle Quattro Fontane (also referred to here as San Carlino). The ingenuity of the church plan has been the subject of particularly intense debate. It is normally seen as a longitudinal oval, though in reality only the church dome is this shape. This supposed oval-centeredness has led Borromini to be thought as both neo-medieval, in that he bypassed the column-based proportionality of the Renaissance, and protomodern, in that his architecture gave form to the spirit of the new science of Kepler and Galileo.[2] More recently, scholars have called into question the degree to which Borromini depended on any coherent geometry at all in designing San Carlino. A counterimage has emerged of an architect who retrofitted intricate schemes into projects that were forged within more workaday patronal and site-specific realities. From a mystery written in code to something fashioned in a social matrix, from geometrician to avid professional, the reading of the church and the categorization of its maker are indices of art historical attitudes at large over the last half century.

The first complete exegesis of San Carlino's geometry came from Leo Steinberg in his doctoral dissertation of 1960.[3] Casting aside the irrelevant designs that had misled earlier commentators, which are not for San Carlino nor even by Borromini, Steinberg instead focused on Alb. 171 (Figure 1), the earliest surviving plan, demonstrating how the church evolved from an elongated Greek cross into its final synthesis of cross, oval, and octagon.[4] His analysis of a later drawing, Alb. 173 (Figure 2), hidden until then in the Albertina Museum in Vienna, seemed to reveal once and for all the plan's underlying geometrical structure, which Steinberg summarized in shorthand prose, as follows (Figure 3): "1) Two triangles with shared base, [with] perpendiculars erected over their sides. 2) Two tangent circles [are] inscribed, yielding the foci—and the short segments—of an inscribed oval. 3) A double-rail rectangle tangent to the oval. 4) Semicircular chapels in the long axis articulated by four columns. 5) Chamfered corners reducing the rectangle to an octagon. 6) Completion of the side chapels."[5]

Steinberg was suspicious of the church's geometrical scheme, however, arguing first that Alb. 171 was drawn without ruler and compass, and then that Alb. 173 depicts a regularization rather than ideation of the form, one that

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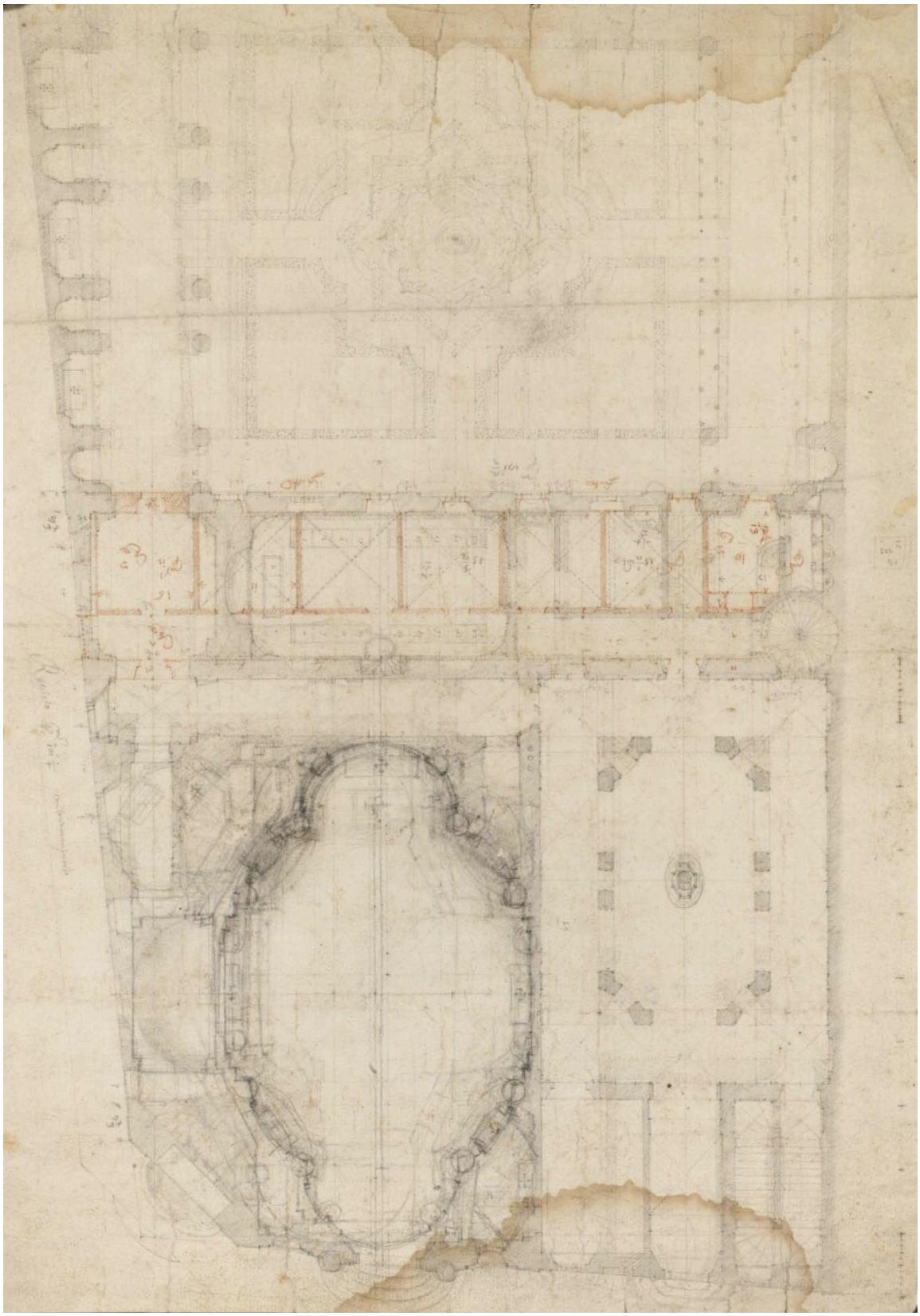

Figure 1 Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, 1634 (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 171)

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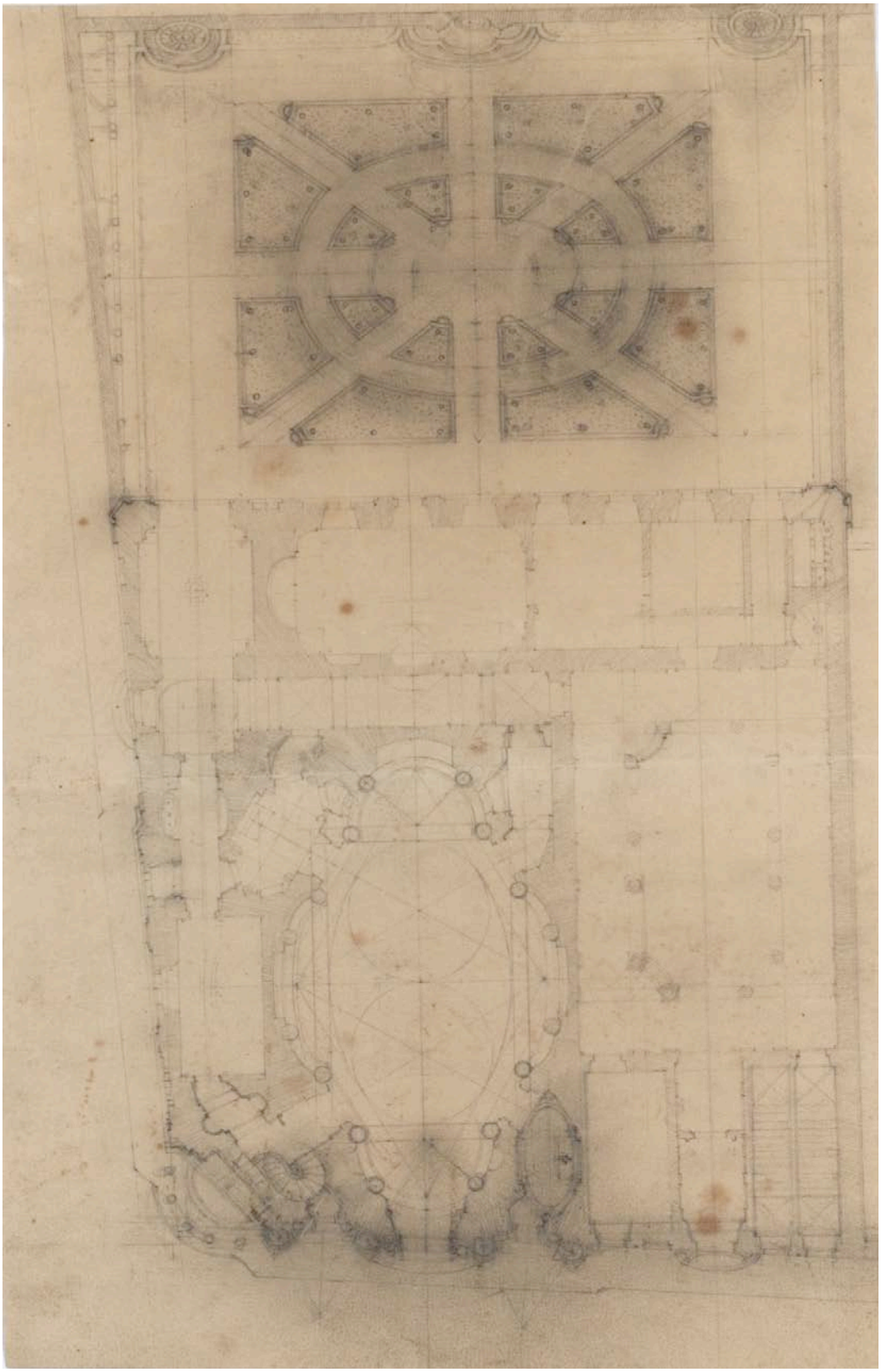

Figure 2 Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, early 1660s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 173)

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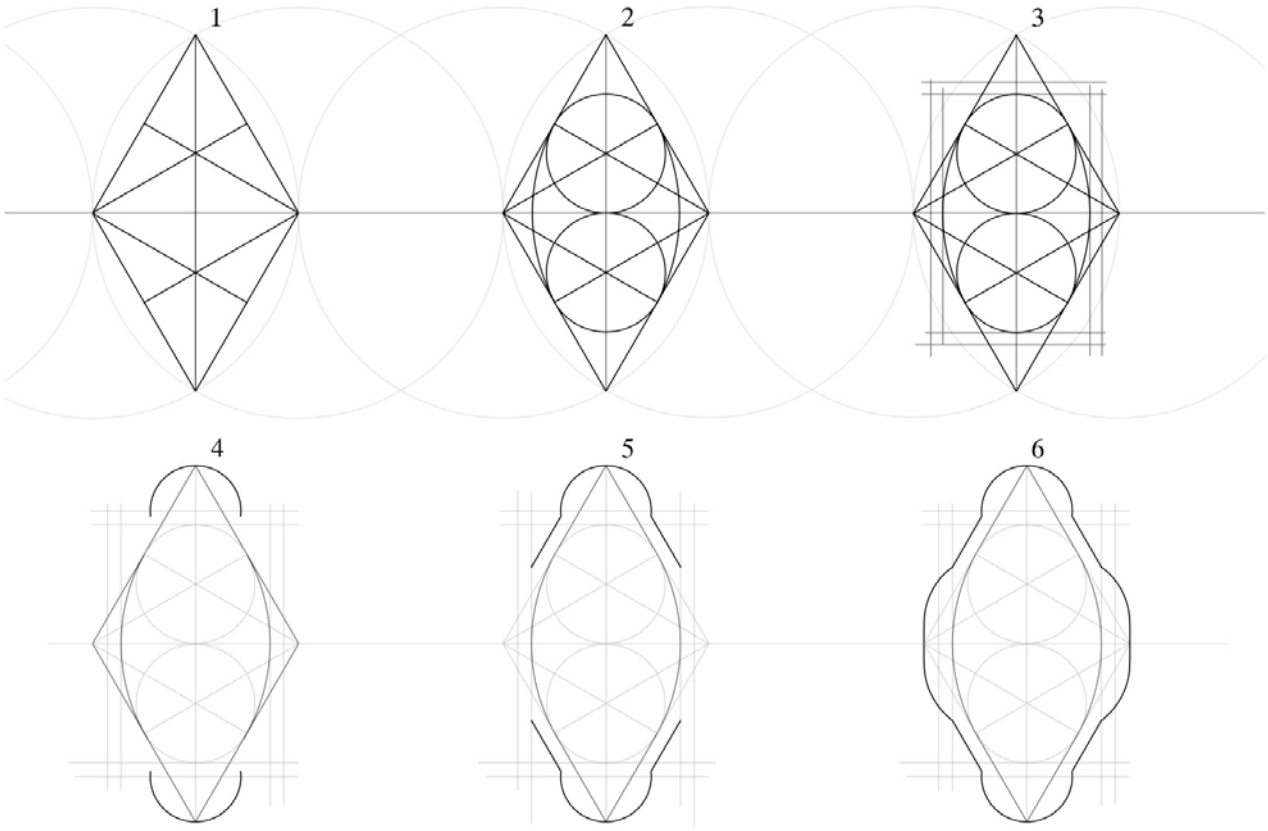

Figure 3 Author's reconstruction of Steinberg's scheme for the construction of Az. Rom. 173

exhibits "no causal connection between the envisaged result and the construction employed."[6] The status of Alb. 173 was further diminished when Joseph Connors argued that it and others were reworked or drawn anew around 1660, following Borromini's decision to publish engravings of the monastery.[7] The only definitive drawing of the church that remains from the 1630s is Alb. 172 (Figure 4), in which the constructional lines are all but effaced.[8] The implication is that Borromini layered over the plan a geometrical armature at a late date, finally acquiescing to repeated demands for him to reveal the long-held secret of the church's morphology.[9] Connors does not state outright that San Carlino has no geometrical underpinning; he argues that at the design stage Borromini's main concern was to mold an image of a four-armed church that alluded to churches such as St. Peter's and SS. Luca e Martina, among other examples, for which geometry was more a means of articulation than substance.[10]

Under the influence of Connors's argument, however, Federico Bellini has taken the extra step and claimed that the plans of the 1660s were not only drawn but also conceived after the fact.[11] In particular, he dismisses the triangles that appear in the center of the church. These, Bellini says, have little architectural significance and mislead one to think that they generate and neatly frame the oval dome, which in Alb. 172 and as constructed is wider and longer than could be contained by such triangles.[12] According to Bellini, Borromini triangulated the plan because he wanted to demonstrate that Trinitarian symbolism permeated the whole convent: "[the] geometry did not create the architecture, rather the architecture created the geometry."[13] To be fair, Julia Smyth-Pinney noted a similar ex post facto triangulation at Sant'Ivo della Sapienza, with the original plan (ca. 1640, Archivio di Stato, Rome) being oriented around a hexagon, while the later one (ca. 1659, Alb. 509) shows the design based on the more memorable image of intersecting triangles.[14] Moreover, as I will demonstrate, Borromini not only idealized the geometry of San Carlino in the later plans, he also shrank its footprint to make it appear less cramped within its site than it really was.

But all this is beside the point. It is one thing to say that the geometrical plans are after the fact; it is another to suggest that Borromini contrived a geometrical structure that would falsely correspond to a shape conceived at an earlier

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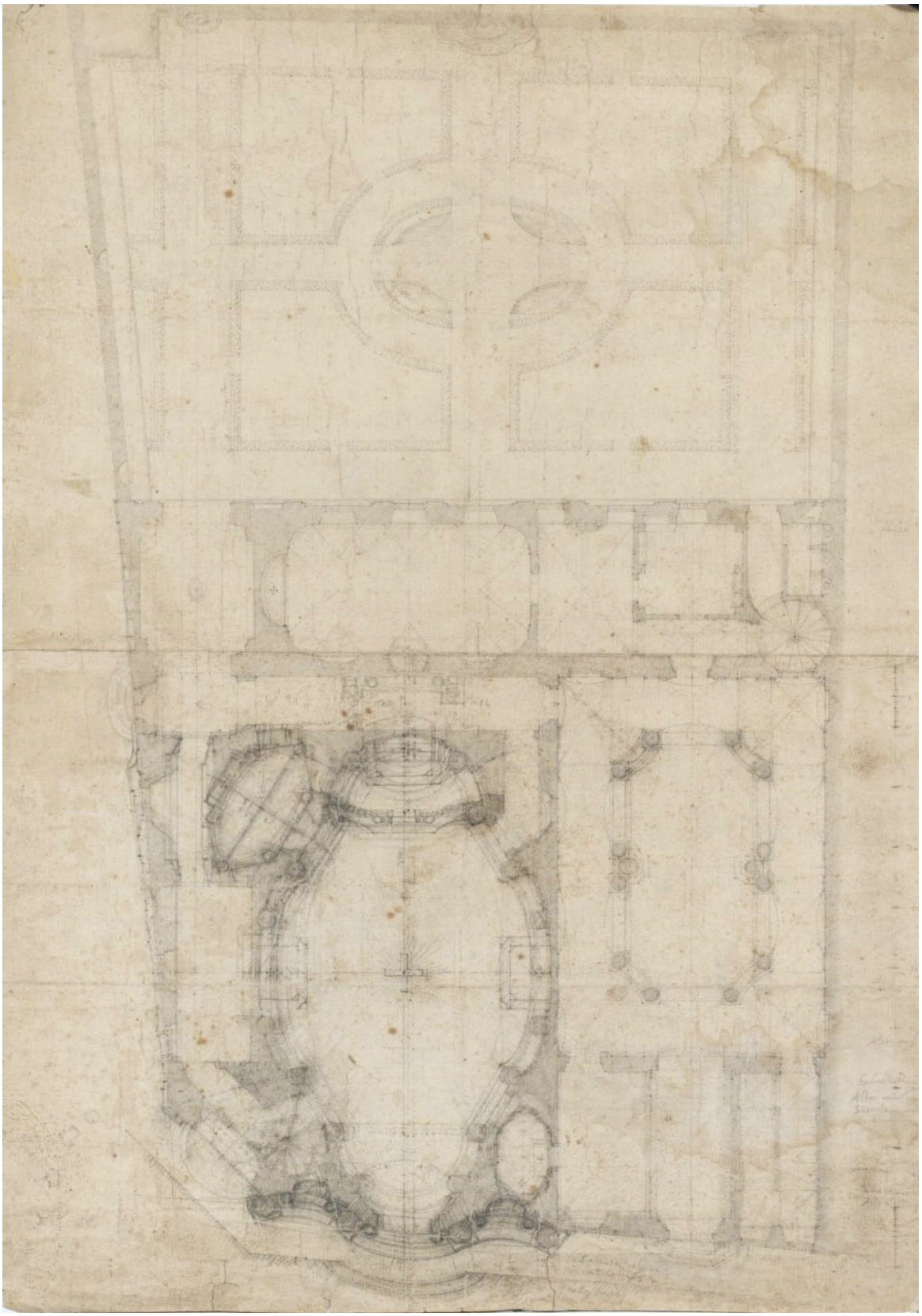

Figure 4 Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, 1638–60s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 172)

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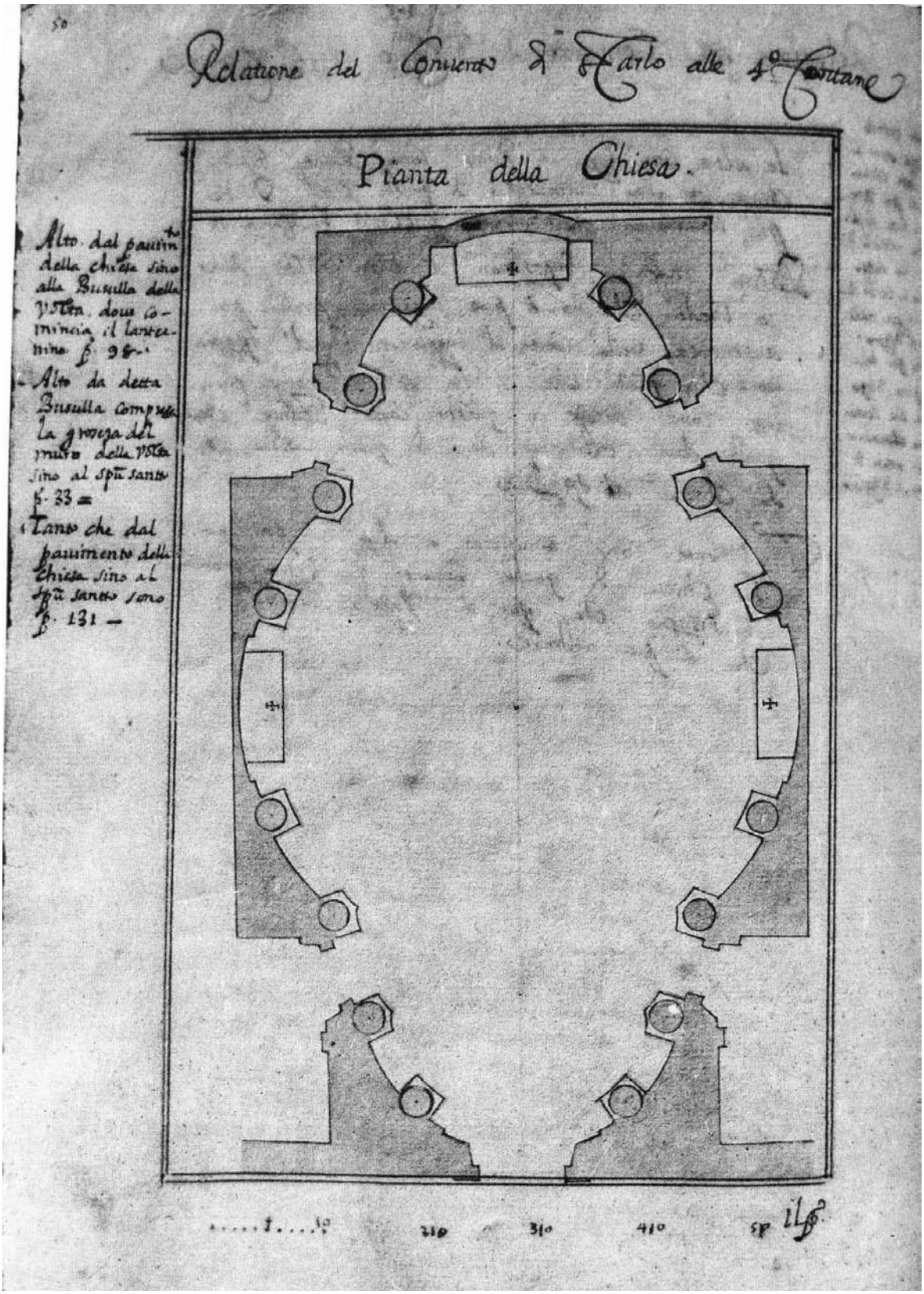

Figure 5 Fra Juan di San Buenaventura, plan of San Carlo, *Relatione del Convento di San Carlo alle Quattro Fontane*, early 1650s (fol. 50)

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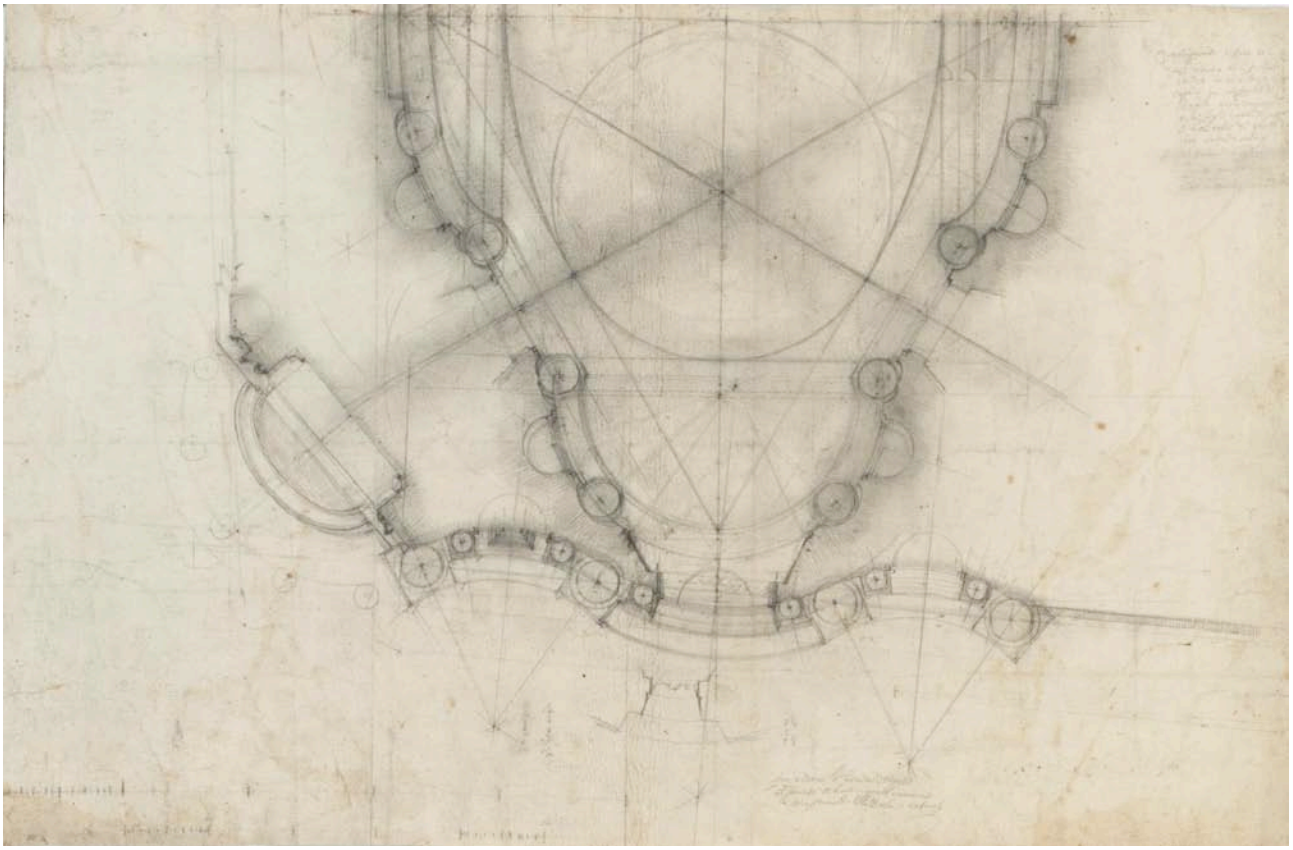

Figure 6 Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, early 1660s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 175)

stage, one using a different series of design options.[15] Although Connors is surely correct in arguing that Borromini revised drawings for publication in the 1660s, it is unlikely that the remaining two from the 1630s (Alb. 171 and 172) represent the complete sequence of preparatory studies. Some may have been lost, and Borromini destroyed the drawings he still possessed before his suicide in 1667.[16] It is conceivable, for example, that the smaller oval presented in the 1660s drawings, cited by Bellini as attesting to the redundancy of these latter sheets, was an initial idea, only later inflated to the form that appears in Alb. 172, as the plan was adjusted to the site.[17] It is incorrect that we have to wait until the 1660s before the equilateral triangle appears in the scheme. The otherwise approximate early 1650s plan of the church (Figure 5) in the *Relatione del Convento di San Carlo alle Quattro Fontane* has coordinates that can only have been supplied by Borromini: the three cross marks on the three altars are both signs of their consecration and the exact apices of an undrawn equilateral triangle.[18] Moreover, Bellini misinterprets the 1660s plans when he claims that the divergent sizes of the triangles drawn on Alb. 175 (Figure 6) and 176 (Figure 7) are proof of their arbitrariness.[19] In reality, they spring from different points, the first from the cornice (the inner line), the second from the wall below. The concentric triangles are not arbitrary; rather they demonstrate that the governing ratio remains constant as the spatial envelope expands.

If one focused exclusively on the drawings of the 1630s, it would do little to contradict the view that the language of Borromini's planning was geometrical. If this were not the case, it would be hard to explain the dimensions of the seminal schemes of Alb. 171, which are based on the compass-derived ratio of 1:√3. Moreover, Alb. 172 is actually replete with ghostly traces of constructional lines, segments, compass points, and bisections, all of which can be hypothetically articulated (Figure 8). I am not suggesting that the later drawings should resume their status as straightforward documents of the planning process; I am simply saying that their evidentiary value with respect to the prior steps in the formation of the design should not be discounted purely on the basis of their retrospection. Given that the plan expands around a scaffold of 1:√3, while

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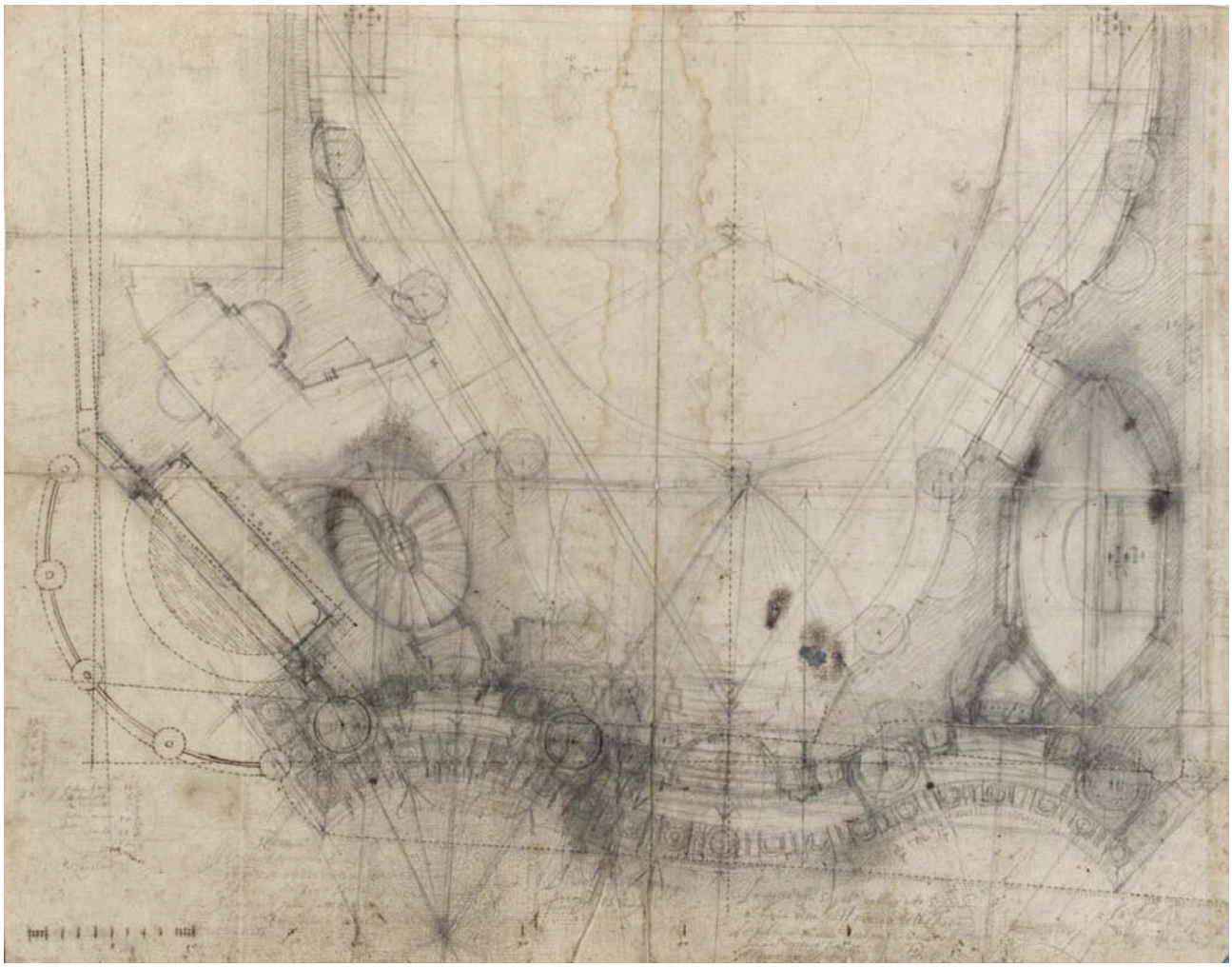

Figure 7 Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, early 1660s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 176)

also being composed of regular geometric segments, all of which must have staging points, it seems reasonable to insist on an initial sequence of graphic construction—as Borromini himself made clear, however idealized, in his drawings from the 1660s. Another way of putting it is this: the idea of the plan, founded in geometry, was adjusted to the site, only to be graphically perfected when Borromini found the occasion to publish it.

The *Biangolo* and the Lateral Chapels

Nevertheless, something is missing. The back-to-back equilateral triangles would seem to be the basic armature, and the normal reduction of the plan is a rhombus, with intersecting diagonal cross axes providing two foci for the inscription of an interior oval. From here one can follow Steinberg's steps in the formation of the plan, with one important exception: the rationale of the shallow arcs that compose the lateral chapels (Figures 9 and 10).[20]

No one has convincingly explained how these arcs are constructed.[21] The most common view sees the side arcs as segments of two small, elongated ovals, which answer the semicircular longitudinal apses. This was how the chapels were described by a French diarist in 1671, and the characterization was reprised by Hans Sedlmayer, Connors, Paolo Portoghesi, Eusebio García, and Bellini.[22] Borromini also referred to the apses in each chapel as a "nicchione ovato," because conceptually they are flattened semicircular exedrae.[23] However, the appearance belies the actual geometry: were they true semiovals, the elbow-like curves from shallow arc (chapel) to straight diagonal (pier) would be quarters of a still-smaller circle, which clearly they are not: instead, they

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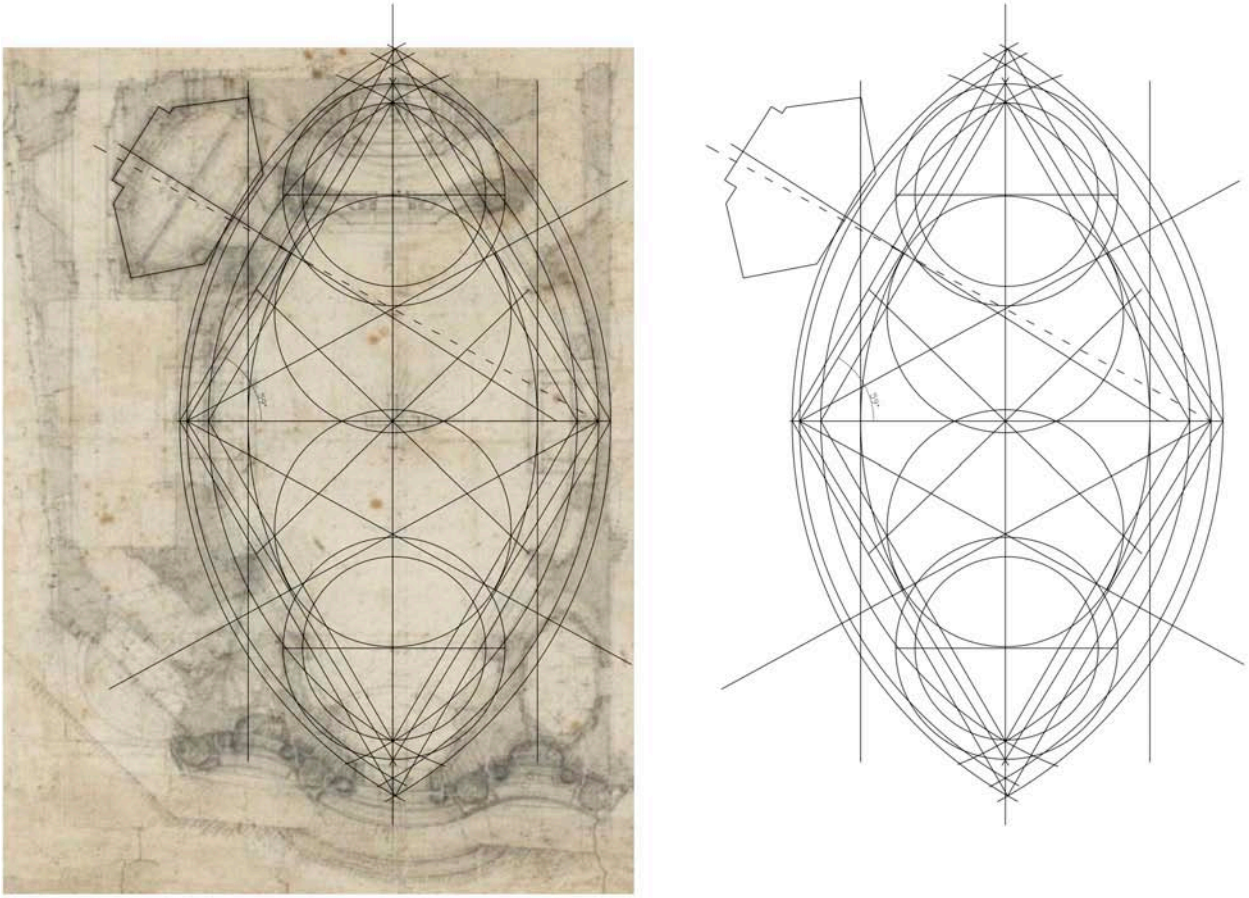

Figure 8 Az. Rom. 172 and author's reconstruction of geometrical armature

Figure 9 Lateral chapel, San Carlo alle Quattro Fontane, Rome (author's photo)

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Figure 10 Lateral chapel, San Carlo alle Quattro Fontane, Rome (author's photo)

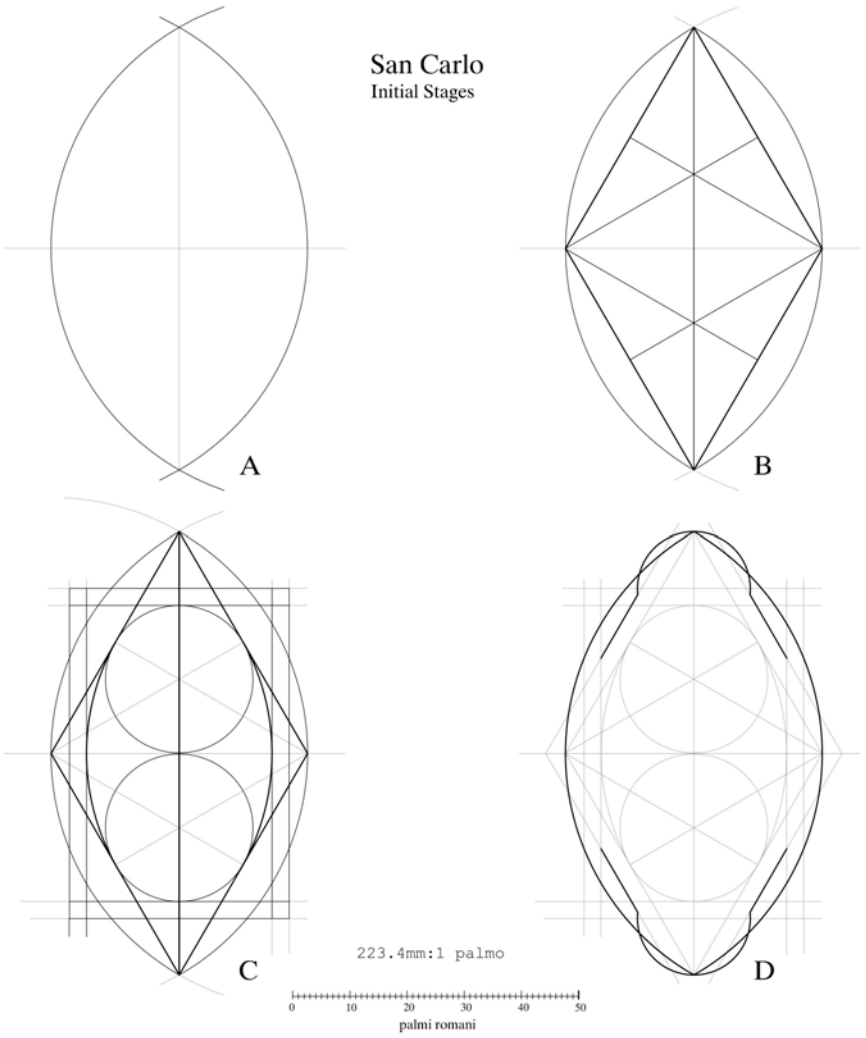

Figure 11 Author's reconstruction of the initial steps in San Carlo's plan

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appear to be segments of a spiral, a simple figure to construct for those used to carving Ionic volutes.

The mysterious construction of the lateral arcs is partly the result of treating the plan as if it began from equilateral triangles, which establish the proportion of 1:√3 ($2 \times \sqrt{3}/2$, i.e., twice the height of an equilateral triangle). Missing is the initial construction, in which the compass is set at either end of the desired transverse axis, to describe two circles that create a cell with a width-to-length ratio of 1:√3 (see Figure 3, upper register). Following Filippo Juvarra, this construction can be called a *biangolo* (pl. *biangoli*; the better-known term *vesica pisces* is anachronistic).[24] When the tips of the base line are connected to the intersecting arcs above and below, a rhombus is formed, that is, end-on-end equilateral triangles (Figure 11). Had Borromini drawn the biangolo only to determine the proportions of the plan, then it would be no more than an invisible means to an end. But this is not the case, for it is this biangolo that provides the curvature of the side chapels (Figure 12). On both Alb. 172 and the plans drawn in the 1660s, biangolo segments correspond to the arcs between the innermost lateral columns.

The inner line of Alb. 172 indicates the projection line of the cornice (Figure 13), below the pendentive zone. The concentric outer line, which describes the wall below, is also formed by the curvature of a biangolo, with each segment set about 2.5 palmi farther along the transverse axis; the width of the two tracks equals the depth of the cornice that sits atop the sixteen engaged columns.[25] Thus, a second biangolo can be drawn, enveloping the first, which precisely describes the outer lines of the plan's lateral wings (Figure 14). According to the 1660s plans, a third biangolo accommodates the curved exedrae for the side altar paintings, with the centers offset another 1 palmi along the transverse axis.[26] In fact, the third biangolo, 50.5 palmi in width and defining the altar exedrae, would have already plotted the lines of the diagonal piers, which run a course along equilateral triangles parallel to the smaller ones that Borromini would later inscribe as the center of the plan (Figure 15).[27]

Biangoli therefore plot the inner track, the outer one, and the exedrae. Borromini did not draw any biangolo in full, nor was it installed as a geometrical cell in the 1660s drawings. There was no need to, as only its proportion and segments of its curvature were required.

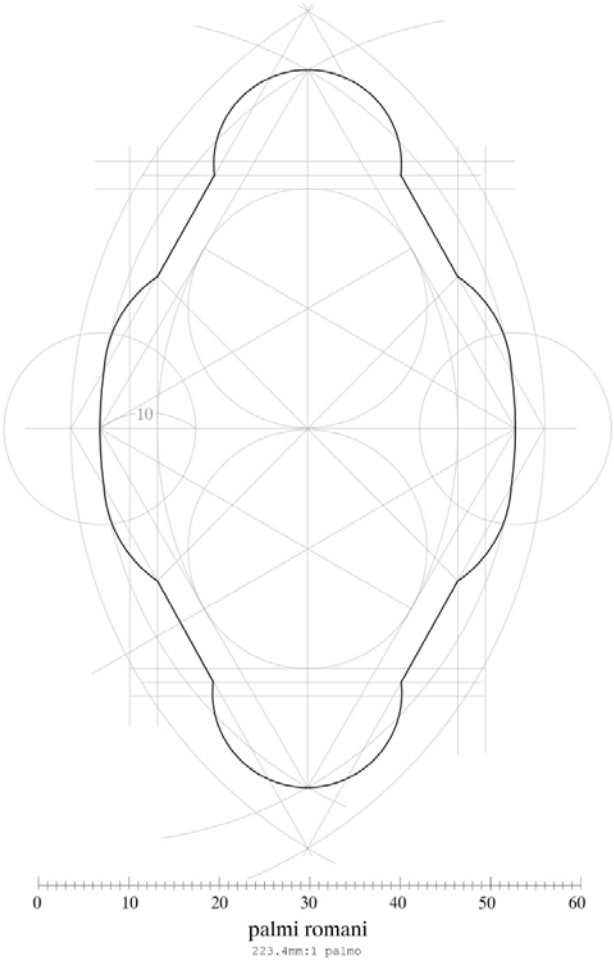

Figure 12 Author's reconstruction of the inner line of San Carlo's plan

Biangoli and the Development of the Plan

Apart from explaining the lateral arcs, highlighting the biangoli also helps us reconstruct earlier planning phases, when the church was developed in relation to the site. The first surviving draft of the monastery, Alb. 171, shows the plot destined for the church measuring approximately 65×82 palmi. The incipient and barely visible idea (Figure 16) is a lobed rhombus, with the (east-west) longitudinal axis centered on the church quarter.[28] The angle of the diagonals is 62 degrees, which is close enough to 60 degrees to suggest that Borromini was constructing the plan around equilateral triangles from the very beginning. He needed to accommodate a sacristy, however, so the north lobe was blocked off for that purpose and the longitudinal axis shifted south about 6 palmi. The area that remains for the church measures 51×82 palmi. It is at this point that Borromini laterally compressed the church plan into a shape that approximates its eventual form (Figure 17). The transverse axis in the second scheme of Alb. 171 measures 44.5 palmi, and the length, 77.5 palmi, a ratio of almost exactly 1:√3. At this stage the biangolo does no more than establish proportions: it contributes nothing to the shape, for in squashing the initial lobed cross

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Figure 13 View into San Carlo's cornice and dome (photo by Fabio Barry)

Borromini has arrived at a flat-walled form in the side chapels.

The second scheme of Alb. 171 is a tight fit and unresolved. The solution is Alb. 172 (Figure 18), in which Borromini made the church smaller still. He reduced the semicircular apses from 25 to 20 palmi in diameter. He also pinched the diagonal bays, drawing in the four central columns so that they now stand as corners on a 34-palmi-sided square (see Figure 8); 34 palmi will also become the nominal height of the engaged columns, thus creating a cubic volume in the church center.[29] Finally, and crucially for the present argument, the curvature of a biangolo was set into the lateral arms, while the diagonal piers were straightened onto the sides of equilateral triangles created by a larger

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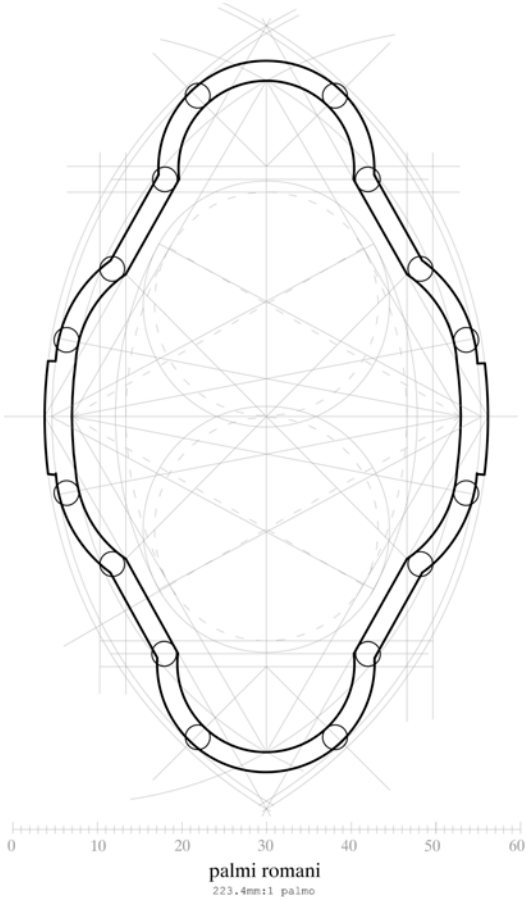

Figure 14 Author's reconstruction of San Carlo's plan

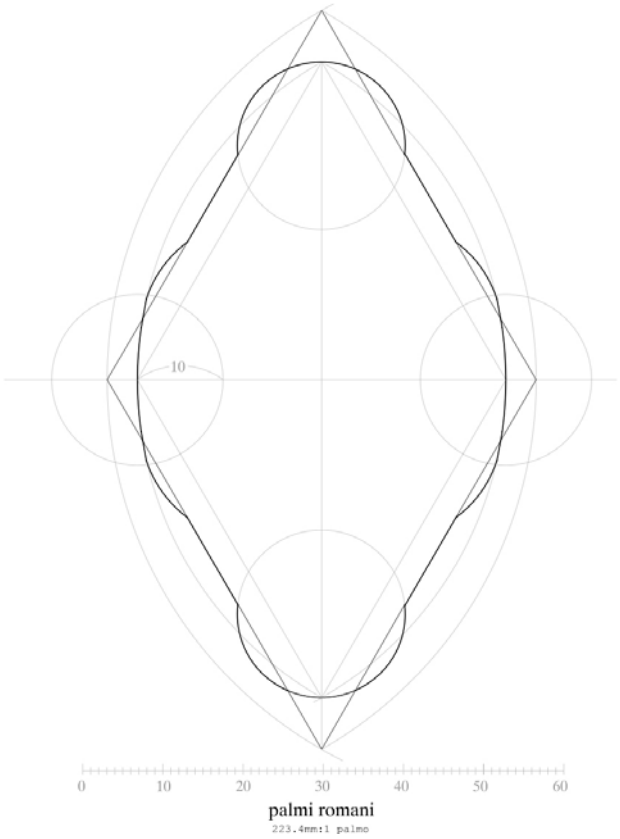

Figure 15 Author's hypothetical reconstruction of San Carlo's plan, showing inner biangolo, 44.5 palmi wide, and outer biangolo, 50.5 palmi wide

biangolo (see Figure 15). In so doing, Borromini reclaimed the lobed rhombus-cross, which had in fact been his first idea (see Figure 16).

This would be the definitive solution, but still there was not enough room, so Borromini shortened the length of the church by about 3 palmi, which results in a squatter proportion than 1:√3.[30] Two drawings, however, demonstrate that Borromini cherished this ratio: first, the *Relatione* plan (see Figure 5), which isolates the church from the constraints of the plot and shows the dimensions as originally planned, with the inner line axes approximately 44.5 × 77 palmi = 1:√3; second, Alb. 173 (Figure 19), in which he reinstated the exact biangolo proportion missing from the built version, but only by shrinking the size of the church nearly 10 percent to fit the site.[31]

Practical Significance

The biangolo results from Euclid's first proposition in the *Elements*. It was fundamental to practical geometry and in fact provides the template for the arch throughout Gothic architecture. It appears as a frontispiece in surveying manuals of the type that Borromini would have studied, and Vincenzo Scamozzi made the interlocked circles the center of the tableau of geometry in his *L'idea dell'architettura universale*.[32] It was the beginning of things, as Cesare Cesariano had explained a century earlier: "Because from these [interlocked circles] almost all the ends of geometrical propositions and figures can be demonstrated, distinguished, and manipulated. The most expert geometers know how to do this. For one can derive every body from the circle; then within it the square and the equilateral triangles with its proper figures."[33]

At San Carlino and in his later work, Borromini regularly mapped out spaces to the ratio of 1:√3 and, on at least one occasion, sketched the biangolo that generated it.[34] Thus, on the original plan for the convent (see Figure 1), he proportioned both the refectory and the courtyard arcade to the dimensions of 1:√3. This proportion would govern the elevation as well: the annotations on the *Relatione* plan indicate that the interior height from pavement to lantern ceiling is 131 palmi, which when related to the length of

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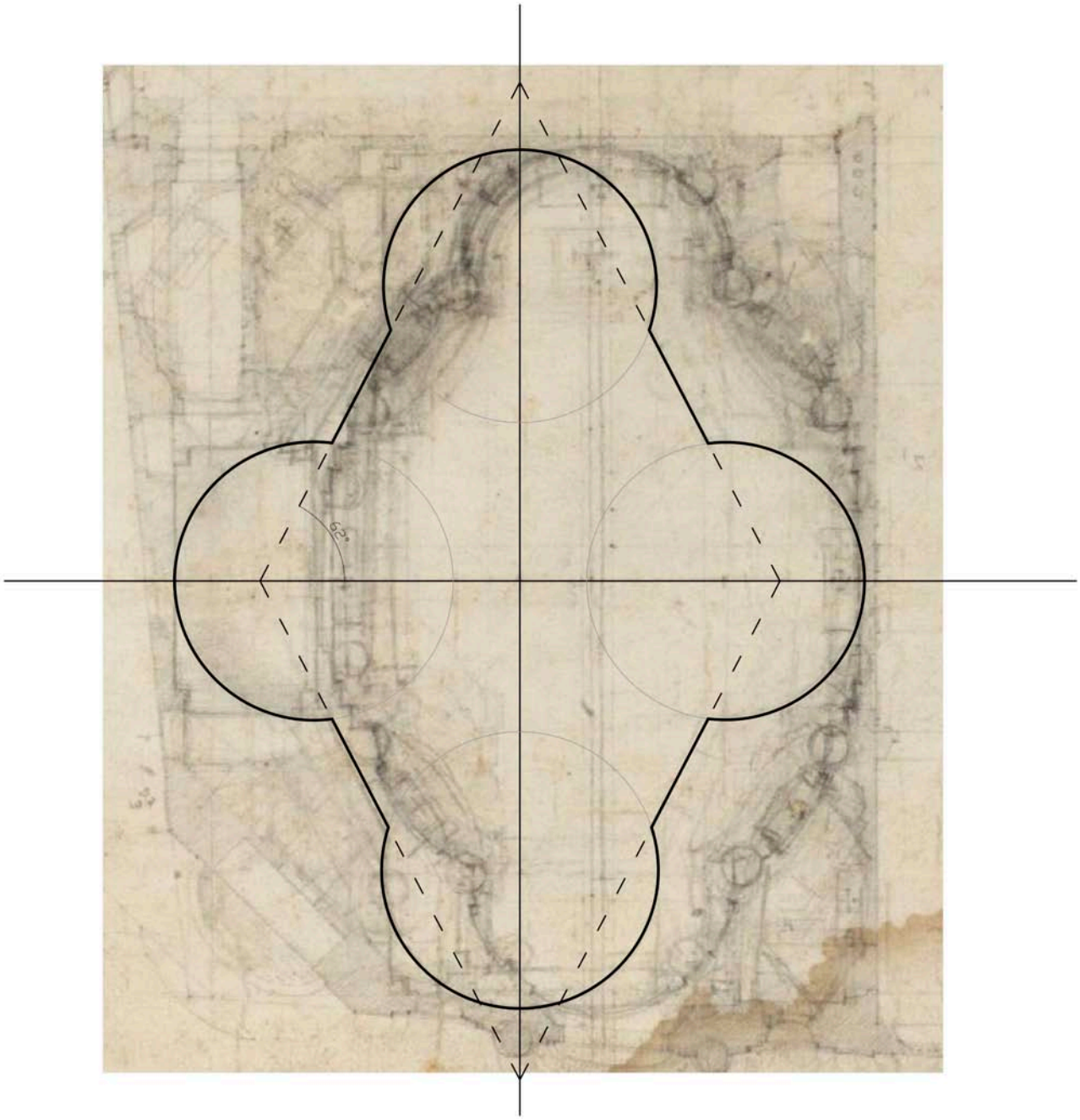

Figure 16 Author's reconstruction of first scheme in Az. Rom. 171

the church described in the same drawing produces a ratio close to 1:√3. Moreover, √3 fits over the façade (minus the crowning balustrade), where the transverse axis is measured at the entablature cornice.[35] When Borromini took over the scheme for the Oratory and Apartments of the Filippini in 1637, he reproportioned the existing plan for the oratory as a precise √3 rectangle, inscribing two equilateral triangles onto the hall (Alb. 283).[36] In the final proposal for the Collegio di Propaganda Fide of 1660, Borromini proportioned the nave of the Church of the Re Magi 1:√3, before adjusting the space to the fatter dimensions of approximately 1:1.6.[37] Moreover, the high altar chapel in the Re Magi was also constructed using the biangolo, this time perpendicular to the nave; the sacristy beside it was likewise proportioned 1:√3. Finally, although this is not an exhaustive list, Borromini laid out the Collegio's formal garden on a rectangular

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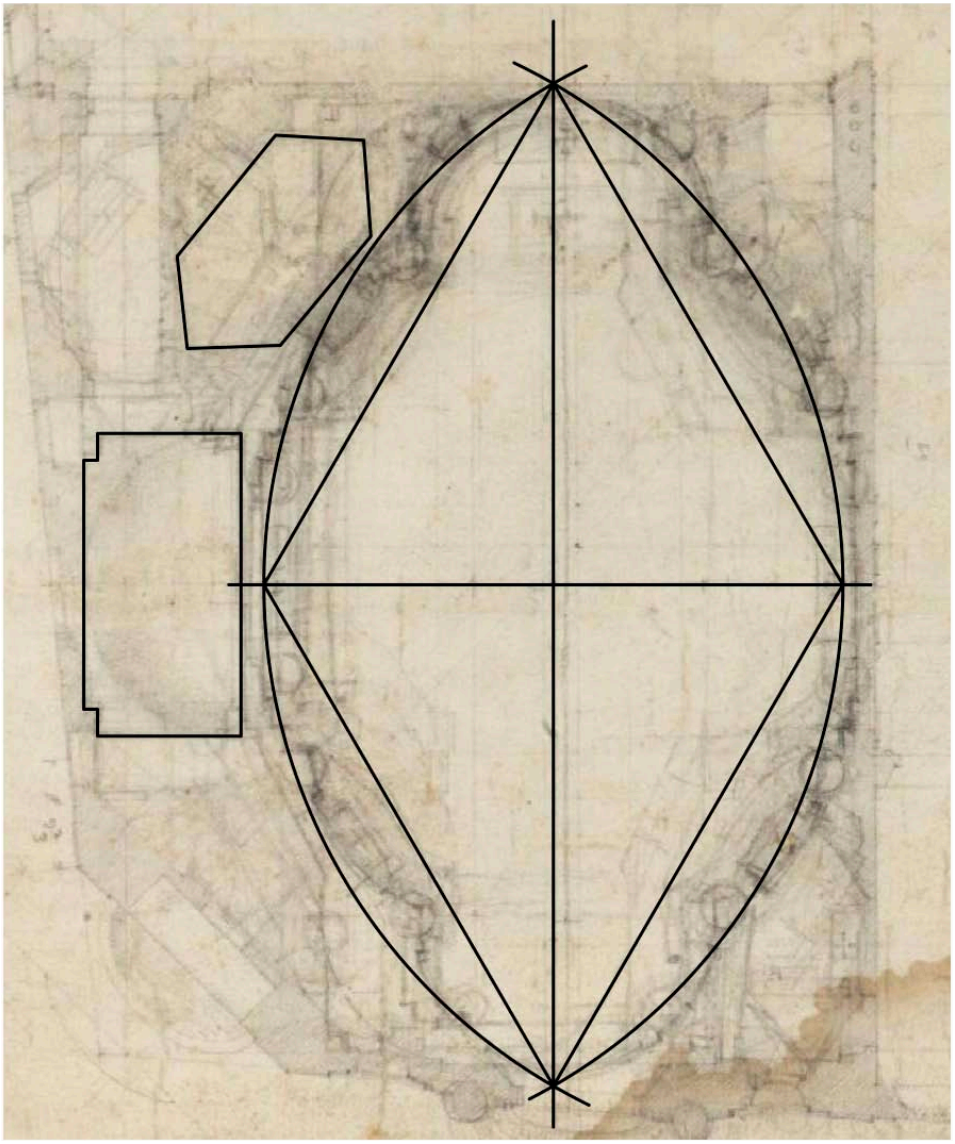

Figure 17 Biangolo and the second scheme in Az. Rom. 171 (author's drawing)

plot proportioned 1:√3; a smaller biangolo even provides the curvature of the corner sections of the garden beds, just as the biangolo lends its curves to the lateral chapels of San Carlino.

At San Carlino, Borromini used the biangolo's dimensions to adapt a lobed rhombus to the awkward site. Once established, he took further cues from the biangolo's form; hence the 60 degree diagonal piers and the curvature of the lateral chapels. The idea affected the size and orientation of other parts of the plan, right down to the chapels and exit corridors, all aligned to the axes bisecting the triangles at 45 degrees. Connors called the plan "a sacred theorem." One could also think of the plan as a puzzle. As the author of the *Relatione* explained, the defining problem of the commission was how to fit everything—church, cloister, apartments, and garden—on a small and irregular site, a problem repeated in compacted form with the church, which also required satellite spaces for sacristy, spiral stair, and two chapels.[38] The solution was provided by geometry, which allowed each part to flow from the other.[39] The visual appeal of the plans is important, for Borromini was clearly enthralled by the idea of spaces taut with constructional lines, as witnessed by the vibrant dialogue between geometry and minor details in the 1660s drawings, when all but the façade had been built.[40]

Symbolic Significance

While the biangolo sheds light on Borromini's design procedure, it is also significant for what it suggests about the

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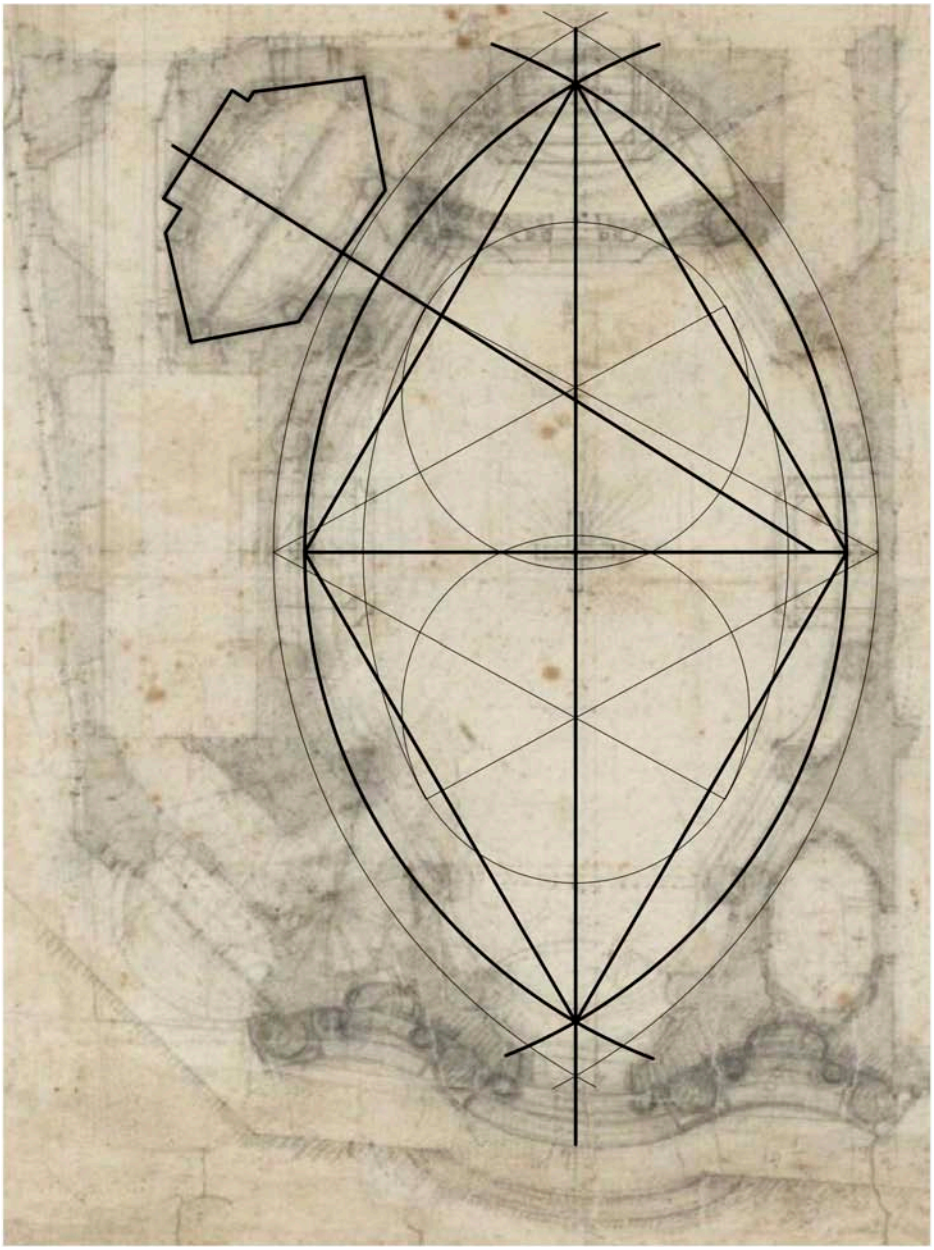

Figure 18 Biangolo over Az. Rom. 172 (author's drawing)

symbolic potential of his geometry. As the purpose of Euclid's first proposition is to prove the construction of an equilateral triangle, the presence of the form supports the interpretation that San Carlino was conceived as a triune instantiation of the Trinity, a dedication that Borromini had reaffirmed when he inscribed the Trinitarian cross at the center of Alb. 172.[41] Moreover, the *Scutum Fidei* ("Shield of Faith"), a pan-European emblem of the Trinity since the thirteenth century, was an abstraction from a biangolo formed from not two but three circles.[42] Indeed, three interlocked circles feature in San Carlino as a stucco relief on the lavabo niche, in the wrought iron *portalumi* installed at the base of the dome, as well as the trefoil cusps in ironwork on the chapel doors.

The biangolo is also the shape of the *mandorla* ("almond"), the auric vessel and window into heaven that had become a ubiquitous ideogram in Christian art from at least the ninth century, when its original shield shape had been made geometrical using, again, Euclid's first proposition. The knowledge that this figure was the overlap between two intersecting circles only fueled the symbolism that it could merge heaven and earth, divine and human, especially when it framed the dual nature of Christ. As a framing device, the mandorla could mutate into a

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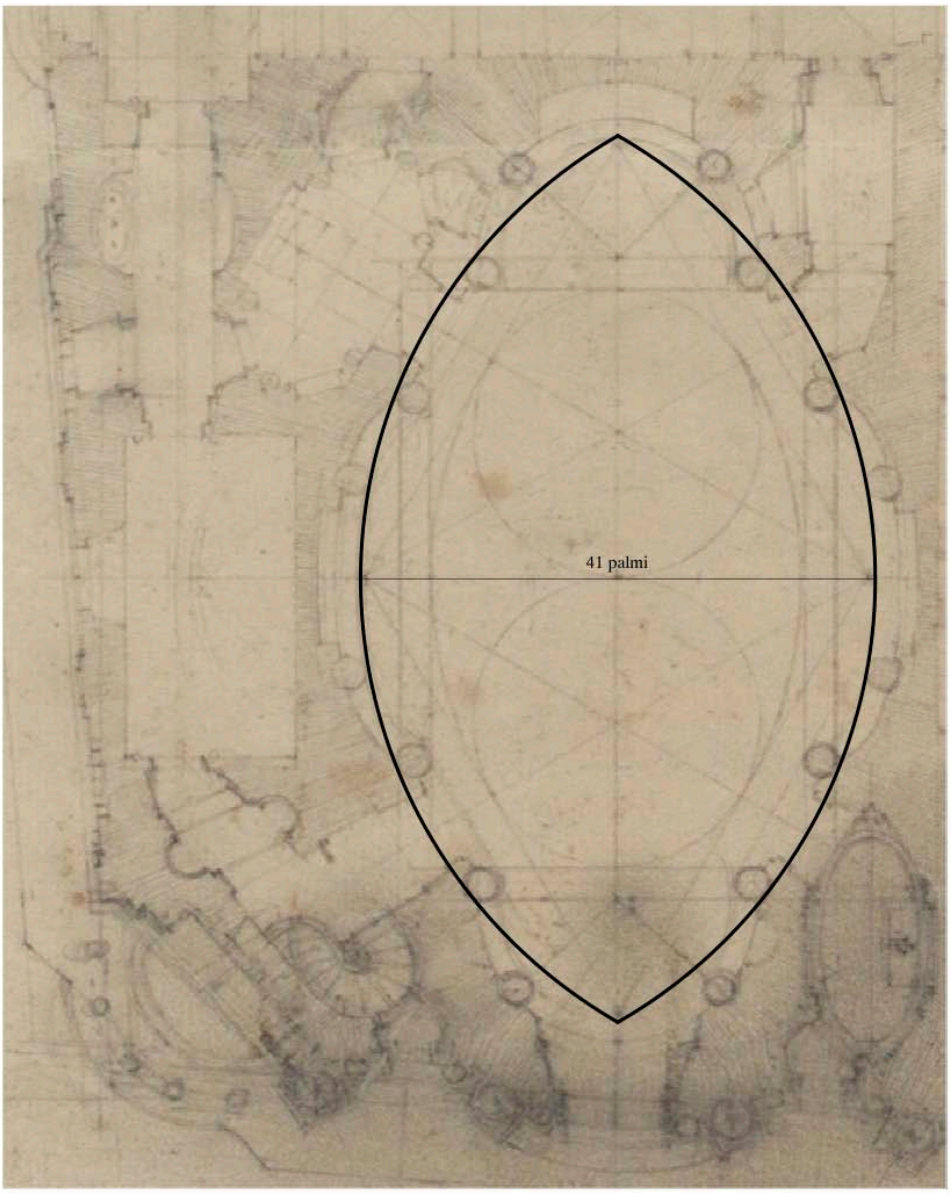

Figure 19 Biangolo over Az. Rom. 173 (author's drawing)

variety of shapes, often becoming lobed like a quatrefoil, as we see in contemporary stucco decorations, such as that enclosing God the Father in Borromini's Santa Lucia in Selci, and, closer to home, framing the Trinitarian cross atop the high altar frame and formerly above the internal entrance in San Carlino itself (discussed later). The lobed mandorla also entailed without contradiction the lobed rhombus, the form of Borromini's very first plan for San Carlino and one reclaimed to an extent in the definitive version. Such a figure could stand for the *tetragonus mundus* ("four-cornered world"), an ideogram of the fourfold macro/microcosm, with its four elements, four humors, four seasons, four Evangelists, and so on, united by the rhomboidal world and sanctified by the rota of Christ (Figure 20).[43] San Carlino as lobed rhombus makes the Trinitarian Greek Cross framed within the four-foiled mardorla doubly meaningful.[44]

When Borromini redrew the plans for publication in the 1660s, he installed the two-triangled rhombus, not the biangolo, as the central diagram of the plan. The one, however, does not exclude the other. The rhombus had also become diagrammatic of the Trinity, in the shape of the "Throne of Mercy" (or *Gnadenstuhl*), where the arms and legs of the crucified Christ make a downward pointing triangle, matched by the upward pointing one of God the Father standing with outstretched arms behind (Figures 21 and 22): the rhombus thus envelopes a mirrored T, the opening letter of the prayer "Te igitur."[45] A later variant,

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Figure 20 Christ as Geometer, illustration of Genesis 1:1, 1252–70 (Cathedral Museum, Toledo, Spain)

the *Not Gottes*, appears in the fourteenth century; it shows the Father supporting the dead Son, still maintained in rhomboidal triangulation (Figure 23). Both the *Gnadenstuhl* and the *Not Gottes* can be set within a mandorla, whether it is a heraldic frame or the curved parting of a seraphic cloud—a self-reflexive revelation in that the biangolo-devised mandorla displays a figure of the Trinity that is structured according to the geometry of the biangolo.[46] At San Carlino, Borromini began with a lobed rhombus, generated around √3; the proportioning and then curve of the biangolo transfigured the plan into a shape at once architectural and symbolic, as the fourfold orientation of design was fused with the epiphanic representation of the Trinity.

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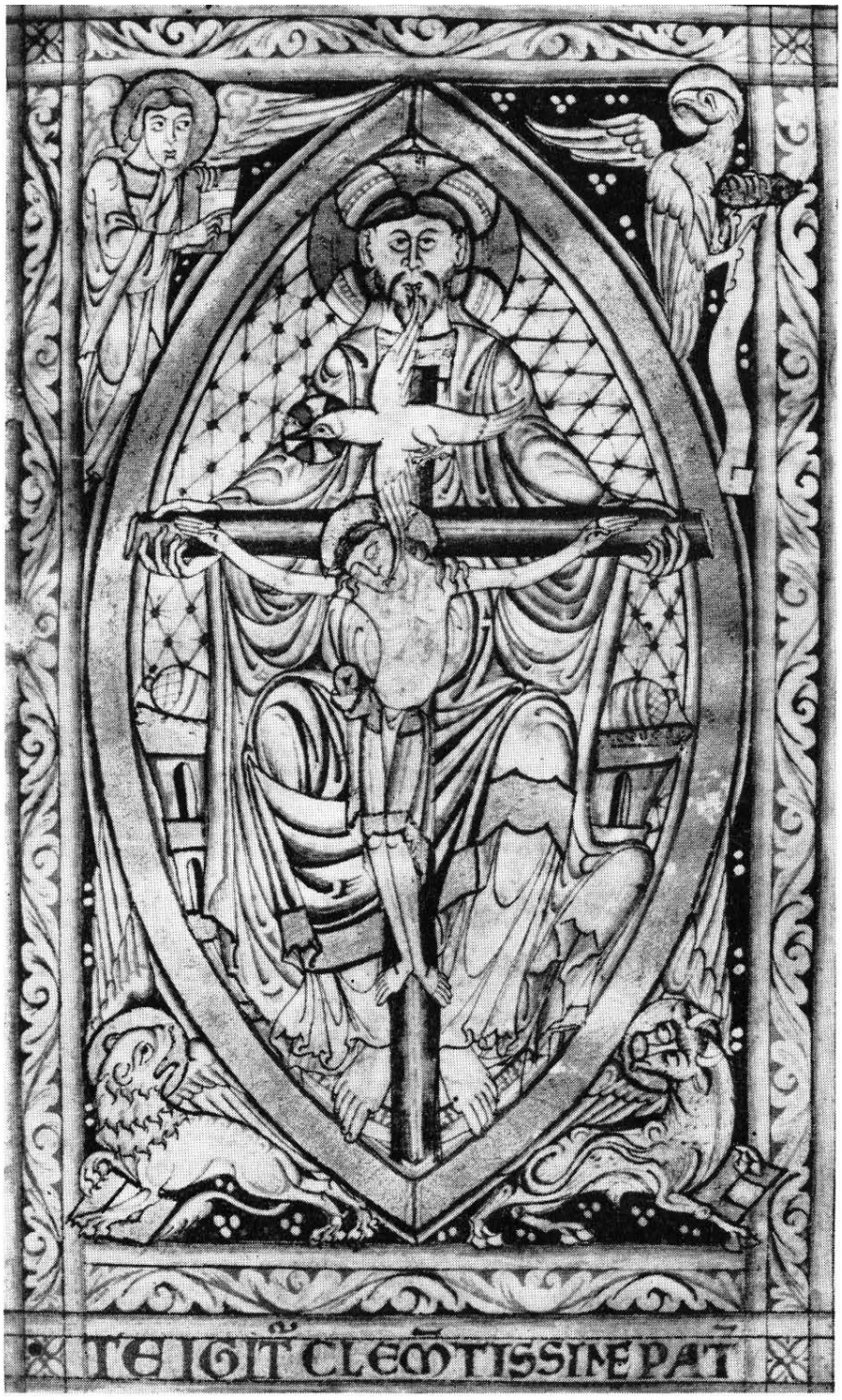

Figure 21 "Te igitur" with *Gnadenstuhl*Trinity, missal, ca. 1120 (Cambrai Biblio Municipale, MS 234 fol. 2r, Westminster School)

The Altarpieces and Other Images

In this light, it is worth considering the representation of the Trinity in San Carlino's high altarpieces.[47] Orazio Borgianni painted the first for the original Trinitarian convent in 1612, dedicated to San Carlo Borromeo, canonized only two years before (Figure 24).[48] Borromeo is shown adoring a *Not Gottes*, momentarily unsecreted from the dark, recalling the definition in the Roman Catechism of "a mysterious truth … deeply hidden in that inaccessible light in which God dwells."[49] Borromeo's body faces the viewer, while he turns to look over his shoulder at a mystery to which only

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Figure 22 *Gnadenstuhl*, engraving of "Trinus et unus" emblem of the Confraternity SS. Trinità dei Pellegrini, ca. 1620s (in *Roma Sancta: La città delle basiliche*, ed. M. Fagiolo and M. L. Madonna [Rome: Gangemi, 1985], 85)

the saints were witness.[50] His forearms are set not in the normal half-open gesture of revelation but parallel, so that the hand on his heart is angled in the direction of the Trinity, while the other acts as conduit for the light that emanates from the lantern-like Dove above God's head, running down Borromeo's shoulder, across the top of his index finger, to spill at his feet on the ground. Behind the saint stands an antique relief of the marriage of Peleus and Thetis, counterpoint to the betrothal of Borromeo's soul with the Trinity; in front is a Composite capital of unknown provenance, capped like abaci by two unidentified but surely sacred books—the remnant of antiquity awaiting reintegration under the sign of the cross.[51] Heavenly and earthly zones are linked by the upright body of the saint, a model of the effectuation of sacred ideals within the material world.

When Borromini began his commission to replace the original convent, Borgianni's altarpiece was a major visual datum of corporate identity. According to Fra Juan's *Relatione*,

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Figure 23 Lucas Cranach, *Not Gottes* Trinity, ca. 1520s (Museum der Bildenden Künste, Leipzig)

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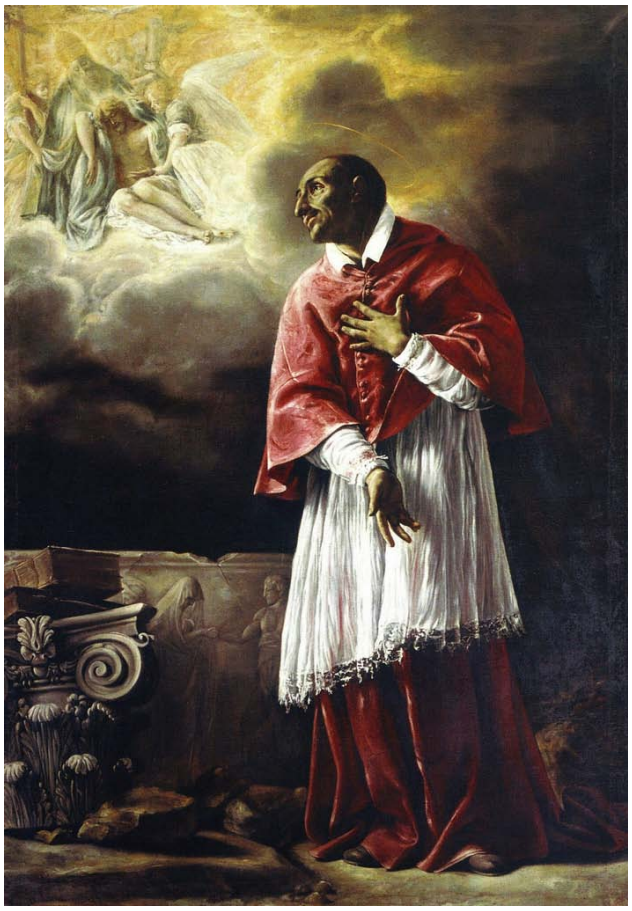

Figure 24 Orazio Borgianni, *San Carlo Borromeo Adoring the Trinity*, 1612 (San Carlo alle Quattro Fontane, Rome; photo: Atlante dell'arte italiana)

Figure 25 Anonymous, Fra Juan de la Anunciación, mid-seventeenth century (Convent of San Carlo alle Quattro Fontane, Rome)

Pope Paul V had a personal devotion to Borromeo, and it was he who insisted that the newly ratified Roman branch of the Spanish Trinitarians take the Milanese bishop as their dedicatee.[52] In fact, Borromeo was also a role model for Borromini, who likewise dressed in a Spanish style and changed his name after 1628 from Castelli to one that alliterated with the Milanese saint.[53] In that Borromini regarded Borromeo as his spiritual patron, might he not also have taken from the high altarpiece a commitment to transmit Borromeo's epiphany to the faithful and build a church in the Trinity's honor? Borgianni's Composite capital is surely a symbol of architecture in general and the church in particular, and it can be no coincidence that Borromini chose the same order for San Carlino's interior.[54]

Of course, Borromini was not the only one driving the project; the cothematic director was the procurator general of the congregation, Fra Juan de la Anunciación (1595–1644). It was due to Fra Juan's zeal that the dedication for the new convent had doubled to include the Holy Trinity, no longer merely implied by the name of the sponsoring congregation, the Trinitarians.[55] But such rededication did not efface Borromeo's legacy, as Fra Juan too remained true to the saint: in an anonymous posthumous portrait (Figure 25), Fra Juan is shown admiring a generic plan of San Carlino, while pointing with his left hand at a small image of a cardinal adoring a crucifix—a cardinal who, judging from the beaky nose and bald pate, is none other than Borromeo.[56]

Pierre Mignard painted the replacement altarpiece around 1645, with an iconography duly broadened to the changed circumstance (Figure 26).[57] The painting is curved and difficult to see, and some description is in order. Saints Carlo, Jean de Matha, and Felice di Valois are depicted celebrating at an open-air altar, adorned with a bishop's miter, two candelabra, and a crucifix. Roman ruins are scattered in the distance. Borromeo stands on the third altar step, the other two on the paved floor. From behind, a standard-bearing angel strides toward the three saints, heralding the

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Figure 26 Pierre Mignard, *Adoration of the Trinity*, ca. 1645, high altar, San Carlo alle Quattro Fontane, Rome (photo source: Wiki Commons)

appearance of the Trinity, staged on a seraphim-borne cloud. As in the first altarpiece, the Trinity remains a *Not Gottes*, but is now centered and enlarged to the scale of the human figures below; not distant and ethereal, but immediate and realized. Christ is laid out in the shape of a church plan, the transverse axis being suggested by outstretched arms bent at elbows and wrists. The attitude of Borromeo is opened, so that the Trinitarian vision fills him like a vessel, while his upturned hands seem ready to receive it if it were handed down. It is now the role of SS. Jean and Felice, as founders of the Trinitarians, to gesture toward the ground and to the congregation beyond the painting.

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Figure 27 Plan of the original paintings in San Carlo alle Quattro Fontane, Rome. Side altarpieces by Domenico Cerrini, 1643: left, the Holy Family with St. Catherine of Alexandria and St. Agnes; right, St. Ursula holding a flag bearing the Trinitarian cross (photos of Cerrini paintings: Convent of San Carlo alle Quattro Fontane)

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Figure 28 Pierre Mignard, *Annunciation* (partially destroyed), 1641, internal façade, San Carlo alle Quattro Fontane, Rome (photo source: Wiki Commons)

Mignard's high altarpiece is a key element of the project to build a church dedicated to the Trinity, witnessed by Borromeo, and offered to the world by the founders of the institution established in its honor. To this end one must imagine that Mignard and Borromini worked together (they remained friends thereafter), for the painting had to take its place in a preexisting and planned ensemble of decorative and figurative symbolic parts. The red and blue of the Trinitarian cross provided the chromatic notes for Mignard's central axis, as they did for the schemes of the lateral altarpieces by Domenico Cerrini, installed in 1643 but sadly replaced in the nineteenth century, when they were removed to the convent (Figure 27). Moreover, Mignard's configuration of saints would be announced by the sculpture on the façade, where the central figure of an adorant Borromeo is framed by Matha and Felice, both oriented to the direction of the incoming churchgoer.[58]

Mignard's altarpiece also beckoned to an *Annunciation* he had already executed for San Carlino's internal façade in 1641 (Figure 28). The oval fresco was partly destroyed in 1855 following the installation of an organ, at great cost to the church's symbolism, because the painting, dear to Borromini himself, activated the interior as a room framed by the conception and death of Christ.[59] Moreover, the *Annunciation* related not just to the dead Christ but also to the larger persona of the Trinity, which according to tradition was the sovereign celestial committee that resolved to incarnate the Son, commanding Gabriel to take the message to Mary; hence the Annunciation. In fact, the Roman Catechism refers to the persons of the Trinity as the "authors of this mystery."[60] In this sense the Trinity precedes the Annunciation, and the end (Crucifixion-Trinity) becomes the beginning (Trinity as generator of Incarnation). What little survives of the painting suggests that Mignard related the altarpiece to his earlier painting, which has Gabriel kneeling on a cloud, just as a nebulous structure will platform the Trinity over the altar; moreover, the now-vanished annunciating Dove would surely have been just above the level of

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the cornice that breaks across the oval, which is the position the Dove occupies in the altar painting. There is a call and answer that is doubled back on itself: between the commitment and enactment of Incarnation, between the beginning and end of the Word made flesh—the body of Christ. And the theater of this provocation is the church itself, which thereby assumes the condition of embodied pictorial space. Meanwhile, Mignard's high altar suggests the idea of figurative architecture, perhaps an allegory of San Carlino itself. While the dove is moved back into its traditional pictorial location between God and Son, in its scale and foreshortening it is perpendicular to Christ's stomach, centered over his body like a lantern, just as the triangulated dove on San Carlino's lantern hovers over the mystic body of the church (Figure 29).[61]

Figure 29 Lantern of San Carlo alle Quattro Fontane, Rome (photo by Giovanni Dall'Orto, Wiki Commons)

Trinitarian Devotion

I began by noting that the central arcs of the lateral chapels are segments of a biangolo, a form that also established the church's proportional structure of 1:√3. Borromini often used the ratio when laying out plans. Yet at San Carlino the device was more than a convenience, for the image of the church evokes the epiphanic vision of the biangolo as mandorla, a vision embedded in the emblematic structure of the Trinity. According to the altarpiece painters, Borromeo had this vision of the Trinity, and it was in honor of these two sacred names that Borromini dedicated his design. Practical and symbolic geometry interconnect in the staging of devotion to the Trinity.

Notes

1. All dimensions are in palmi romani; 1 palmo = 223.4 mm. Citation of drawings as Alb. 171, 172, etc., refers to the Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. I would like to thank Peter Carl for his comments on an early version of the article, and Lucy Vader, who turned my drawings into computer-animated designs. I owe a special debt of gratitude to Fabio Barry, who engaged with the text from beginning to end.

The sequence of construction on the monastery, as testified by the 1650 account written by the prior of San Carlo, is as follows: dormitory 6 July 1634, completed August 1635; cloister began February 1635, finishing June 1636; church began 23 February 1638, consecrated on 26 May, 1641: Fra Juan de San Buenaventura, *Relatione del Convento di San Carlo alle Quattro Fontane* (ca. 1650), ed. J. M. M. Garcia (Rome: Polifilo, 1999), 59–60. The lower part of the curved façade was built 1665–67; Borromini's nephew, Bernardo Castelli, added the upper level in 1665–77.

2. The categorization of San Carlino's space as ovular began in Borromini's own day and continued among the majority of the formative art historians. See the review of the critical history by Paolo Portoghesi, *Storia di San Carlino alle Quattro Fontane* (Rome: Newton and Compton, 2001), 149–71. The "medieval Borromini" is discussed in Rudolf Wittkower, *Gothic versus Classic: Architectural Projects in Seventeenth-Century Italy* (London: Thames and Hudson, 1974), 90. On Borromini and the new science, see, e.g., Anthony Blunt, *Borromini* (London: Allen Lane, 1979), 47–49; Michele Simona, "Le geometrie del Borromini," in *Il giovane Borromini: Dagli esordi a San Carlo alle Quattro Fontane*, ed. M. Kahn-Rossi and M. Franciolli (Milan: Skira, 1999), 453–54; and Connors, "Un teorema sacro: San Carlo alle Quattro Fontane," in ibid., 469.

3. Leo Steinberg, "Borromini's San Carlo alle Quattro Fontane: A Study in Multiple Form and Architectural Symbolism" (PhD diss., New York University, Institute of Fine Arts, 1960). Although widely known, it was not published until 1977 (New York: Garland). In this connection, see Joseph Connors's review of Steinberg in *JSAH* 38, no. 3 (1979), 283–85.

4. Steinberg, *Borromini's San Carlo*, 73–94. Eberhard Hempel, *Francesco Borromini* (Vienna: Kunstverlag, 1924), 38–41, published the anonymous oval plans Alb. 165, 166, and 167, as Borromini's early ideas for San Carlino, which were major errors (see Steinberg, *Borromini's San Carlo*, 72).

5. Steinberg, *Borromini's San Carlo*, 89.

6. Ibid., 91–93.

7. Joseph Connors advanced the idea in his review of Steinberg in *JSAH* (284) and then in numerous articles; see, e.g., "A Copy of S. Carlo alle Quattro Fontane in Gubbio," *Burlington Magazine* 137 (1995), 590. Connors fully

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spelled out the relationship of Borromini and the printmaker Domenico Barrière in his introduction to Borromini's *Opus architectonicum* (Milan: Polifio, 1998), lvii. Connors hardened his view in a catalog essay on San Carlo: "Questi disegni geometrici [Alb. 168–70, 173, 175–77] sono spesso stati identificati come progetti per la chiesa, ma in realtà sono stati eseguiti oltre venti'anni dopo e tendono a idealizzare quanto costruito …": Joseph Connors, in *Borromini e l'universo barocco*, ed. R. Bösel and C. Frommel (Milan: Electa, 2000), 2:110. Connors's view was seconded by Martin Raspe: "The Final Problem: Borromini's Failed Publication Project and His Suicide," *Annali di architettura* 13 (2001), 135n15.

8. Connors, in Bösel and Frommel, *Borromini e l'universo barocco*, 2:118–19. There remains much that is unresolved in Alb. 172; for example, the side altar exedrae are only partially indicated and the placement of columns is unclear. There are also false paths, such as segmental steps to the high altar.

9. The widespread curiosity in Borromini's design is reported by Fra Juan, *Relatione del Convento*, 56.

10. Elsewhere, Connors describes Borromini's geometry as a "movable template": "S. Ivo alla Sapienza: The first three minutes," *JSAH* 55 no.1 (1996), 44.

11. Federico Bellini, *Le cupole di Borromini: La "scientia" costruttiva in età barocca* (Milan: Electa, 2004), 139–47.

12. Ibid., 145.

13. Ibid., 141.

14. Julia Smyth-Pinney, "Borromini's Plans for Sant'Ivo alla Sapienza," *JSAH* 59, no. 3 (2000), 312–37. The context being that Borromini was attempting to secure funding from Alexander VII to complete the upper reaches of the church.

15. Paolo Portoghesi, while accepting that Alb. 173 was done after the fact, is confident that it reveals both the logic of the plan and the triangulated heart of the church as a whole: Portoghesi, *Storia di San Carlino alle Quattro Fontane* (Rome: Newton and Compton, 2001), 121.

16. On the destroyed drawings, see Raspe, "The Final Problem," 131.

17. My reconstruction of the oval in Alb. 172 (see Figure 8) is slightly smaller than Bellini's (*Le cupole di Borromini*, 132–33).

18. Fra Juan, *Relatione del Convento*, 76.

19. Bellini, *Le cupole di Borromini*, 142. Bellini also claims (145) that the faint geometry on the sheet for the subterranean church (Alb. 180) is misleading because it feigns to position center points within two equilateral triangles, which if they were used as foci would result in circles that, while touching on the shared baseline, expand outside the diagonals, not flush within them. However, the axes controlling the secondary spaces are not the bisecting lines of the triangles drawn on the sheet, which sit within an unbroken and slightly smaller linear idealization (42 palmi in width) of the plan shape; instead they are those of larger undrawn triangles, whose apices are also indicated a further 1 palmi along the transverse axis, thus corresponding to the 44-palmi width of the actual plan. Within these triangles, with compass points placed on the intersections of the aforementioned diagonal axes, circles can indeed be inscribed. If this drawing were dated to 1638, which Connors proposes (Bösel and Frommel, *Borromini e l'universo barocco*, 2:125), but which Bellini disputes (*Le cupole di Borromini*, 154n67), it would itself reaffirm the fundamental importance of geometry at the earliest stages.

20. On the south side is the altar of Sant'Agnese, housing the relics of SS. Claudio and Maximo; on the north, the altar of Sant'Ursula, with the relics of San Theodulo: Fra Juan, *Relatione del Convento*, 82.

21. Steinberg's reading is intriguing but inaccurate: "[San Carlo's plan] is a four-segment oval like that of the dome, but on longer extension. Accordingly, the church is an oval indeed, but a periodic oval, an oval with interruptions" (150). Steinberg had earlier suggested that the lateral chapels were drawn freehand (89). George Hersey calls the supposed encompassing oval an ellipse, no doubt in reference to Kepler: *Architecture and Geometry in the Age of the Baroque* (Chicago: University of Chicago Press, 2000), 141.

22. "… dont les flancs sont deux portions d'ovale dans lesquelles sont deux autels, couronné par-dessus la corniche de deux frontons qui tournent comme l'ovale. Le fond, où est le grand autel, et l'entrée vis-à-vis, sont deux portions de cercle couronnés de frontons." Marquis De Seignelay, *Diary*, quoted in Steinberg, *Borromini's San Carlo*, 40. Hans Sedlmayr, *Die Architektur Borrominis* (Berlin, 1930), quoted in Italian in Portoghesi, *Storia di San Carlino*, 155. Connors, "Un teorema sacro," 469; Portoghesi, *Storia di San Carlino*, 121; Bellini, *Le cupole di Borromini*, 130. Eusebio Alonso García, *San Carlino: La máquina geométrica de Borromini* (Valladolid: University of Valladolid, 2003), 202.

23. Annotation on Alb. 208r, a sheet examining different solutions for the chapel coffering: see Connors, in Bösel and Frommel, *Borromini e l'universo barocco*, 2:124.

24. Filippo Juvarra showed the biangolo cell in his itinerary of figures, *Appunti di geometria* (ca. 1709), in Salvatore Boscarino, *Juvarra architetto* (Rome: Officina Edizioni, 1973), plate 79. The term *vesica pisces* (fish bladder) did not enter the architect's vocabulary until the nineteenth century, and that mainly in English (the *Oxford English Dictionary* notes the first use in 1809). On the identity of the biangolo as vescia pisces, see Ray Lawler, *Sacred Geometry: Philosophy and Practice* (London: Thames and Hudson, 1982), 33–35. The suggestion here advanced regarding the biangolo has some similarities to Amelio Fara's thesis that the plan is organized along the lines of a pentagon constructed via interlocked circles, derived from Albrecht Dürer and Galileo: Fara, "Geometrie della fortificazione e architettura da Borromini a Guarini," *Mitteilungen des Kunsthistorischen Institutes in Florenz*, 43:102–13. However, Fara does not align the curvature of the lateral chapels to the interlocked circles, and his scheme is compromised by a reliance on Giannini's eighteenth-century engraving.

25. The columns are 2.7 palmi in diameter. The height of the sub-pendentive wall zone is 44.5 palmi (the same as the transverse axis!), and the column height is 34 palmi. Given that authorities (e.g., Vincenzo Scamozzi, *L'idea dell'architettura universale* [Venice, 1615], part 2, book 6, 6) recommended for the Composite order a 1:8 ratio of column width to column and 1:12 ratio for the entire order (column plus entablature), a column proportioned to a width of 2.7 palmi should result in a height of 22 palmi, which would force the entablature to an extraordinary height to make up the remains; alternatively, the column should be closer to 4 palmi in width, which would have been a disaster for the intercolumniation. Instead, Borromini raised extremely attenuated columns, with a width-to-height ratio of approximately 1:12.5 for the column and 1:16 for the entire order. See Connors, "S. Ivo alla Sapienza: The First Three Minutes," *JSAH* 55, no. 1 (1996), 45, for a similar problem in Sant'Ivo.

26. According to Paolo Degni's measured plan, the transverse axis from one altar exedra to the other is 11,300 mm (50.6 palmi): appendix to *La fabrica di San Carlino alle Quattro Fontane: Gli anni del restauro* (Rome: Bollettino d'arte speciale, 2007). References to built dimensions in the text are based on Degni's plan, combined with the author's tape measurements.

27. A detailed written description of the operations in Figures 11, 12, and 14 would be too tedious for the main text, but may be summarized here. (1) Establish scale and transverse axis, set the compass to around 44.5 palmi, draw biangolo and longitudinal axis (Figure 11A); (2) bisect arcs for diagonal axes; inscribe base-to-base equilateral triangles (Figure 11B); (3) within resulting diamond, construct an oval (Figure 11C) (the oval in Alb. 172 expands outside the diamond); (4) inscribe a rectangle tangential to oval and another parallel to it, by a width midway between broad segment of the oval and point of the diamond, namely, 3 palmi (Figure 11C); (5) set semicircular

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apses with 10-palmi radius on the long axis (Figure 11D; this varies from plan to plan: in Alb. 172, the semicircles are slightly beyond the apices of the triangles; in Alb. 173, etc., they are made to coordinate); (6) rule diagonals, extracted from a larger rhombus set within an approximately 50.5-palmi-wide biangolo (Figures 11D and 12); (7) complete plan with spiral curves to the lateral segments of the biangolo (Figure 12); (8) second biangolo, 5 palmi wider than the first, to establish the outer track of the plan (Figure 14); (9) repeat steps 5, 6, and 7; (10) altar exedrae formed from segments of the 50.5-palmi biangolo described in step 6 (Figure 14); (11) sixteen 2.7 palmi width columns, in four groups to underscore the shallow-armed cross (Figure 14).

28. Connors identifies an earlier phase of small cruciform with convex walls ("Un teorema sacro," 466).

29. The height of the column from floor to abacus is approximately 38 palmi; however, deducting the plinth and measuring the column from the base arrives at 34 palmi.

30. The actual church from the cornice (the inner line on the plans) is 9,900 × 16,550 mm; that is, 44.3 × 74.1 palmi (or, 1:1.68): based on Degni, *La fabrica di San Carlino* and tape measurements made by the author.

31. On Alb. 173, the transverse axis of the inner line is 41 palmi; its length is 70 palmi, which is close to 1:√3. Alb. 173 does not have a scale, but one can be applied by comparing the relative position of the components in the other scaled drawings. A scale can also be inferred by taking into consideration the length of the site, 198 palmi (Fra Juan, *Relatione del Convento*, 51) relative to the plan's transverse axis. Steinberg, taking his measure from the sacristy, thought the site had been increased by 3 palmi. The undersizing of Alb. 173 was thus unnoticed by Steinberg, among others. In other drawings for San Carlo (Alb. 168, 170, 175–76), a different strategy of distortion was employed: Borromini maintained the actual size of the church, but lengthened the plot on which it stands by 10 palmi, with the consequence that the dormitory was shifted east and the garden diminished. Borromini also undersized Sant Ivo in postconstruction plans: Smyth Pinney, "Borromini's Plans for Sant'Ivo," 331–32, referring to Alb. 499 and 500.

32. Euclid, *Elements*, book 1, proposition 1; the surveying textbook, B. Ricchino, *Schemi geometrici per le lezioni di agrimensura* (Milan, Cast. Sforzesco, 1616), reproduced in Kahn-Rossi and Franciolli, *Il giovane Borromini*, 62; Scamozzi, *L'idea dell'architettura universale*, 32.

33. Cesare Cesariano, *Vitruvius: De architectura* (Como, 1521), 81. "Perche da questi etiam si po excipere quasi tutti li termini de le geometricae praepositione e figuratione e destinguerle e permutarle. Como sanno fare il periti geometri. Cum sia dal circulo ogni corpo si possa excipere: poi in esso il quadrato e il trigono aequilateri con le quale figure."

34. It is a side note that the biangolo could have helped Borromini calculate the perimeter of the plan, shedding light on an old theory, of eighteenth-century origin, that this quantity was identical to the diameter of St. Peter's dome, which thanks to Vasari was well known to be 186 palmi: Steinberg, *Borromini's San Carlo*, 44 and 404–5; Giorgio Vasari, *Le vite de' più eccellenti pittori, scultori e architettori*, ed. P. Barocchi (1568; Florence: SPES, 1987), 6:96 and 101. The legend is skewed by sloppy measurements, however. The oval dome of San Carlino is approximately 147 palmi in circumference, not 186 (the oval dome as it appears in Alb. 172 consists of two 120 degree circular segments with a diameter of 29 palmi, plus two approximately 60 degree segments with a diameter of 83 palmi; thus, 58π/3 + 166π/6 = 147.5). The source of the fable is an account for stucco, which mentions 186 palmi of "Ornamento sotto il gocciolat[oion]e della cornice principe della ch[ies]a f[att]a a stampa con rose": Oskar Pollak, *Die Kunsttätigkeit unter Urban VIII* (Vienna, 1928), 90, cited by Steinberg, *Borromini's San Carlo*, 45 The number 186 thus refers not to the perimeter of the oval dome but to the perimeter of San Carlino's cornice, which supports the entire domical zone of pendentives, arches, and the dome itself. If Borromini did want the church to match St. Peter's, then creating the perimeter to fit the number 186 would have required some method. A biangolo's length is easily calculated, being two-thirds the circumference of a circle (4rπ/3): one drawn with a radius of 44.3, the length of the transverse axis of the cornice as built, is 185.6 palmi!

35. Portoghesi (*La Storia di San Carlino*, 121–35) showed San Carlino overlaid with an triangular system derived from Cesariano's schematic for Milan cathedral, but he missed the concordance of 1:√3, thinking of triangulation only in terms of single triangles rather than the end-on-end ones produced by the biangolo. The proportion 1:√3 also governs the interior width (at the spring line of the dome) to height (pavement to lantern ceiling) at Sant'Ivo della Sapienza.

36. Another plan, Alb. 283, imagined the Oratory repositioned closer to the adjacent church, but again with the 1:√3 proportion.

37. The proportion of Re Magi's nave requires some interpretation. In Alb. 889, Borromini established the dimensions of the space on the central transverse axis, setting the compass to 40 palmi (the points where the compass was placed are visible), which intersects the longitudinal axis (with marks that also remain visible) to create a length of 69 palmi (40:69 = 1:1.72 [approx. √3]). The boundary of the space when converted to the rectangular shape of the nave was then made shorter and wider. The measurements 42 and 68.75 (1.1.64) are written on a secondary transverse axis and the longitudinal axis, respectively, but the final outline of the plan indicates that the length was further truncated to 66 palmi (42:66 = 1.1.6).

38. Fra Juan, *Relatione del Convento*, 19.

39. Borromini said to his confidant Virgilio Spada that the compass establishes a spatial logic by its very nature, "come in musica la bellezza delle fabriche … pretende nascer parimenti da numeri, e che tutte le parti habbino una tale proportione, che un [a sola] apertura di compasso—senza mai muomerlo—le misuri tutte." In H. Thelen, "Sui disegni di Borromini," in Bösel and Frommel, *Borromini e l'universo barocco*, 1:73. See also Portoghesi, *Storia di San Carlino*, 123, who connects Borromini's words to a passage in Cesariano.

40. Filippo Baldinucci, *Notizie dei professori del disegno* (Florence, 1681–28), 5:139; a French visitor to Rome in 1677 recalled that "luy faisait passer des nuits entières a ressuer sur quelque partie d'un nuoveau dessein": in H. Thelen, "Sui disegni di Borromini," in Bösel and Frommel, *Borromini e l'universo barocco*, 1:72.

41. Steinberg, *Borromini's San Carlo*, 287–331.

42. Wolfgang Braunfels, *Die heilige Dreifaltigkeit* (Düsseldorf: Verlag L. Schwann, 1954), 10. Since at least Joachim of Fiore (ca. 1135–1202), the diagram of three interlocking circles had been the geometry used to express that which exceeds all understanding: B. Obrist, "Le figure géométrique dans l'oeuvre de Joachim de Fiore," *Cahiers de civilisation medieval* 31 (1988), 297–321.

43. On the mandorla and *tetragonus mundus*, see Herbert Kessler, *The Illustrated Bibles from Tours* (Princeton, N.J.: Princeton University Press, 1977), 36–58; Madeline Caviness, "Images of Divine Order and the Third Mode of Seeing," *Gesta* 22, no. 2 (1983), 99–120, esp. 107.

44. Steinberg spotted the continuum from the Greek cross to the quatrefoil, thence the plan of San Carlino: "the four-lobed figure is unquestionably a modality of the Cross—at least at S. Carlo, where cross and quarterfoil continually pass into each other in emblems and ornaments." Steinberg, *Borromini's San Carlo*, 133.

45. The *Gnadenstuhl* was originally an illustration of the "Te igitur," the opening prayer of the canon of Mass, confirming Christ's presence in the Eucharist. On this and the *Not Gottes* Trinity, see Braunfels, *Die heilige Dreifaltigkeit*, 35–43. See also Gertrud Schiller, *Iconography of Christian Art*, trans.

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J. Seligman (London: Lund Humphries, 1972), 2:219–22; Jane Rosenthal, "Three Drawings in an Anglo-Saxon Pontifical: Anthropomorphic Trinity or Threefold Christ?," *Art Bulletin* 63, no. 4 (1981), 547–62; Carolyn M. Carty, "Albrecht Dürer's Adoration of the Trinity: A Reinterpretation," *Art Bulletin* 67, no. 1 (1985), 147; François Boespflug, "The Compassion of God the Father," *Cross Currents* 42, no. 4 (1992), 487–503; Barbara Newman, "Holy Trinity and Holy Family in the Late Middle Ages," *Religion and Literature* 31, no. 1 (1999), 84–85.

46. Change the word mandorla for corpus and another image is evoked, *Vierge Ouvrante* or Shrine Madonna, where the *Gnadenstuhl* is placed at the center of Mary's body: see Newman, "Holy Trinity and Holy Family," 86.

47. The iconography of Borgianni's and Mignard's paintings has been all but ignored by San Carlino's interpreters. Steinberg is an exception, but his reading is uncharacteristically mild: *Borromini's San Carlo*, 304–5. His main observation is that Borgianni's altarpiece had Borromeo as the main subject, with the Trinity no more than the object of his adoration; Mignard makes the Trinity the principal focus, and "the changed emphasis clearly reflects the new dedication."

48. "Per li Frati Spagnoli della Crocetta alle quattro Fontane fece un San Carlo, che adora la santissima Trinità, assai devote, e di buona maniera." Giovanni Baglione, "Vita di Horatio Borgianni, Pittore," *Le vite de' pittori, scultori et architetti, dal pontificato di Gregorio XIII fino a tutto quello d'Urbano VIII* (Rome, 1649), 142; Harold Wethey, "Orazio Borgianni in Italy and Spain," *Burlington Magazine* 106, no. 733 (1964), 146–59.

49. *The Catechism of the Council of Trent*, trans. Rev. J. Donovan (Baltimore: Lucas Brothers, 1829), 26.

50. "The mystery which had been hidden from ages and generations so far transcends the reach of man's understanding, that were it not manifested to his saints to whom God, by the gift of faith, would make known the riches of the glory of this mystery, amongst the Gentiles, which is Christ." Ibid., preface, 13.

51. Wethey "Orazio Borgianni in Italy and Spain," 157, identifies the relief depicting Pelius and Thetis's marriage (Ovid, *Metamorphoses*, XI, 221–59) as a terracotta from the school of Cerveteri, now in the Louvre; it also featured as a table in Valentine de Boulogne's *Musicians* (1622, Louvre).

52. Fra Juan, *Relatione del Convento*, 16. So successful was Steinberg in his reading of the church as dedicated to the Holy Trinity that the symbolism owing to its co-dedicatee has been overlooked.

53. Sebastian Schütz, "Ritratto di Francesco Borromini," in Bösel and Frommel, *Borromini e l'universo barocco*, 2:15. On the name change, see also Rudolf Wittkower's insightful portrait, "Francesco Borromini, His Character and Life" (1967), in Wittkower, *Studies in the Italian Baroque* (London: Thames and Hudson, 1975), 157–58; Connors, "Vita di Francesco Borromini," in Bösel and Frommel, *Borromini e l'universo barocco*, 1:7.

54. Albeit one that substitutes, on alternate capitals, pomegranates for the egg and dart moulding, alluding to the columns of Solomon's temple, bedecked with the same fruit.

55. Fra Juan, *Relatione del Convento*, 30.

56. The painting, remaining in the collection of the Trinitarians of San Carlo, was included in the 1999 Roman exhibition on Borromini; Connors furnished a short biography, saying of its iconography only that Fra Juan holds a plan of San Carlo: Bösel and Frommel, *Borromini e l'universo barocco*, 2:113.

57. The contract for the painting is collected in the *Libro della Fabrica* (San Carlo alle Quattro Fontane, Archivio) and was published in a conference on Mignard; *Pierre Mignard, "le Romain": Actes du colloque organisé au Musée du Louvre par le service culturel, le 29 Septembre 1995*, ed. Jean-Claude Boyer (Paris: Documentation française, 1997), 33. The altarpiece was installed four years after the church had seen its first Mass (on Sunday, 26 May 1641) but still one year before it was officially consecrated (Sunday, 14 October 1646): Fra Juan, *Relatione del Convento*, 56 and 58.

58. Antonio Raggi (1624–86) did the statue of Borromeo in 1675; Sillano Sillani (d. 1705) executed the figures of Matha and Felice in 1682: Portoghesi, *Storia di San Carlino*, 202–5. The Trinity does not feature on the church façade, but it is tempting to construe Borromeo's over-shoulder gaze as directed to the emblem of the Trinity above the main door of the adjacent convent.

59. In that sense, one might consider triptych altarpieces by the likes of Luca di Tommè and Giovanni di Paolo, where the central panel featuring a *Gnadenstuhl* Trinity is flanked by panels whose upper triangular portions show, respectively, Gabriel and Mary: see Michael Mallory, "An Early Quattrocentro Trinity," *Art Bulletin* 48, no. 1 (1966), 85–89. Borromini's particular esteem for Mignard's *Annunciation* is attested by Fra Juan, "Come dice il Sr. Francesco Borromino nella Europea crede che non sia Pittura di Angelo che sprima così il mistero et la sua embasciata come questa": From the *Libro della Fabrica*, cited in Steinberg, *Borromini's San Carlo*, 166.

60. Braunfels, *Die Heilige Dreifaltigkeit*, 25; Schiller, *Iconography of Christian Art*, 1:9; *The Catechism of the Council of Trent*, art. 3, 38.

61. Although he missed the mandorla appearance of the plan, Steinberg similarly concluded that San Carlo's cross-oval plan has an overarching connotation, "the emblem and hieroglyph of Christ's body": *Borromino's San Carlo*, 442.

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