Fra' Giovanni's Intarsias in Verona

Hartwig Thomas and Kim Williams

Travelers are drawn to Verona usually by its arena, an opera performance, the antiquities, artistic treasures, or the house where Juliet Capulet was born. Beyond the curve in the river, however, on a stroll to the somewhat out-of-the-way Giusti Gardens, one comes across the Santa Maria in Organo (figure 1), whose gorgeous tower invites you to take a glance inside. Yet only those who ask or join in on a tour of the church discover that they are only steps away from marvelous mosaics made with pieces of inlaid wood.

In the dark apse of the church there is a wonderful choirstall with intarsias by Fra' Giovanni da Verona (1457–1525). Vasari (1511–1574) wrote that the adjacent sacristy of this former Olivetan monastery was the most beautiful in all of Italy. It contains a collection of intarsias as well as, in a fresco above the door, a portrait of the artist Fra' Giovanni. This extraordinary

Does your hometown have any mathematical tourist attractions such as statues, plaques, graves, the café where the famous conjecture was made, the desk where the famous initials are scratched, birthplaces, houses, or memorials? Have you encountered a mathematical sight on your travels? If so, we invite you to submit to this column a picture, a description of its mathematical significance, and either a map or directions so that others may follow in your tracks.

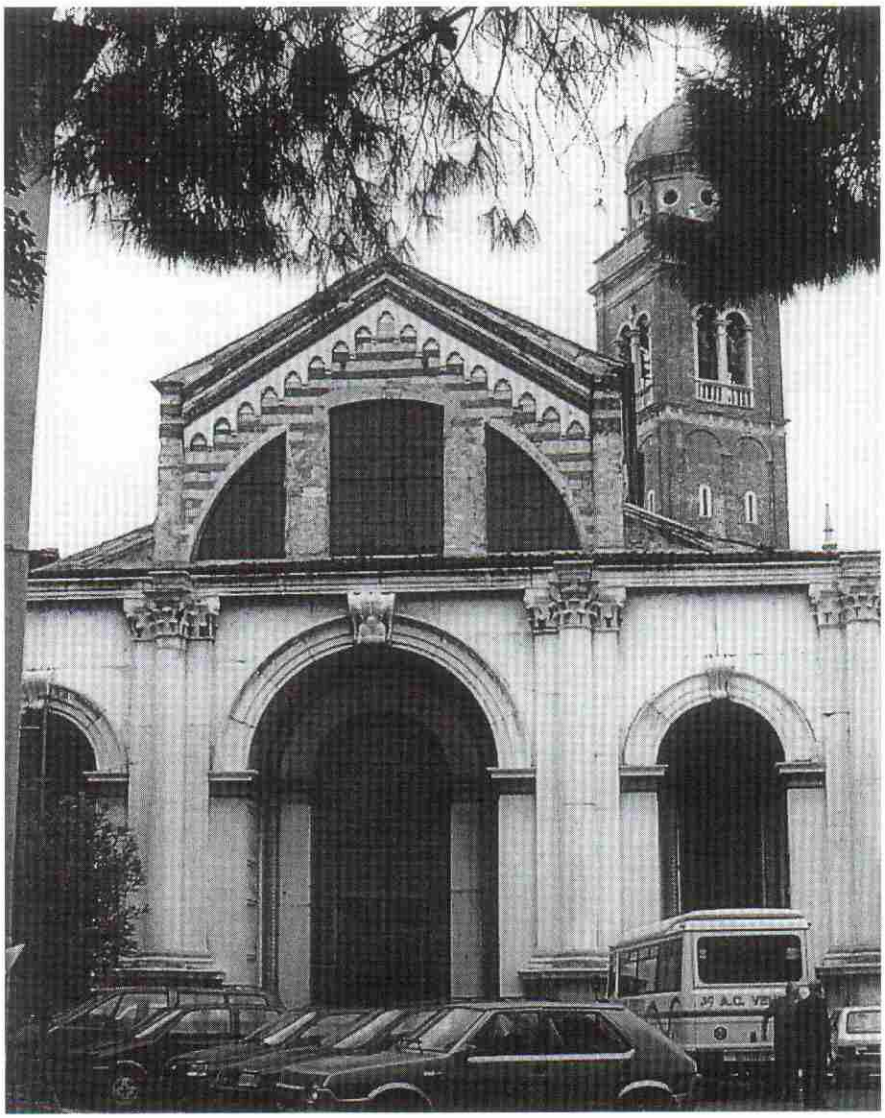

Figure 1. The Santa Maria in Organo, Verona.

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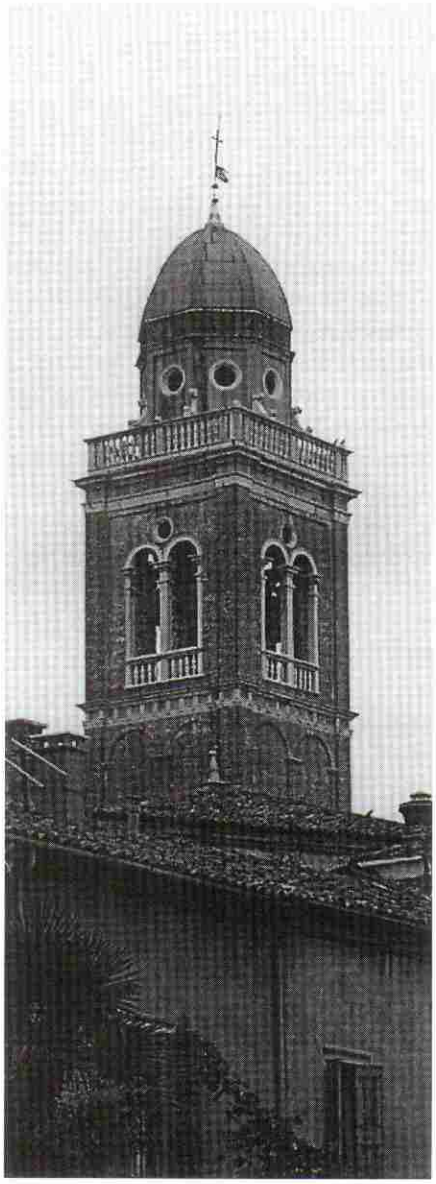

Figure 2. The elegant church tower was Fra' Giovanni's work.

artist brought the art of inlaid woodwork to a high point in Renaissance Italy, and was active as a sculptor and architect. Indeed, he designed the elegant church tower of Santa Maria in Organo (figure 2).

In this sacristy, one unexpectedly comes across two intarsias devoted to mathematics from the time between 1519 and 1525. These naturally draw the attention of the mathematical tourist. If one were to see their warm tones of brown and the shimmering grainy nature of their surface structure first in a reproduction, one might be deceived by the illusion and think that it was an illustration of an arranged three-dimensional set-up, for example here a small cupboard with half-open doors, books, and wooden models of the polyhedra. This intarsia is, however, a flat, varnished panel in reality. The illusion is created by the care with which the artist obeyed the laws of perspective, as well as the skill with which he even used the grain of the wood in order to achieve this effect. Under the varnish, the intarsia is made from hundreds of tiny pieces of different kinds of wood, which were glued onto a wooden substrate (figure 3).

Fra' Giovanni's pictures with obvious mathematical references reflect the mathematical topics and techniques of the time. The systematic investigation of perspective had made considerable progress in the fifteenth century. Although manuscripts on the subject by Brunelleschi and Piero della Francesca circulated among Italian artists, no published works on perspective were at Fra' Giovanni's disposal when he learned his craft. Even Albrecht Dürer wrote his friend Willibald Pirckheimer from Venice, on his second trip to Italy in October 1506, "After ten days I'll be free here and then I will ride to Bologna for the sake of the art of secret perspective, which someone wants to teach me . . ."

Representations of a Campanus sphere, an icosahedron, and a truncated icosahedron with twenty hexagons and twelve pentagons are found in Fra' Giovanni's intarsia. All three polyhedrons can be traced back to illustrations from Luca Pacioli's book *(De) Divina Proportione*, published in

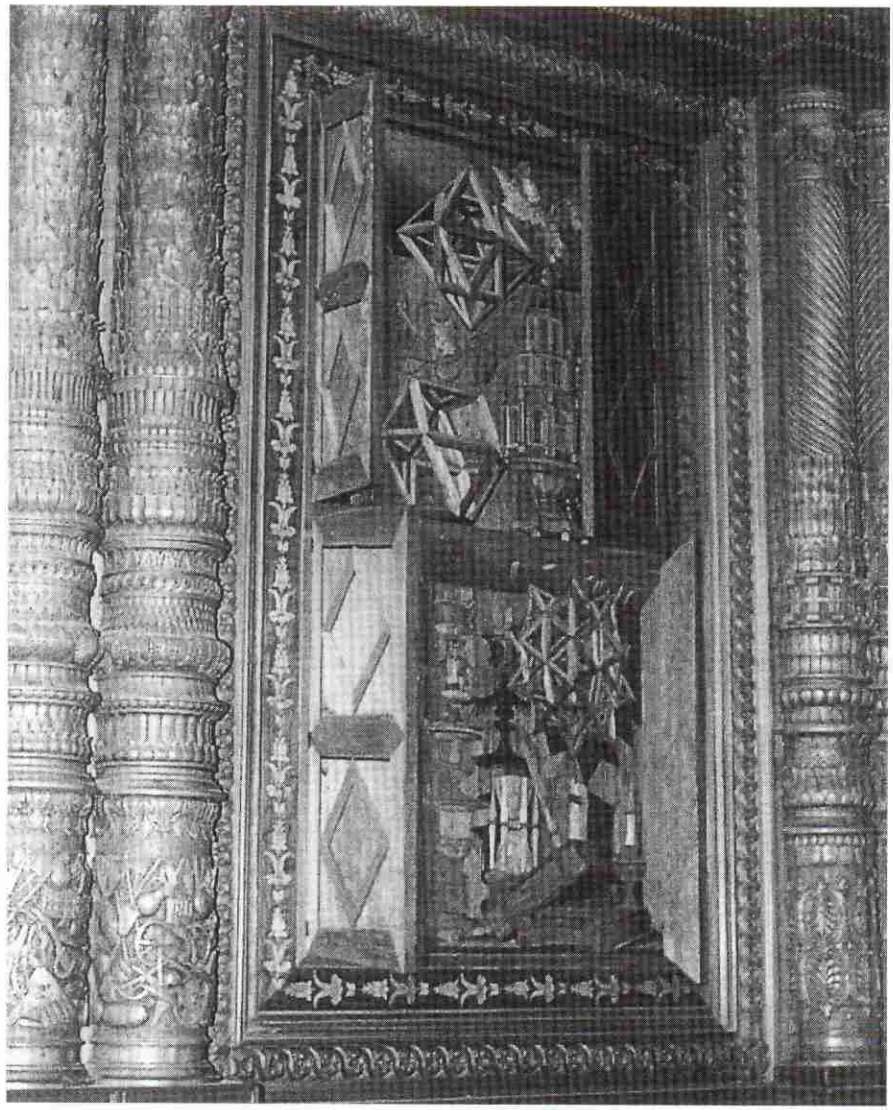

Figure 3. Intarsias in the Santa Maria in Organo, Verona.

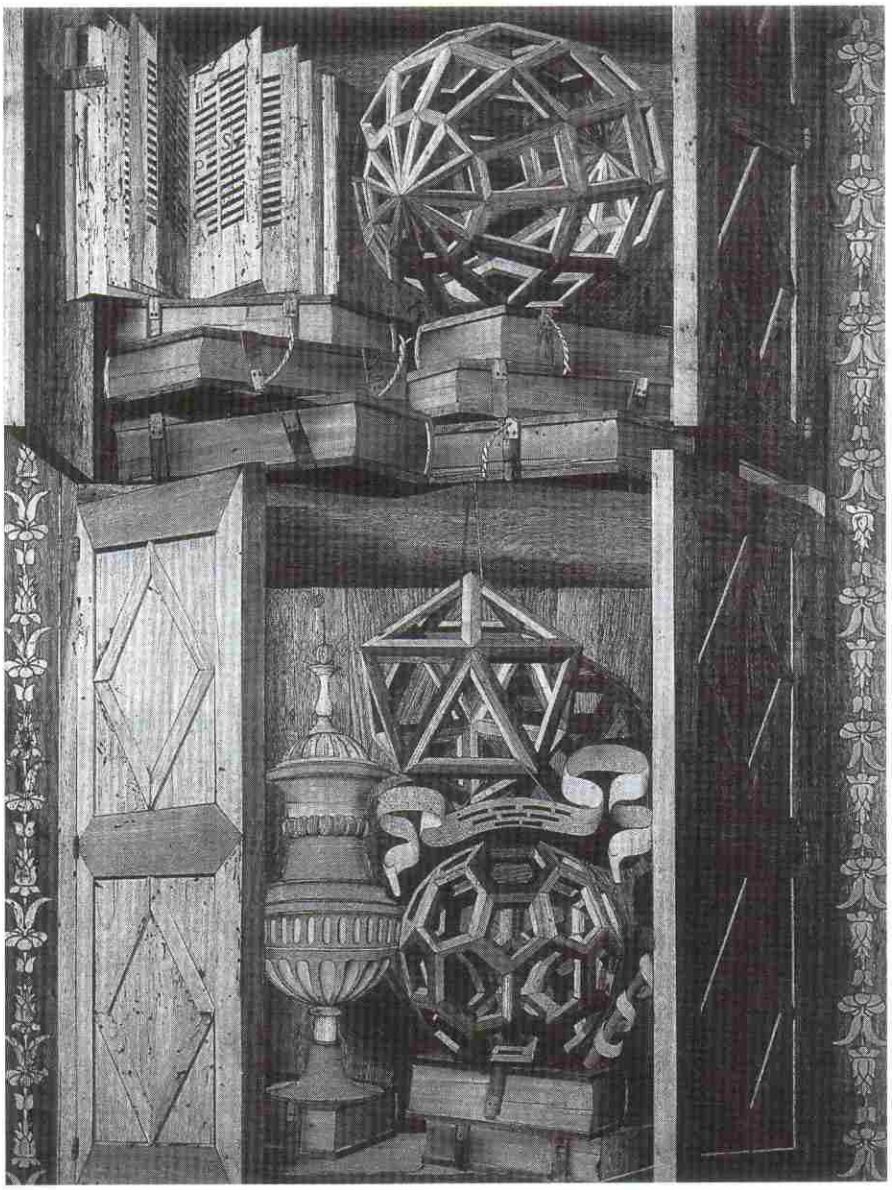

Figure 4. An illustration out of Luciano Rognini's *Some brief artistic notes about the marquetries of S. Maria in Organo in Verona*, edited with the support of the Banca Popolare di Verona. It is a special five-page document, locally provided to tourists visiting the Verona church.

Mathematical tourist Prof. Benno Artmann, of the Georg-August-Universität Göttingen, wondered if the Verona intarsia contain a mistake, on the bottom of the polyhedron below. Maybe Fra' Giovanni did not dare to alter Pacioli's work and thus oppose the great da Vinci?

Venice in 1509. It contains many geometric constructions and drawings which, according to Pacioli, are by Leonardo da Vinci. The first, the Campanus sphere, even refers as far as to Euclid XII, 17/18, where it was proved that the volumes of two spheres relate as the third powers of their radii.

From the fifteenth century, polyhedrons have been objects of continuing fascination, as can be concluded from the list of very recent references below. Their algebraic characteristics of symmetry have been the concern of mathematicians such as Felix Klein in his *Vorlesungen über das Ikosaeder und die Auflösung der Gleichungen vom fünften Grade* (Leipzig, 1884). Graphic artists and architects were interested in the more pragmatic surface characteristics of such bodies, such as the fact that one cannot construct a closed body only from hexagons. Architect Richard Buckminster Fuller, for instance, used the principle that for a closed sphere, which contains only pentagons and hexagons, one needs twelve pentagons. This is exemplified by the internationally standardized soccer ball, still the most popular polyhedron in Italy today.

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