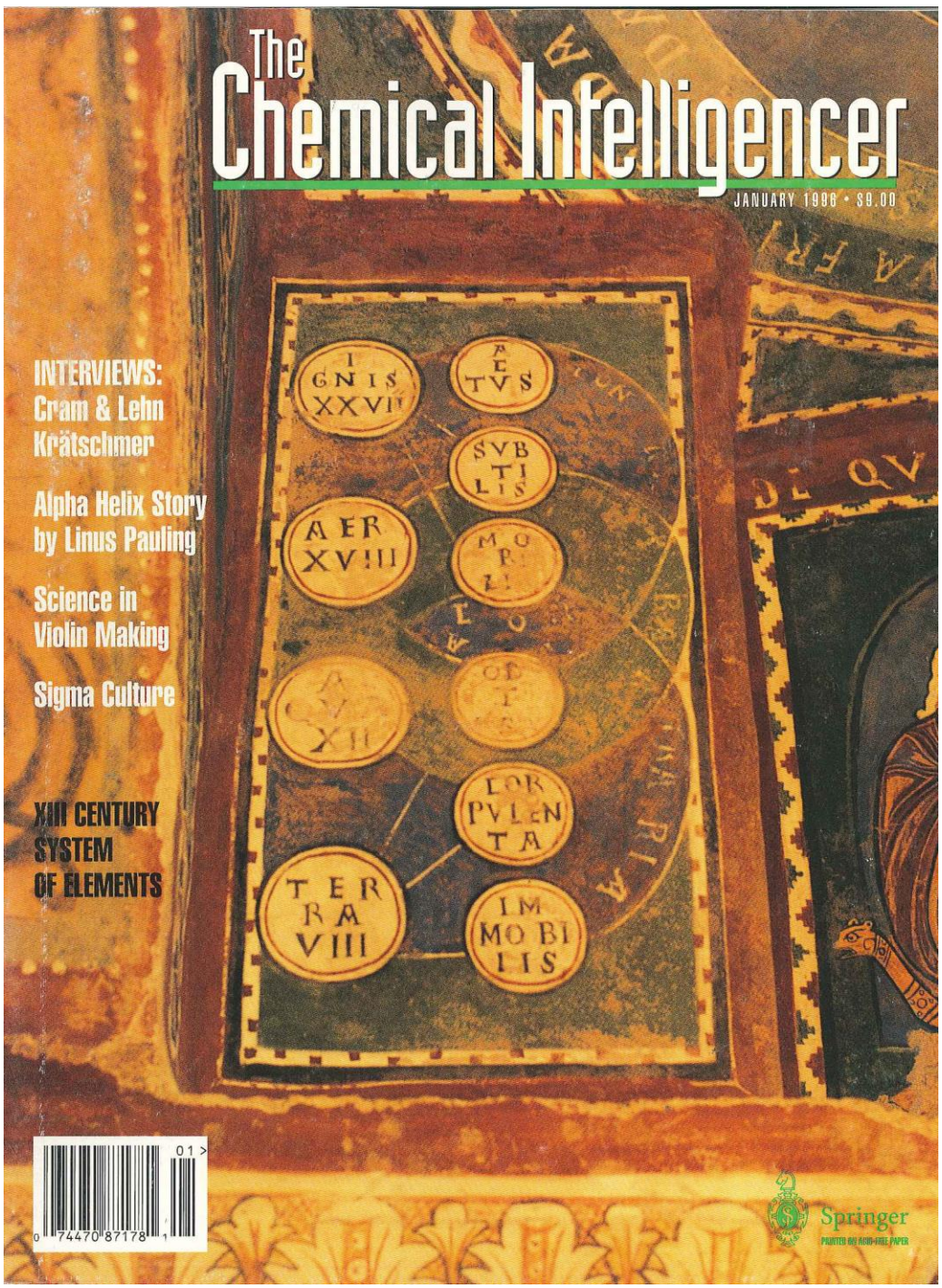

Cover of the January 1996 issue of *The Chemical Intelligencer* from I. Hargittai and A. Domenicano, “System of Elements in Anagni.” © 1996, Springer.

System of Elements in Anagni[a]

István Hargittai and Aldo Domenicano

Anagni is an ancient little town, beautifully situated on top of a hill about 60 km southeast of Rome, off the Rome–Naples motorway. Originally a Hernic settlement, it was conquered by the Romans in 306 B.C. Anagni became wealthy and important in the thirteenth century, during which it gave four popes to the Roman Catholic church.

Anagni Cathedral (Fig. 1) was built between 1072 and 1104, originally in the Romanesque style. Gothic elements were added later in the thirteenth century. A famous feature of the cathedral is its mosaic floors, created by the Cosma family in the first half of the thirteenth century.

Fig. 1 Anagni Cathedral (the transept and two apses). (Photograph taken by I. Hargittai, June 1995).

To the chemical tourist though, the most interesting feature may be some of the frescoes covering the walls and ceiling of the crypt, built in the same period as the upper church. These twelfth- and thirteenth-century frescoes are due to Benedictine painters of the Roman-Byzantine school. They blend religious topics and representations of the physical world, namely, medicine, astrology, and alchemy [1, 2]. In one of the 21 vaults, a human figure symbolizes the allegory of life in relation to the astronomical cycles. The four ages of man are presented in relation to the four seasons and *the four elements.* The fresco is thought to have been inspired by Platonic cosmology (Plato's teachings were spread in southern Italy by the Salerno medical school). Another fresco displays two physicians, Hippocrates (fourth century B.C.) and Galenus (second century A.D.), sitting together as Teacher and Disciple.

Next to the two physicians, there is a diagram of the four elements (Fig. 2), Earth, Water, Air, and Fire, and six properties, *immobile, corpulent, obtuse, mobile, subtle,* and *acute.* The straight connecting lines indicate correspondence (e.g., fire is mobile, subtle, and acute) whereas the curved lines connect opposite qualities. There are Roman

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numerals beneath the names of the elements: for Earth, $8 = 2^3$; for Fire, $27 = 3^3$; for Water, $12 = 3 \times 2^2$; for Air, $18 = 2 \times 3^2$. The equality containing these numbers, i.e., 8/12 = 18/27, unifies the whole universe in its perfection according to Platonic philosophy [3]. This relationship may be generalized as $x^3/[(x + 1)x^2] = x(x + 1)^2/(x + 1)^3$.

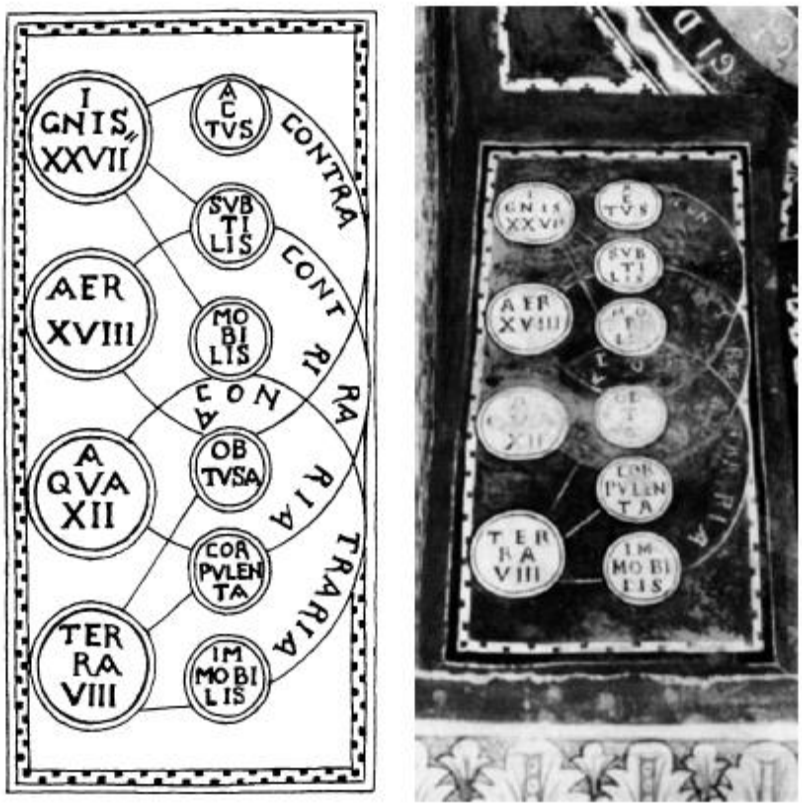

Fig. 2 System of four elements in the crypt of Anagni Cathedral (twelfth-or thirteenth-century fresco). (a) Scheme after Ref. 1; (b) photograph (taken by I. Hargittai, June, 1995).

A detailed description of the six properties and their relationship to the four elements, corresponding closely to the Anagni diagram, was already given by Chalcidius (ca. fourth century A.D.), a Latin philosopher who translated and commentated Plato's *Timaeus* [3].

Acknowledgments

Alan L. Mackay (Birkbeck College, University of London) suggested that we visit Anagni Cathedral to see its mosaic floors. The Cathedral authorities graciously gave us permission to take one photograph in the crypt.

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