Illuminated manuscript with superb paintings of astrological signs, three discs connected by a central spigot, with vellum laid over pine, the main disc 1280mm in diameter, the smaller two 533mm and 483mm respectively, calendar entries on outermost edge of main disc in black and red in a fine late gothic hand, enclosing nine columns of figures in arabic numerals arranged in continuous circular tables in black and red, twelve large miniatures of the astrological signs, approximately 100mm high, arranged in a circle, smaller disc with three columns of figures in Arabic and roman numerals and names of months, central disc painted with the night sky enclosed within a ring of foliage sprigs encircled by ribbons, designed with a circular hole offset to reveal phases of moon on panel below, spigot-head decorated with a painted 6-petalled flower, undersides of discs and verso with leaves from fifteenth-century choirbooks laid on.

## A UNIQUE LATE MEDIEVAL/EARLY RENAISSANCE VOLVELLE ASTRONOMICAL CALENDAR

**[The San Zeno Instrument].**

**Author**
[Anonymous].

**Publication date**
c1455]

**Publisher**

**Publication place**
[Verona, cloister of San Zeno

**Physical description**
Illuminated manuscript with superb paintings of astrological signs, three discs connected by a

central spigot, with vellum laid over pine, the main disc 1280mm in diameter, the smaller two 533mm and 483mm respectively, calendar entries on outermost edge of main disc in black and red in a fine late gothic hand, enclosing nine columns of figures in arabic numerals arranged in continuous circular tables in black and red, twelve large miniatures of the astrological signs, approximately 100mm high, arranged in a circle, smaller disc with three columns of figures in Arabic and roman numerals and names of months, central disc painted with the night sky enclosed within a ring of foliage sprigs encircled by ribbons, designed with a circular hole offset to reveal phases of moon on panel below, spigot-head decorated with a painted 6-petalled flower, undersides of discs and verso with leaves from fifteenth-century choirbooks laid on.

**Dimensions**
1280 by 1280mm. (50.5 by 50.5 inches).

**Notes**
A unique calendar, and the only object of its type to have survived from the Middle Ages.

Wall mounted and hanging for over three centuries in the cloister of the Benedictine abbey of San Zeno, Verona, it was the primary timekeeper for the monks who saw and used it daily to organise their devotional schedule. Its three dials can be rotated by hand and chart the phases of the moon, the zodiacal calendar of the stars, the amount of daylight occurring in any given day of the year, and the feast days and times of the Saints to whom the monks intended to pray.

Introduction

For at least three centuries this remarkable object hung on the wall in the cloister of the abbey of San Zeno, and it was placed in such a way that it would have been seen by all of the monks several times each day: as they left the dormitory for Matins at about midnight and as they returned to bed, as they returned to the church in the morning, and when they retraced their steps again to go back to bed in the evening. It would have been the monks only way of telling the time – it was, in effect, their clock – because it told them what time the sun rose and set each day, how many hours of light and darkness there were, changing with the seasons, and thus allowed them to tell the time based on sunrise, sunset, and the position of the sun in the sky.

Datable to about 1455 – within a year of the printing of the Gutenburg Bible – the Calendar marks the transition from the Middle Ages (generally considered to have ended around 1500 in northern Europe) to the Renaissance (generally considered to have begun about 1400 in Florence). As an object it is essentially medieval in character, yet the artist of the Zodiac illustrations was decidedly Renaissance in style.

It is also the major witness to the continued tradition of astronomical observation at Verona in the fifteenth century, a tradition that dates back to Pacificus (died 844), who invented a primitive form of astrolabe for telling the time during the night at Verona Cathedral.

To understand the San Zeno Calendar one needs first to understand a little about medieval time-keeping in general, and specifically about time-keeping within a Benedictine monastery. Astronomy and religion were inextricably linked in the Middle Ages: the date of the most important feast of the Christian ecclesiastical year, Easter – and every other feast whose date depended on it, such as Lent and Pentecost – was based on the variable date of a full moon occurring in March or April. Thus at the very least Church authorities needed to be able to predict in advance the relationship between the phases of the moon and the 365-day year.

Questions of astronomical time-keeping were therefore crucial, and some of the greatest minds

applied themselves to the problem, including the venerable Bede in the eighth century. But, even today, the Eastern Church celebrates Easter on a different date than the West, due to differences in how the dates were calculated in the early Middle Ages.

Daily life in any Benedictine monastery, including San Zeno, was dictated by the liturgical 'hours' (called Matins, Lauds, Prime, Terce, Sext, None, Vespers, and Compline), at intervals of about three hours from about midnight until about 9pm the next evening; so seasonal variations in the length of the day and night were also of fundamental concern.

As early as the fifth century BC it had been realised that although the solar year and the lunar month did not correspond neatly with one another (discussed in more detail below) the relationship between them would repeat every 19 years. Thus, if one could calculate data for a whole 19-year cycle it could be re-used in perpetuity, re-starting every 19 years.

As the Middle Ages progressed astronomical observation became more sophisticated; increasingly precise instruments such as astrolabes were manufactured; and greater numbers of scientific texts were translated into Latin from Arabic and Hebrew. By the mid-thirteenth century it was possible for King Alfonso X of Castile to commission the so-called Alfonsine tables of astronomical data: not only do these tables provide data for the full 19-year cycle, but they also provide data applicable to a wide variety of different latitudes in Europe, so that wherever one was, one could look up variable seasonal features (such as the length of the day and night) for one's own location. The tables included data for a number of cities in Italy, including Venice, which is on the same latitude as Verona.

Knowledge that features of the world and the cosmos repeat themselves regularly – including seasons, phases of the moon, and tides – led to their representation on circular devices from a very early date: perhaps the most famous circular representation of time is the carved stone Mayan Calendar (which some people believed predicted the end of the world in 2012). But different cosmological features observed cycles of different lengths: the sun appeared to repeat a cycle lasting about 365 days, while the moon had a cycle of about 19½ days. The most efficient way of representing cycles that were out of step with one another was by means of a volvelle: a device that allowed the different cycles to be represented by rotating discs of different sizes.

The Benedictine abbey of San Zeno had an illustrious history of astronomical scholarship, and it is perhaps thus less surprising that it should commission an astronomical calendar unlike any other known to have existed. WE HAVE NOT BEEN ABLE TO FIND ANY REFERENCE TO ANY OTHER COMPARABLE MEDIEVAL VOLVELLE ASTRONOMICAL CALENDAR, NOR HAVE WE EVEN FOUND ANY DOCUMENTARY EVIDENCE THAT ANY OTHER EVER EXISTED. The closest comparisons that we have been able to find are the famous astronomical clock in Prague, originally most of which dates from 1490, and heavily restored in more recent years; and the similar astronomical clock in St Mary's, Gdansk, dating from the late-1460s, which was severely damaged in 1945 and subsequently heavily restored.

Content

The various columns of letters, numbers, and text, from the outermost to the innermost concentric circle, are as follows:

1. The day of the month in Arabic numerals: 1–28 (February), 1–30 (April, June, etc.), or 1–31 (January, march, etc.), according to the modern (Gregorian) calendar.; in black ink.

2. The day of the month in Roman numerals, with kalends, ides, and nones, according to the Roman

(Julian) calendar; in red.

3. The Sunday Letters, “Litterae Dominicales”: the first seven letters of the alphabet A–G repeated fifty-two times for the weeks of the year, starting at A on 1 January; in black except for ‘A’s, which are in red.

4. Saints’ days and their liturgical gradings, plus a number of other astrological entries including the equinoxes and solstices, and immovable ecclesiastical entries, such as and earliest possible dates of Septuagesima and Easter; in black, with red for major feasts.

5. The Golden Numbers (16, 5, 13, 2, … 11, 19, 8) against various dates from 17 January–15 February, and letters representing the possible dates of Easter, “Littere tabulares” against 21 March–25 April with [a]–u in black and a–q in red, to be used with a table indicating the date of Easter.

6. The age of the sign of the zodiac, in arabic numerals 1–30; in red.

7. The Siderial Months, starting at 1 January, consisting of the letters of the alphabet a–z, often with one or more letters repeated and followed by the tironian symbols for ‘et’ and ‘con’, making a total of 27 or 28 days; in black.

The next three pairs of columns each give an increasingly long period of time:

8–9. The half-length of the night (i.e. from dusk to midnight, or midnight to dawn) in hours and minutes, varying from a maximum of 7 hours 45 minutes on 13–16 December (i.e. the Winter Solstice), to a minimum of 4 hours 15 minutes on 13–18 June (i.e. the Summer Solstice).

10–11. The full length of the night in hours and minutes, varying from a maximum of 15 hours 30 minutes on 13–16 December, to a minimum of 8 hours 30 minutes on 13–18 June; i.e. the lengths of night in this pair of columns are simply twice as long as those in the previous pair of columns.

12–13. The full length of the night plus half the length of the day, i.e. the length of time from dusk to the following midday, in hours and minutes, varying from a maximum of 19 hours 45 minutes on 13–16 December, to a minimum of 16 hours 15 minutes on 13–18 June.

14. Depictions of the signs of the zodiac, with two labels stuck on each (some now missing), one inscribed with the name of the sign (Aquarius, Pisces, Aries, etc.), the other with the word “Bonum”, “Indifferens” or “Malum”, indicating whether it is a good, indifferent, or bad time for blood-letting.

15–16.Of the next two concentric circles, the inner one contains column headings “Lune”, “H”[orae, i.e. hours], “M”[inuta, i.e. minutes], and “Etas” (i.e. age), and the other one contains the numbers 1–30 under the alternate Lune and Etas headings, and with hours and minutes columns with numbers rising from 0:0 to 12:0 and then decreasing back to 0:0, in increments of eight: 0:0, 0:8, 1:6, 2:4 … 12:0, 11:12, 11:4 … 1:6, 0:8, 0:0.

By turning a pointer attached to the innermost disc so that it points to the age of the moon, a hole in this disc reveals a depiction of the phase of moon, from new to full and back again, with intermediate crescents showing its waxing and waning:

Artist

The artist of the miniatures has not been identified. The art historian Caterina Gemma Brenzoni of Verona University studied the calendar a few years ago in relation to the restoration of the apse of

San Zeno, which contains a remarkable fresco 24-hour clock-face on a wall to the left of the altar, numbered in both roman and arabic numerals, that presumably once had a mechanism to drive an hour-hand:

Copies of her unpublished work (Ricerche inedite d'archivio e lettura storico artistica della decorazione dell'abside della basilica di San Zeno, Verona 2008-2009) are deposited with the Banco Popolare Archive, Verona, and in the Biblioteca Civica di Verona. She kindly informs us that the closest stylistic paralells that she found were Lombard painters working in the middle of fifteenth century, such as the Maestro Paroto's Madonna and Child with Saints and Crucifixion poliptych in the Bagatti Valsecchi Museum, Milan; the famous sets of 'Tarocchi' (Tarot cards) by the workshop of Bonifacio Bembo (Pinacoteca Brera, Milan) and works by the Zavattari brothers, such as the frescoes in the chapel of Queen Theodolinda, Monza Cathedral, executed by Ambrogio and Gregorio Zavattari in 1444:

Provenance

There is ample liturgical evidence that the calendar was made for the use of the Benedictine abbey of San Zeno, Verona:

The highest grade ("Duplex maius") feasts include:
21 March: Benedict, founder of the Benedictine Order
12 April: The Deposition of Zeno, bishop of Verona
21 May: The Translation of Zeno
8 December: The Ordination of Zeno
10 December: The Dedication of the Basilica of San Zeno

The next highest ("Duplex minus") feasts include:
28 March: The Octave of Benedict
5 September: Crescentianus, bishop of Verona

The next highest feasts (with 12 readings) include:
23 March: Proculus, bishop of Verona
29 April: Peter Martyr, who was born in Verona
22 May [added:] Lupicinus, bishop of Verona
13 July: Anthony Abbot, "the father of all monks"
and probably (but the grading is damaged):
31 October: Lucillus, bishop of Verona

The calendar is recorded attached to a wall in the cloister of San Zeno in the mid-eighteenth century: Giambatista Biancolini, Dei Vescovi e Governatori di Verona [Bishops and Governors of Verona] (Verona, 1757), p.22, in a section discussing the former bishop of Verona St Lupicino, has the following passage:

"Curioso Calendario si sta annicchiato nella parete della Loggia che dal Dormitorio del Monistero Zenoniano conduce al Coro e alla Sagristia di quella Chiesa. Codesto Calendario è molto bello, ampio ed esatto, scritto sopra carta su di una tavola sferica che si può girare attorno per comodo de' leggittori, e vi su posto del 1455. per uso degl' istessi Monaci di San Zenone. Nel medesimo de' nostri santi Vescovi si leggono S. Procolo, S. Lucillo, S. Zenone e S. Cerbonio solamente. Ma non fi sa il perchè vi manchi S. Lupicino, il cui sacro Corpo insieme con quelli di S. Lucillo e del Martire S. Crescenziano (il qual S. Martire nel detto Calendario si sta eziandio registrato) per tempo immemorabile nella suddetta Chiesa si riposa, mercecchè in un Catalogo de' nostri Santi Vescovi in un Codice Miscellaneo della Librerìa Zenoniana, più antico del suddetto, standosi registrato il nome

del suddetto Santo, vi su al nome medesimo da mano più recente aggiunto: cujus Corpus in Ecclesia S. Zenonis."

This may be loosely translated as:

"A curious calendar is tucked into the wall of the loggia which leads from the dormitory of San Zeno monastery to the choir and the sacristy of the church [i.e. the East side of the Cloister]. This calendar is very beautiful, large, and accurate, written on paper [sic] on a circular panel that it is possible to rotate for the convenience of readers, placed there about 1455 for use of the monks of San Zeno. In it one can only read the names our sainted bishops San Proculo, San Lucillio, San Zeno and San Cerbonio. But it is unknown why it lacks San Lupicino whose sacred body, together with those of San Lucillo and the martyr San Crescenziano (who is recorded in the said calendar) rests in the said church since time immemorial, since in a list register of our sainted bishops in a miscellaneous codex in the library of San Zeno, the oldest of the latter, is recorded the name of the said saint, by whose name is added in a more recent hand: 'whose body is in the church of San Zeno'."

If Biancolini is correct about the date of the placement of the calendar in 1455 (he must have had information no longer available, perhaps an inscription painted on the wall of the cloister, or perhaps a document in the abbey archives, now lost) then it was doubtless commissioned by Gregorio Correr (1409–64), who was Abbot of San Zeno from 1448. A somewhat earlier date than 1455 is perhaps suggested by the absence of the feast-day (20 May) of St Bernardino of Siena, however: he died in 1444, was canonized in 1450, and the feast was quickly adopted by liturgical calendars throughout Italy.

San Zeno was plundered by Napoleonic troops in 1797, one result of which is that the three predella panels of Mantegna's San Zeno Altarpiece, commissioned by Abbot Correr and painted c.1457–60, are today at Paris in the Louvre and at Tours in the Musée des Beaux-Arts.

By the early twentieth century the calendar was the property of the Conte Antonio Maria Cartolari of Verona (born 1843 – see Vittore Spreti, Enciclopedia storico-nobiliare italiana: famiglie nobile e titolate viventi riconosciute …, II (1929), pp.344-5.), and it may have entered the noble family's collection during the Napoleonic upheavals through one of their ancestors: they are recorded as owning a portrait of an ancestor called Bartolomeo who was a monk of San Zeno (Inscribed "Bartholomaeus de Fanzago Cartulariis, S. Zenonis Majoris Ver. Cenobii Monachus filius Io[hannes] Baptistae e consilio Nobilium gubernatoris S. Montis Pietatis"; see Avena and Callegari, p.29). It is not known exactly when the Calendar left the Cartolari family collection (Conte Antonio Maria was born in 1843, married in 1869, and was apparently still alive in 1929 – when the Enciclopedia cited above was published – but was dead by 1943 unless he lived for more than 100 years.), but a portrait of a Woman with Green Vest, White Blouse and Red Choker by Pietro Antonio Rotari was sold by the descendants of the Conte Antonio Maria Cartolari in the 1970s, and is now in the Norton Simon Museum, California.

## Bibliography

Bibliography

Apart from Biancolini's brief 1757 description, there appears to be only one published account of the calendar, now almost a century old, which has rarely been referred to in print:

A. Avena and G.V. Callegari, "Un calendario ecclesiastico veronese del secolo XVo", Madonna Verona, Anno XI, n.1: fascicolo 41 (Gennaio–Giugno, 1917), pp.1–33.

**Provenance**
Provenance: 1. Benedictine monastery of San Zeno in Verona; 2. which was plundered by Napoleonic troops in 1797; by descent through the noble Cartolari family; to the Conte Antonio Maria Cartolari of Verona (born 1843 – after 1929).

**Price:** £1275000

**Inventory reference:** 15438