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PREVIOUS articles about *Epact* - the Museum's collaborative electronic catalogue of medieval and Renaissance instruments - have used individual pieces as a starting point to explore the identity of particular instrument makers. A sixteenth-century English astronomical compendium, which carries the initials 'V. C.', provides an instance where the maker remains a shadowy figure, but where fresh information has emerged about the instrument itself.

The many leaves of this gilt brass compendium are crammed with features: a nocturnal, a universal equinoctial sun and moon dial, a horizontal sundial, a compass and a quadratum nauticum, as well as calendrical, astrological, tide and latitude tables. These devices and tables are hinged within a square box, the covers of which are decorated with strapwork, heads, foliage and fruit, while the remaining free surfaces carry foliate engraving. The box is surmounted by a triangular pediment decorated with pairs of heads, as well as representations of an armillary sphere, two quadrants and the reverse of an astrolabe.

The initials 'V. C.' appear on the (now broken) hinged support for the nocturnal disc. That they represent the instrument's maker is clear on two counts. Firstly, the compendium carries another pair of initials as part of a motto prominently displayed in an oval on the back cover: '+ Aske + me + not + for + ye + Gett + me + not + + R + P + +'. Matched by a coat of arms on the front cover, the initials 'R. P.' presumably represent the instrument's first owner. Secondly, the initials 'V. C.' also appear on a closely related compendium now held at the Adler Planetarium in Chicago.

The identity of 'V. C.' has long been a puzzle. In the 1920s R. T. Gunther was inclined to accept the existence of an otherwise unknown early maker; in his later years he was tempted to identify V. C. as the youthful Humphrey Cole, the best known of the Elizabethan instrument makers. This identification was also assumed by Louis Janin, who published a copiously illustrated article about the Adler compendium in 1976.

Although expressed in a tentative manner, the Museum has previously acknowledged this possible identification. Until the recent closure, the compendium was displayed alongside a group of Humphrey Cole instruments together with a label which identified V. C. as '? = Vmfredus Cole'.

However, the identification has not commanded universal assent. There is both a stylistic and a chronological gap between the two V. C. instruments and the earliest instruments by Cole. From such disparities, Gerard Turner was led to argue more than fifteen years ago that V. C. was not Cole but most likely a Flemish craftsman, probably employed by the publisher and engraver Thomas Gemini, who was himself a Flemish immigrant based in London.

In 1556 Gemini had published Leonard Digges's *Tectonicon*, a text on practical mathematics and surveying. The title page advertised Gemini's readiness to supply the instruments featured in the book. Gemini had already been responsible for Digges's other principal publication, the *Prognostication Everlasting of Right Good Effect*. Published under a number of titles from at least 1553 onwards, this almanac provided calendrical, meteorological and astrological rules, together with basic astronomical information and material on tides and time-telling.

The Museum's V. C. compendium is very closely related to material in Leonard Digges's *Prognostication* and it seems that, as well as providing the instruments of *Tectonicon*, Gemini also ensured that he could meet any commission that might be forthcoming as a result of the earlier work by Digges.

The compendium's quadratum nauticum is similar to Digges's and the instrument also incorporates copies of the general calendar as well as tables for the moon, the moveable feasts and tides. A further table with the time of daybreak and sunrise, the length of the day and night, and the time of sunset and twilight for the first, tenth and twentieth of every month also follows Digges's pattern.

The connection with Leonard Digges's book, and with the business activities of Thomas Gemini, is thus strongly suggested by the instrument itself. The dates of the two V. C. instruments also exactly fit the context of this early mathematical publishing in England. The Adler compendium is dated 1557 while the Museum's undated example must have been made around 1554, since it carries two tables for the period 1554 to 1579.

Suggestive as this evidence is, the identity of V. C. may never be conclusively established. Turner's suggestion of a Flemish maker nevertheless provides the most plausible answer currently available and certainly requires a good deal less interpretative ingenuity than the identification with Humphrey Cole.

Whatever the final merits of such competing claims, it might have been expected that the form and structure of the V. C. compendium would now be well understood. However, when catalogued for *Epact*, the instrument provided a surprise by giving up an additional unexpected secret.

The compendium's equinoctial dial is of an unusual design. The dial is universal, with a hinged plate which can be adjusted to any inclination and can therefore serve for any latitude. The plate itself is straightforward with a circular scale of hours on the upper and lower faces. The provision of lunar volvelles within the hour scales on both faces allows the instrument to serve as a moon dial, though each volvelle is presently mounted on the wrong side of the leaf so that its scale of hours from 4 to 12 to 8 increases in the wrong direction.

There have been two common solutions devised to register and fix the inclination of equinoctial dials: a graduated arc of degrees (which often folds flat for portability) providing a friction-tight surface against which the dial plate is set; and a folding strut fitting into a notched scale of degrees used to elevate the plate.

The V. C. compendium incorporates a different design. On the upper surface of the dial plate is a square clinometer with a quadrant scale and a small plummet (illustrated left). The clinometer folds flat across the dial plate and on its reverse carries a circular scale of degrees enclosing a depiction of an armillary sphere.

The plummet no longer swings freely but it does, in principle, indicate the elevation of the dial plate. To set the plate for the correct latitude, its inclination is adjusted until the plummet indicates the appropriate point on the quadrant scale. With the clinometer set carefully in the vertical plane its leading edge sits perpendicular to the centre of the dial plate and therefore also serves as the gnomon for the upper face of the dial.

While the operation of the equinoctial dial is clear enough in outline, practical problems apparently remain. Firstly, there is no obvious way to hold the dial at a particular elevation: the plate has no support or strut. Moreover, how can the clinometer be reliably held in the vertical plane essential both for the operation of the plummet and the clinometer's role as a gnomon? Finally, while there is a gnomon for the upper face, there is no equivalent projection for the lower face, which therefore renders the instrument ineffective for half of the year.

These practical difficulties seemed to imply that a component was missing from the instrument. The form of the clinometer itself suggested what the missing piece might be. Rather than a sharp, shadow-casting line, the leading edge of the clinometer square is shaped as a hollow sleeve with an open slit running along its length.

Gunther noticed this feature and thought that the hollow edge was perhaps intended to receive a wind vane. Such devices are found, for example, on the contemporary astronomical compendia of the Augsburg master Christoph Schissler. But Gunther's suggestion scarcely seems plausible: rather than being in the plane of the horizon, the plate is meant to be set at an angle parallel to the equinoctial; neither is there any wind rose against which wind directions could be read.

A more likely candidate for the missing insertion would be a pin, slipping into the clinometer sleeve and passing through a hole in the centre of the dial plate. This would provide not only a continuous gnomon for the northern and southern declination of the sun but also a rigid means of ensuring that the clinometer remained in the vertical plane. Although partly obscured by subsequent restoration, a hole is indeed visible in the centre of the plate.

Unfortunately, while Janin's article on the V. C. compendium at the Adler illustrates an equinoctial dial of the same type, there is no discussion of its gnomon or the elevation of its dial plate. Only direct contact with the Adler revealed that a solution to all these problems had already been found - within the instrument itself.

Though not noted by Janin, there is indeed a pin provided with the Adler example, hidden away in the dial plate. Housed in a hollowed edge of the plate, this pin is keyed to fit the open profile of the clinometer edge and to pass through a hole at the centre of the dial plate. Circular in section, with a projecting ridge running along its length, the pin fits the sleeve of the clinometer while also giving a clean gnomon edge for both the upper and lower faces of the dial.

When pushed through the plate, the end of the pin rests on the next leaf of the compendium, holding the dial plate up at an angle. Inserting the pin to a variable distance therefore allows the dial to be set for a wide range of latitudes, effectively (if rather inelegantly) solving the remaining practical problem of the dial's operation.

Armed with this news from the Adler, the Museum's compendium was quickly re-examined. Overlooked and apparently unnoticed, the same solution was immediately discovered. One edge of the dial plate bulges slightly and, once alerted to its existence, the head of a pin was indeed discernible. Extricated with some difficulty and illustrated above projecting from its housing, this pin then successfully emerged from what was presumably a long period of hiding.

The Museum's gnomon pin is shaped slightly differently from the Adler example: rather than a circular section with a projecting ridge, it is in the form of a thin rod, the cross section of which is a rounded wedge. The sharp edge of the wedge projects through the slit in the clinometer sleeve to serve as the gnomon for the upper face.

Its other functions also match those of the Adler example: pushed through the hole in the dial plate the rod ensures that the clinometer remains perpendicular to the dial plate and also acts both as the gnomon for the lower face and as the support for elevating the dial plate above the next leaf of the instrument. In practice, damage to the clinometer sleeve prevents the rod being fully inserted, but the principle is clear.

The discovery of this secret part of the V. C. compendium, despite being a small feature in itself, indicates how the cataloguing of instruments for *Epact* has not only led onwards to a broader context, but also to new revelations about the structure and use of instruments which might otherwise have been considered to be already exhaustively studied. S. A. J.