

# Teasels, Bulls and Quatrefoils

## The symbology of medieval astrolabes

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Astrolabes from medieval Europe often have retes in which the star pointers have zoomorphic, anthropomorphic or other symbolic form. Today's collectors and curators find these attractive and often describe them as decorative but in the medieval period symbols were common and almost always had a meaning which the original owners of the astrolabes would have understood, though these meanings have now been largely forgotten. Contemporary manuscript descriptions of how to make and use an astrolabe – much studied by modern academic researchers – never mention these practical features so it is left to enthusiasts to rediscover their meaning. In doing so, some of the lost provenance of these undated and unsigned instruments can be reconstructed, giving a clearer view of how they were actually employed.

In recent years, a group of about ten or a dozen English astrolabes from the early fourteenth century featuring prominent quatrefoils on their retes has been recognised and dubbed the 'Sloane Group'.<sup>1</sup> These begin with the great Sloane astrolabe<sup>2</sup> itself which, it is hypothesised, was commissioned for Prince Edward of Windsor by his tutor and mentor Richard de Bury,<sup>3</sup> shortly before he became King Edward III in 1327, at the tender age of 14. This design, in modified form, was then used for a series of much smaller astrolabes which were presented over the next couple of decades or so as political gifts to supporters of the king in recognition of services provided, sometimes secretly.<sup>4</sup> The recipients were often overseas merchants or clerics with the result that the instruments resurfaced in later centuries all over Europe. An evolution of various features of the design, both stylistic and scientific, allows a rough chronology of these astrolabes to be proposed.

The subset of three instruments from the Sloane group which form the main subject of this article each have retes with two very distinctive 'triple pointers', that is, pointers for three stars which spring from the same base connected to the ecliptic circle of the rete (see example in Fig. 1). These three astrolabes are:

1. The 'Tsvi Herz' astrolabe now in the London Science Museum.<sup>5</sup> It is so-named because many of the star names were later re-engraved in Renaissance style for the eponymous Jew whose name was placed in Hebrew characters on both sides of the throne. The structure of the astrolabe remained unchanged although only one of the original four or five plates is still extant. It is now quite highly polished, probably as a result of treatment in the late 19<sup>th</sup> century when it was presented to the Museum.



Fig. 1 The rete of the Tsvi Herz astrolabe showing the overall appearance of the triple pointers. Note that most of the star names have been re-engraved at a later period. Photograph by the author, courtesy of the Science Museum, South Kensington.



Fig. 2 Close-ups of the face and botanical triple pointers for the three Sloane group astrolabes. Left to right: 1, Tsvi Herz; 2, Baillie's rete; 3, Istanbul.



Fig. 3 Overlay of the rete of Baillie (green) and that of the 'Istanbul' astrolabe. Note the very significant overlap and the closeness of the star positions.

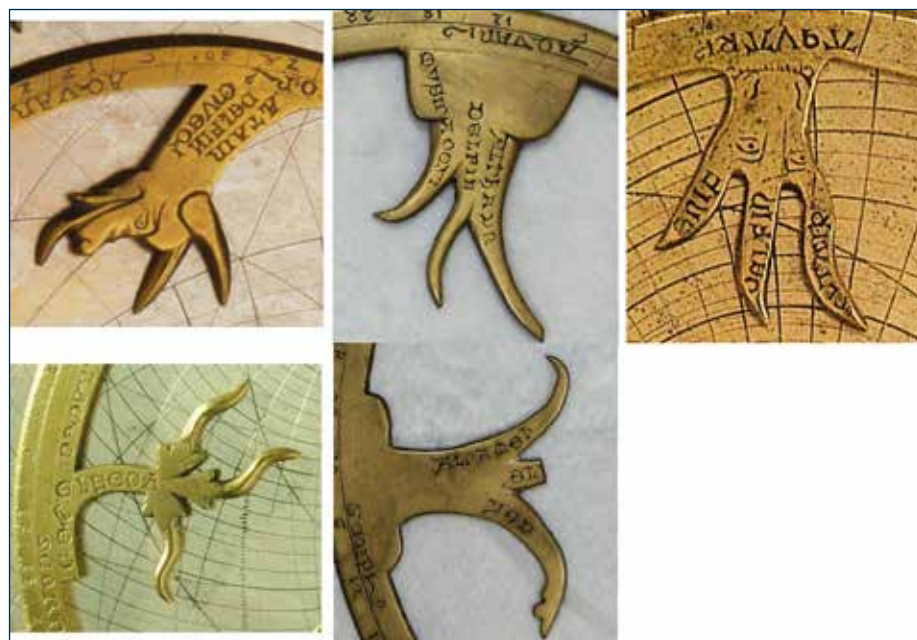


Fig. 4 Close-ups of the face and botanical triple pointers for the three associated astrolabes. Left to right: 4, Mensing-26; 5, Whipple 1264; 6, Sotheby's/Time.

2. 'Baillie's rete', an isolated rete without its mater or plates, so-named because it once belonged to G. H. Baillie. It is now in the Oxford History of Science Museum and has a very dark, almost black, patina.<sup>6</sup>

3. The 'Istanbul astrolabe' has an unknown provenance but is now kept securely under lock and key with restricted access at the Bilim ve Teknoloji Tarihi Enstitüsü, Teknik Üniversitesi, İstanbul.<sup>7</sup> It has had a hard life

though it has a full set of five plates and at some stage the brass has been cleaned of oxidation.<sup>8</sup>

The similarity of the first two of these astrolabes was noted by Gunther<sup>9</sup> and they are listed amongst the zoomorphic instruments described in a pioneering article by Owen Gingerich.<sup>10</sup> The Istanbul astrolabe was shown in a cursory way by David A. King but has not yet been fully published.<sup>11</sup> XRF analyses of the Tsvi Herz and Baillie's instruments have been performed and although the heavy patina on the latter prevents a detailed comparison of the major elements, the presence of a low level of bismuth (Bi) in both alloys supports the view that they are from the Sloane group of early 14<sup>th</sup> century astrolabes.<sup>12</sup>

The triple pointer on the left of these three astrolabes (Fig. 2; in the Capricorn/Aquarius region of the ecliptic) is in the form of a face with a long beard, the three points of which identify the stars Aquila, Delfin and Mucida Equi. The structure on the right (the Libra/Scorpio region) is botanical in nature with three stems for the stars Alramech, Elfeca and Yed.<sup>13</sup> The central stem ends in a terminal which looks like a cross between a strawberry and a fir cone although on the Istanbul astrolabe this has broken off. The two outside pointers are floral in nature (an unfurling leaf or bud?) and this shape re-occurs as the pointer for several single stars on the outside of the ecliptic. See Fig. 2 for a more detailed view.

The extreme similarity of these astrolabes, believed to be from the same workshop, is illustrated in Fig. 3 which shows the superimposed retes of Baillie and the Istanbul astrolabe. The small differences show that they have not been produced together as a group or from a fixed template and so they could be separated by a year or more. In addition to these three Sloane group astrolabes, a further member of the group and two other medieval astrolabes, almost certainly from different English workshops, each have triple pointer structures but without the same detailed shaping or engraving. These are shown in Fig. 4 and they are:

4. Mensing-26, a member of the Sloane Group, now in the Adler Planetarium.<sup>14</sup> Its details have been published previously.<sup>15</sup> It does have two triple pointers in the same positions but their details are quite different to those on the three astrolabes described above.

5. Whipple 1264. A single-latitude Gothic astrolabe thought to be closely associated with the Sloane group but not made in the same workshop.<sup>16</sup> The 'face' is just an amorphous shape with no engraving other than the star names and the central terminal of the botanical group is again broken off.

6. An astrolabe sold by Sotheby's in 1986 and



Fig. 5 Illuminated capital 'E' showing Edward III and his eldest son, the Black Prince, with long pointed beards. In this image Edward's beard has two points but he also has a moustache with long points. Note also that they are wearing jupons (short surcoats) with the old English coat of arms quartered with that of France. Courtesy of the British Library, Cotton MS Nero D VI, f.31r.

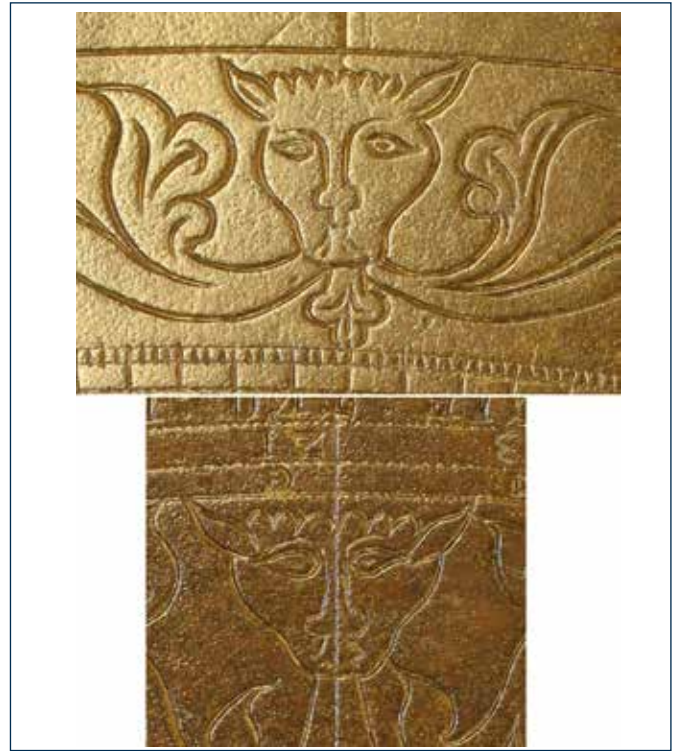


Fig. 6 The two bulls engraved on the back of the great Sloane astrolabe (British Museum SLMATHInst.54, CCA/III #290). Note the similarity in style with the triple-pointers of Fig. 2. Photos by the author, courtesy of the Trustees of the British Museum.



Fig. 7 (a) The Black Bull denoting Henricus Tertius (Henry III), Edward III's great-grandfather, on a copy of the genealogical roll by Roger of St Albans. (b) The figure of a bull indicating Edward III in the Bohun psalter, Psalm 68. Courtesy of the British Library, Egerton MS 3277, f.46v.



shown at the Amsterdam 'Time' exhibition in 1990: it is likely to be a slightly later copy of the Sloane group ones.<sup>17</sup> In this case the 'face' engraving is upside down so that the star pointers are formed from rather spikey hair and the botanical triple is completely absent (though there are several other zoomorphic pointers).

There are other medieval astrolabes that employ triple pointers – for example those of Jean Fusoris<sup>18</sup> – but the pointers and the bases are simple structures without the symbology

described above. The two symbols will now be considered individually and their possible meanings discussed.

### The 'Face' Triple Pointer

Owen Gingerich describes this structure on the Tsvi Herz astrolabe as 'the points of a satyr's beard (?)'<sup>19</sup> whereas David King calls it 'the face of an ogre'.<sup>20</sup> In contrast, I propose that it is actually a caricature of Edward III in the guise of a bull, that is, it shows the commissioner and donor of the astrolabe. The

actual appearance of the engraving is visibly rather bull-like, from the snout with three bulbs to the ears and other features. The long beard is typical of Edward in his mature years as is seen in numerous illustrations (see Fig. 5 for a typical example) and also on the effigy which is on his tomb in Westminster Abbey.<sup>21</sup> The bull was a rather appropriate symbol for Edward because it has been recognised since Antiquity as representing power, potency and fecundity.<sup>22</sup> Representations of bulls also appear on the back of the Sloane astrolabe with



Fig. 8 The thistle and the teasel (spelled 'Thesyl') in 'The Tudor Pattern Book', c. 1525. The central seed head of the teasel was known as the 'king' and the smaller ones on the main side-shoots as 'queens'. Bodleian Library, MS Ashmole 1504, f. 18v. Creative Commons NonCommercial 4.0 International (CC BY-NC 4.0).

a very similar style, as shown in Fig. 6.<sup>23</sup> The head of a black bull can be found denoting Edward's paternal great-grandfather Henry III in a genealogical roll by Roger of St Albans (fl. c. 1450; see Fig. 7a) and it was also the symbol of Edward's second surviving son, Lionel of Antwerp, Duke of Clarence (1338–68). The 'Black Bull of Clarence' remains one of the Queen's Beasts today.<sup>24</sup>

The strongest evidence that Edward was widely known at the time as being represented as a bull comes from the important genre of literature called political prophecy in which the course of national and international affairs was prophesied (sometimes with hindsight!) by representing the players as animals rather than by name.<sup>25</sup> One of the most important of these prophecies is known as 'The Prophecy of John of Bridlington', also called the 'Prophecy of the Bull'.<sup>26</sup> It was originally written in the 1320s although it was modified, copied and commented upon (including by the Augustine friar John Erghome of York) throughout the fourteenth century: around forty manuscript copies are known.<sup>27</sup> It was a Latin poem of some 600 lines in leonine hexameters and it states (in Latin) that 'The Bull will be strong, fearing not at all the sadness of death; sober and chaste, upright without any crime, fortunate: Not slow to do good, bold as the leopard.' The later published version of the 'Bridlington Prophecies' was dedicated to Humphrey of Bohun (1342–73), 7<sup>th</sup>



Fig. 9 Teasels at Tuckers Hall, Exeter. (Note that 'tucker' is a West Country term for a fuller.) (a) the Master's coat of arms with a set of teasels in a 'bachandle' in the upper red triangle (b) individual teasels hanging from the rafter decoration. Photos courtesy of Edmund Knight.

Earl of Hereford, whose two daughters went on to marry Thomas of Woodstock, youngest son of Edward III, and Henry Bolingbroke, son of John of Gaunt and hence grandson of Edward: clearly, the poem was influential in Edward's intimate circle. The identification of Edward as *taurus* (the bull) and his defeat of *gallus* (the cock, i.e. the king of France) after a battle likely to be identified as the Battle of Crécy (1346) is made clear in the later revised versions.<sup>28</sup> The 'Bohun psalter'<sup>29</sup> includes a figure of a bull in choir vestments as a marginal illustration to Psalm 68 (Fig. 7b) and is thought to allude to a connection between Edward III and the biblical David.<sup>30</sup>

### The Botanical Triple Pointer

Whilst the triple pointers on the right hand side of the ecliptic and shown in Fig. 2 are clearly botanical in form, identifying the highly stylised plant species is by no means easy. Gingerich in 1987 described the central device on the Tsvi Herz rete as 'a flower (thistle?)'.<sup>31</sup> But the thistle is the symbol of Scotland and Edward III had defeated the Scots at the Battle of Halidon Hill in 1333 so it seemed unlikely that he would choose it as an emblem. (As a result of the battle, the town of Berwick came under English control for the first time in several decades: it is noticeable that the Istanbul astrolabe and other later members of the Sloane group include plates for the latitude of Berwick (56°) whereas the Sloane astrolabe itself, believed to be from c.1327, does not.)

My first guess was that the plant might be the broom, (*planta genista*) since this was the origin of the Plantagenet name adopted by Edward's ancestors, as he would have been well aware. Livery collars for the Order of the

Broomcod (the seedpod of the broom plant) feature prominently in Richard II's devotional Wilton Diptych where the plant is represented on the collar of Richard and on the angels.<sup>32</sup> Looking at the real plant and stylised drawings of it in early 'herbals' though, even with wishful thinking, failed to show a convincing similarity.<sup>33</sup> I appealed for help to the online mailing list of the Society for the History of Natural History<sup>34</sup> and received a number of useful replies. One which appeared promising, giving a possible visual match to the star pointer's central terminal, was the inflorescence of the grape hyacinth (*muscari*).<sup>35</sup> In Greek mythology, 'Hyacinthus' was the name of a young Spartan friend of Apollo (i.e. Phoebus-Apollo) the god who was the personification of the sun,<sup>36</sup> mentioned by Richard de Bury in his *Philobiblon*.<sup>37</sup> This is a rather tenuous link, however.

Although the thistle had been rejected, an image of it in a Tudor pattern book showed it alongside the teasel (*Dipsacus fullonum* or *sativa*) as shown in Fig. 8. This struck an immediate chord as the bract or dried seed head of the teasel (sometimes 'tasle' or various other medieval spellings) with its myriad of fine hooks, was used for several centuries to raise the nap of fine woollen cloth immediately after the operation of fulling and before shearing. As a large percentage of England's wealth at this time was through the export of cloth (acting as surety for the large loans from Italian banking houses by which the Edwardian kings financed their various wars). One of the causes of the Hundred Years War was the desire to support the struggles of Flanders, England's main trading partner for wool and cloth, against actions by France.<sup>38</sup>



Fig. 10 One of several angels carrying a 'bachandle' (frame) loaded with teasels in the chapel built by John Lane at Cullompton, Devon. Photo courtesy of Isla Knight.

Teasels for this purpose were cultivated in large numbers across the country and in 1326 King Edward II had been persuaded to sign an Ordinance of the Staple, prohibiting the export of 'tasles' to prevent an English shortage.<sup>39</sup> In addition, 18,000 teasels were imported to Exeter in 1331–32.<sup>40</sup> This suggests that the teasel would be a very appropriate symbol on an astrolabe being given to a European merchant.

The teasel was quite a common symbol of the cloth trade and of wool merchants<sup>41</sup> with the symbolic representations having varying degrees of realism. For examples, see its appearances at the 15<sup>th</sup>-century Tuckers Hall (the original home of The Guild and Incorporation of Weavers, Fullers & Shearmen) in Exeter<sup>42</sup> shown in Fig. 9 and in a chapel built by the wealthy cloth merchant John Lane in Cullompton (Fig. 10). It was also used as a charge on armorials, particularly of wool merchants or of towns and boroughs across the country where it was grown (e.g. Ashburton (Devon), Kendal (Cumbria),<sup>43</sup> Chichester-Constable, Bowden etc.).<sup>44</sup> The teasel also featured in contemporary literature, for example in William Langland's *Piers Ploughman*.<sup>45</sup> In use, several teasel heads were fitted into a special handle (Fig. 11) and there were even special ventilated buildings where the teasels could be dried.<sup>46</sup> It is noticeable that



Fig. 11 Fitting teasel heads into a hand frame. Jacob Schpensetzer; c.1425. Hausbuch der Mendelschen Zwölfbrüderstiftung, Band 1. f.166v. Nürnberg 1426–1549. Stadtbibliothek Nürnberg, Amb. 317.2°. Creative Commons.

the original fir-cone shape of the wild teasel gradually evolved by selective cultivation into a longer and more cylindrical shape by the late 19<sup>th</sup> century when its general use, by then mounted on mechanised rollers, faded out. This has led to some confusion in naming between the *fullonum* (fuller's) and *sativa* varieties. In growth, the seed-head on the central stem is always the strongest and the largest and was known at the time as the 'king'.<sup>47</sup> Those on the main side stems were 'queens' and those on the smaller stems elsewhere were 'princes' or 'buttons'.<sup>48</sup> This surely makes it an appropriate and readily understood symbol to appear on a gift from King Edward III who was rapidly gaining the reputation as the pre-eminent ruler of Europe. As such, its use reinforces that of the central quatrefoil on the astrolabes which, it has been proposed, stood in this instance as a representation of the four-leaved clover, the *corona regia* (king's crown).<sup>49</sup>

Having identified the central stem of the botanical triple-pointer, it is next necessary to consider its overall shape. Here, it can perhaps be taken as a modified form of a fleur-de-lys.<sup>50</sup> This of course is a principle element of the French coat of arms (*azure, semé-de-lis argent*) and it should be noted that in the 'Bridlington' prophecy France is represented as both the lily (*lilium*) and the cock (*gal-*

*lus*).<sup>51</sup> In 1340 Edward III formally changed his (and the English) coat of arms by quartering the traditional *gules, three leopards* or of his ancestor Richard I with that of France, making his claim on the French crown abundantly clear and signalling an intensification of what was to become known as the Hundred Years War. See Fig. 5. Whether the astrolabe triple-pointer can be seen as a precursor to this move is moot: other considerations suggest that the astrolabes are from the decade before the change.

#### Other Astrolabes with Triple-pointers

The astrolabe Mensing-26 (no. 4 above) is clearly a member of the Sloane group and has two triple pointers inside the ecliptic but they are not of the same form as the three astrolabes just described although it can be seen in Fig. 4 that they are the same combination of a zoomorphic and a floral design.<sup>52</sup> Perhaps it represents an early expression of the ideas, later adapted to the bull and teasel forms. The 'dog' (?) form of the left hand triple pointer could well be a private joke shared between Edward and a faithful servant, recipient of the gift, but this is speculation.

The Whipple astrolabe (no. 5 above) is very closely based on the Sloane group instruments but with differences in engraving hand and details (for example, the single latitude – Norwich? – and the spelling of the star names) which suggest a different workshop. It also appears to be very slightly later than the other instruments which might point to it being

after the death of Richard de Bury, the likely champion of the series of astrolabe gifts, in 1345.<sup>53</sup> It is unfortunate that the terminal of the central stalk of the botanical pointers is broken off (it is unclear when this happened) but it is highly likely to have been another teasel. The absence of any facial features on the ‘bull’ triple pointer could indicate that the astrolabe was not a direct gift from Edward as it would have been rather disrespectful for anyone else to have used the caricature. There is more to discover about this astrolabe.

The Sotheby’s/Time astrolabe (no. 6 above) is not of the same quality as any of the others though it does appear to be 14<sup>th</sup> century. With only one of the triple pointers present and a significant number of single zoomorphic pointers of various types, its rough similarity to the Sloane group instruments might result from a maker who had seen one or two of them but was producing his own design from memory. He might have misremembered the details of the bull’s face and not realised its significance. The mere fact of its existence, though, suggests that the other astrolabes were made available for viewing.

### Concluding Remarks

Although the identification of the triple pointers on three of the Sloane group astrolabes as symbolic bulls and teasels is not certain, there is considerable circumstantial evidence to support the supposition. As a result, the association of this whole group with King Edward III is strengthened and their purpose as political gifts to major supporters made clear. The character of Edward as a young king at the height of his powers is apparent showing a confidence and willingness to be represented in a light-hearted manner whilst at the same time as declaring his strong claim on the French crown.

If it is accepted that the astrolabes were political gifts, it begs the question to whom were they given? The retes do not contain any clues to the identify the recipients so it is very unlikely that the original owner of the astrolabe now represented by Baillie’s rete will ever be identified. Fortunately, the backs of the Sloane group astrolabes include calendars of saints’ or feast days, in several cases personalised for the recipient. This allowed a tentative first owner of the Tsvi Herz astrolabe to be hypothesised as John Stratford (c. 1275–1348), successively Bishop of Winchester, Archbishop of Canterbury, Treasurer and Chancellor of England.<sup>54</sup> As an aside, it can be noted that the ‘bull’ on this rete wears a frown and a pained expression which might possibly be attributed to the personal antagonism – later reconciled – between Edward and his Chancellor.<sup>55</sup> For the Istanbul astrolabe, ongoing investigations (beyond the scope of

this article) have provided the name of a particular Italian merchant who fits the clues and who will be published in due course.<sup>56</sup>

It seems that any astronomical, or even astrological, use of these astrolabes was rather secondary to their being visible tokens of the king’s gratitude. They remain, though, quite accurate according to the astronomical knowledge of the time and hence have been made in a workshop led by deep technical knowledge and not just abilities in fine metalwork. This narrows the candidate sites for the workshop.

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**Keywords:** King Edward III, gothic rete, star pointers, English/French coats of arms, Royal gifts, Sloane Group astrolabes.

### Notes and References

1. J. Davis, ‘Fit for a King. Decoding the great Sloane astrolabe and other English astrolabes with “quatrefoil” retes’, Chapter 9 (pp. 310–56) in, Josefina Rodriguez-Arribas, Charles Burnett, Silke Ackermann and Ryan Szpiech, eds, *Astrolabes in Medieval Cultures* (Brill: Leiden, 2019). DOI:10.1163/9789004387867. An earlier version was published in *Medieval Encounters*, special issue on ‘Astrolabes in Medieval Cultures’, **23** (2017), pp. 311–354.
2. The great Sloane astrolabe in the British Museum is inv. no. SLMATHInstr.54 and was purchased by Sir Hans Sloane before 1753 and was donated on his death as part of the founding collection of the British Museum. It was described by Gunther (see note 9 below) and is recorded in the IIL (International Instrument List, previously the CCA, the Computer Checklist of Astrolabes) as #290.
3. Richard de Bury (1287–1345) went on to

become the Chancellor of England and the Keeper of the Seal before being appointed the Bishop of Durham. He remained one of Edward III’s closest advisors and confidants until his death. See W. Mark Ormrod, ‘The King’s Secrets: Richard de Bury and the monarchy of Edward III’, pp. 163–78 in C. Given-Wilson, A. Kettle and L. Scales, eds, *War, Government and Aristocracy in the British Isles c. 1150–1500*, (Woodbridge: Boydell Press, 2008).

4. For a recent list of the Sloane group, see n.1 or J. Davis, ‘Small Details Matter: the search for medieval astrolabe workshops’, *Bulletin of the Scientific Instrument Society*, No. 153 (June 2022), pp. 7–14. The number of astrolabes in the group has grown as more are uncovered and it depends on whether very similar astrolabes, thought to be slightly later copies not from the original workshop, are included.

5. The ‘Tsvi Herz astrolabe’ was donated to the London Science Museum in 1880 and is inv. no. 1880-26. It was described by Gunther (note 9) and is IIL #293. Its original ownership was considered in Davis, ‘Fit for a King’, note 1.

6. ‘Baillie’s rete is in the History of Science Museum, Oxford University, inv. no. 45133. It was described by Gunther (note 9) and is IIL #294. It is named after its owner in the 1930s, the clock historian G.H. Baillie, later being passed to R.P. Howgrave-Graham, another clock historian with a special interest in medieval turret clocks, who sold it to the Museum in 1956.

7. I am very grateful to Gaye Danişan for confirming the continued existence of this astrolabe.

8. The ‘Istanbul astrolabe’ was not known to Gunther but is in the Bilim ve Teknoloji Tarihi Enstitüsü, Teknik Üniversitesi, İstanbul (Technical University of İstanbul) and currently in the office safe of its Director. It is ‘Usturlab no. 2’ and is listed in the IIL (or CCA) as #4508. An old typed exhibit label attached to it incorrectly states ‘1300 senelerinde İspanya’da yapılan bu usturlab Endülüs-İspanya karışımıdır. Üzerindeki rakamlar Arap etkisi ile yazılan rakamlardır. Safihalarda ayrıca Arapça “Mismar” kelimesi bulunmaktadır.’ [This astrolabe made in Spain around c. 1300. Its form is a mixture of Andalusia and Spain. The numbers (rakamlar) on the astrolabe engraved with Arabic influence. There is also an Arabic word which is “MISMAR” on the plates.]

9. R.T. Gunther, *Astrolabes of the World. Vol. I: The Eastern Astrolabes; Vol. II: The Western Astrolabes*. (London: The Holland Press, first published 1932. Published as a single volume 1976), pp. 462–65.

10. Owen Gingerich, 'Zoomorphic Astrolabes: Arabic star names enter Europe', in *From Deferent to Equant: A volume of studies in the history of science in the ancient and medieval Near East in honor of E.S. Kennedy*, David A. King and George Saliba, eds, *Annals of the New York Academy of Science*, Vol. 500, 1987, pp. 89-104. Reprinted in *The Eye of Heaven: Ptolemy, Copernicus, Kepler* (New York: American Institute of Physics, 1993), pp. 81-101.
11. David A. King, *In Synchrony with the Heavens, Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic Civilization*, (Leiden: Brill, 2014), Vol 2, Part 2 ('Instruments of Mass Calculation), Quatrefoil Decoration on Astrolabe Rets', p. 986 and Fig. 3.6. See also <https://davidaking.academia.edu/research>. A more detailed study of the astrolabe and its likely provenance is in preparation by the present author.
12. The XRF results for the Tsvi Herz astrolabe components were reported in Davis, 'Small Details Matter', note 4 which also discusses the significance of the bismuth signal as a marker for the source of the copper ore used. The Istanbul astrolabe was not available for analysis.
13. There are some small variations in the spelling and form of abbreviation of the names between the three astrolabes.
14. The astrolabe is in the Adler Planetarium and Museum, Chicago, with inv. no. M-26.
15. J. Davis: 'A Royal English Medieval Astrolabe Made for Use in Northern Italy', *J. Hist. Astron.*, **48**:1 (Feb. 2017), pp. 3-32 (Feb 2017). DOI: 10.1177/0021828616681214. It was earlier described (with some errors) in R.M. Webster, *Western Astrolabes* (Chicago: Adler Planetarium, 1998). The astrolabe M-26 is #1, pp. 40-3.
16. Whipple Museum of the History of Science, inv. no. Wh.1264. The astrolabe does not appear in Gunther though it was later assigned #4752 and may also be IIL #573. See Seb Falk, 'Sacred Astronomy? Beyond the stars on a Whipple astrolabe', Chapter 1 in J. Nall, L. Taub and F. Willmoth, eds, *The Whipple Museum of the History of Science – Objects and investigations to celebrate the 75<sup>th</sup> anniversary of R.S. Whipple's gift to the University of Cambridge* (CUP, 2019). The astrolabe is also the exemplar used in Seb Falk, *The Light Ages: A Medieval Journey of Discovery*, (London: Allen Lane, 2020).
17. Sotheby's, London, 18 June 1986, lot 125, catalogue notes by Francis Maddison. 'Time' exhibition, Nieuwe Kerk, Amsterdam. Catalogue by Anthony J. Turner, ed., (The Hague, 1990), Item 186, pp. 101 & 106: the description calls the face triple-pointer a 'hand with pointing fingers' ignoring the facial features.
- IIL #4509. Its current private owner is unknown.
18. Fusoris routinely employed a single triple pointer connected to the equinoctial bar inside the ecliptic but it always consists of three simple flame-shaped pointers with their bases interconnected: whether he took inspiration from the earlier English astrolabes is unknown. See, for example, Anthony Turner, 'Recycling Early Modern Mathematical Instruments', *Nuncius*, **37**:1 (2021), pp. 1-17, doi:10.1163/18253911-20210805.
19. Gingerich, *Zoomorphic* (note.10), p. 86.
20. King, *Synchrony* (note 11).
21. See <https://www.westminster-abbey.org/abbey-commemorations/royals/edward-iii-and-philippa-of-hainault/>
22. J. Tresidder, ed., *The Complete Dictionary of Symbols in Myth, Art and Literature* (London: Duncan Baird, 2004), p. 80. It also describes the bull as "a protean symbol of divinity, royalty and the elemental forces of nature" as well being an emblem of lunar, solar and sky gods.
23. Both images of the bull on the Sloane astrolabe are also shown and described in 'Fit for a King' (note 1), Fig. 9.13.
24. H. Stanford London and George Bellew, *The Queen's Beasts* (London: Newman Neame, 1953).
25. Lesley A. Coote, *Prophecy and Public Affairs in Later Medieval England*, (York, York Medieval Press; 2000). See in particular Chapter 3, 'Expectation and Disappointment', pp. 1307-1340.
26. Caroline Shenton, 'Edward III and the Symbol of the Leopard' in P.R. Coss & M. Hugh Keen, eds, *Heraldry, Pageantry and Social Display in Medieval England* (Woodbridge: Boydell Press, 2002), p. 69.
27. Michael J. Curley, 'The Cloak of Anonymity and "The Prophecy of John of Bridlington"', *Modern Philology*, **77**:4 (May 1980), pp. 361-369. <https://www.jstor.org/stable/437589/>
28. Coote, *Prophecy and Public Affairs* (note 25), p. 30, op. cit.
29. Now British Library, Egerton MS 3277. The figure of the bull is on f.46v.
30. Lucy Freeman Sandler, 'Political Imagery in the Bohun Manuscripts', in A.S.G. Edwards, ed., *Decorative Illustration in Medieval English Manuscripts*, (London: British Library Board, 2002), pp. 114-153 especially p. 135.
31. Owen Gingerich (note 10), p. 86.
32. Dillan Gordon, ed., *The Wilton Diptych*, (London: National Gallery / Yale University Press, 2015), pp. 49-53.
33. John Gerard, *The Herball, or, Generall Historie of Plantes* (London, 1633, 2<sup>nd</sup> ed.), see: <https://www.biodiversitylibrary.org/item/285804#page/1357/mode/1up>. A possible exception is an image in *Le Grand Herber en Francoys*, and a 1526 edition of the English version, *The Grete Herball*, with the same or a similar image. <https://www.cppdigitallibrary.org/items/show/1083?collection=35&page=12> in which there are teasel-like flower-heads above the seed pods.
34. I am grateful to Charlotte Tancin and her colleagues at the Hunt Institute for Botanical Documentation, Carnegie Mellon University, for providing this connection.
35. For an image of the *Hyacinthus botryoides*, c. 1600, see for example [https://www.britishmuseum.org/collection/object/P\\_SL-5270-53](https://www.britishmuseum.org/collection/object/P_SL-5270-53).
36. See [https://en.wikipedia.org/wiki/Hyacinth\\_\(mythology\)](https://en.wikipedia.org/wiki/Hyacinth_(mythology)) for details of the Hyacinth myth.
37. See Davis, 'Fit for a King' (note 1).
38. Ben Johnson, 'History of the wool trade', *History Magazine*, online at <https://www.historic-uk.com/HistoryUK/HistoryofEngland/Wool-Trade/>
39. Eleanora Carus-Wilson, 'The Significance of the Secular Sculptures in the Lane Chapel, Cullompton', *Medieval Archaeology*, **1**:1 (1957), 104-17 and plates XIII to XVI. <https://doi.org/10.1080/00766097.1957.11735385>. The 1326 Ordinance is mentioned on p. 111, quoting Close Rolls 19 Edward II m. 5d.
40. Ibid., quoting Exeter City Muniments Custom Rolls 5-6 Edward III.
41. Geoffrey Egan, *Provenanced Leadene Cloth Seals*, Ph.D. thesis, University College London, 1987. The seals shown are mainly 17<sup>th</sup> century but there is little doubt that the usage extends back much further. Egan calls the teasel seed heads 'cobs'.
42. Mary Chisholm, *The Teasel in the English Woollen Cloth Industry*, (2020) <https://www.exploringbuildinghistory.co.uk/the-teasel-in-the-english-woollen-cloth-industry/>
43. John Satchell, *The Kendal Weaver*, (Kendal, F. Peters; 1986). It includes an illustration of teasel heads packed into a *bachandle* (hand frame).
44. Arthur Charles Fox-Davies & Graham Johnston (illustr.), *A Complete Guide to Heraldry*, (2012), <https://www.gutenberg.org/files/41617/41617-h/41617-h.htm>
45. William Langland, *The Vision and Creed of Piers Ploughman*, Vol. 2, c. 1377, (London, J Russell Smith, 1856) lines 10532-35. In translation:  
'...Is not comely to wear;

## Current and Future Events

*Till it be filled under fote, or in fulling  
stocks;  
Washen well with water, and with teasel  
scratched,  
Towked and teynted, and under talour's  
hands.'*

46. A remaining drying building from the 1840s in Trowbridge, Wilts., is called The Handle House: it can be seen at <https://englishbuildings.blogspot.com/2021/05/trowbridge-wiltshire.html>.

47. W. Dallimore, 'The Fuller's Teasel (*Dipsacus Fullonum*, L.)', *Bull. Misc. Info. Roy. Bot. Gard. Kew*, 7 (1912), pp. 345-350. The article states that the teasel was introduced to England by overseas artisans in the reign of Richard I and that it was in full cultivation by the reign of Edward III: in 1912 there were experiments on new methods of cultivation and the heads were installed on mechanical rollers rather than manual handles. The teasel is today still used but only for the finest fibres such as cashmere and vicuna: see <https://www.johnstonsofelgin.com/retail/our-story/our-craftsmanship/>.

48. <https://www.exploringbuildinghistory.co.uk/the-teasel-in-the-english-woollen-cloth-industry/> See also Satchell, 'Kendal Weaver' (note 40).

49. See Davis, 'Fit for a King' (note 1).

50. This has also been suggested by Christine Bartram (ex-Cambridge University Herbarium).

51. Coote, 'Prophecy' (note 25), pp. 30-35.

52. Davis, 'Royal English astrolabe' (note 15).

53. Despite the enthusiasm for astrolabes shown by Richard de Bury, Edward III was not overly keen on astrology. As a result, astrolabe making in England seems to have decreased markedly after Richard's death (and the Black Death in 1348) until it started up again in the Chaucerian period under the reign of Richard II, beginning in 1377. See Hilary M. Carey, *Courting Disaster: Astrology at the English Court and University in the later Middle Ages* (Basingstoke: Macmillan Academic, 1992), especially Chapter 5, 'Astrology Ignored: The Court of Edward III', pp. 79-91.

54. Davis, 'Fit for a King' (note 1), p.353.

55. The difficulties between Edward and John Stratford arose in 1340 whilst the latter was left in charge of England's finances as Edward was in Flanders at the siege of Tournai and short of money: see I. Mortimer, *The Perfect King. The life of Edward III, Father of the English nation*, (London: Jonathan Cape, 2006), pp.182-188.

56. John Davis, 'A Medieval English Astro-labe in Istanbul', in preparation.

*Details of future events, meetings, exhibitions, etc. should be sent to the Editor. Check our website for full details of SIS events: <https://scientificinstrumentsociety.org/events/>*

### 'Fireside Chats' on Zoom at 5 pm London time

The format is now well established: Informal talks of 25 mins will be followed by a 15-20 minutes discussion, on selected Saturday afternoons.

**10 Dec 2022:** 'A Case for Curiosity' by Sara Schechner.

**14 Jan 2023:** 'Alva Mason, Philadelphia Instrument Maker, 1824-1860' by Steve Beare.

**11 Feb 2023:** 'From Galvanometers to Oscilloscopes: The development of instruments to detect and record electrical signals 1850 to 1970' by Robert Whitworth.

**11 Mar 2023:** 'Exponential ex machine – a quest from history to action' by Pietro Milici and Frédérique Plantevin.

*Save the date for subsequent Fireside Chats: Apr 15, May 27, Sept 16, Oct 14, Dec 9 2023.*

*All Zoom links and booking forms will be circulated to members in due course*

*See separate flyer in this Bulletin for more details of the forthcoming Fireside Chats.*

### Online Resources

Royal Institution online lectures: <https://www.rigb.org/whats-on>

Gresham College online lectures: <https://www.gresham.ac.uk/>

The British Society for the History of

Science (BSHS) Travel Guide for places of scientific interest <https://www.bsbs.org.uk/travel-guide/>

### Exhibitions and Events

Exhibitions in London: <https://www.ianvisits.co.uk/>; <https://royalsociety.org/science-events-and-lectures/>

Exhibitions across the UK: <https://www.artfund.org/whats-on>

*Any questions or suggestions? Please send them to Louise Devoy via [events@scientificinstrumentsociety.org](mailto:events@scientificinstrumentsociety.org)*

### Post Turner Lecture Meal

Dr Alison Morrison-Low's Gerard Turner Memorial Lecture (colloquially referred to as the 'Medal Lecture') was much enjoyed at the Society of Antiquaries on the 4<sup>th</sup> of November. As reported by our Events Secretary, Louise Devoy, 'it was nice to see a good crowd both in person and online'. It is intended to publish the lecture next year in the *March Bulletin*.

After the informal drinks reception at Burlington House a small group of dedicated members moved on for a meal at The King's Head in Albemarle Street, a traditional London pub dating back to 1710. It is evident from the picture that the participants enjoyed themselves after a stimulating lecture and felt at ease in their High-Victorian surroundings of dark-wood bar and floors and leather banquettes.



Fig. 1 From left to right: Charles Miller, Joan Schwartz, Sylvia Sumira, Jane Insley, Victor Burness, Budd la Rue, Peter de Clercq, Stephen Johnston, Louise Devoy, Alison Morrison-Low, Gloria Clifton, Carole and Neil Brown. Photograph taken by an obliging waiter. Photo courtesy Louise Devoy.