Hic Sunt Dracones:1

Why are there dragons on medieval astrolabes?

John Davis

One of the many delights of researching medieval astrolabes is that the star pointers on their retes are often zoomorphic. In particular, the two ends of its outer frame (the Capricornian ring) are sometimes fashioned as the head and tail of a dragon – see Fig. 1 for an example. Whilst the use of a dog’s head as the pointer for the Dog star Sirius (α CMa, Alhabor), or birds for the Eagle Altair (α Aql) or the Raven Corvus (γ Crv, Algorab) are obviously intended as forms of a rebus or aide-memoire, it is not clear what meaning the dragon is supposed to portray.

Surprisingly, there have been very few proper studies of this feature with not even a listing of which astrolabes include dragons being published, let alone a listing of which astrolabes include dragons being published, let alone an accepted hypothesis connecting them with a development of the instrument from the early 14th century onwards. Owen Gingerich did publish a useful study in 1987 on zoomorphic astrolabes but he was principally interested in the introduction of Arabic star names into the Latin West.2 More recently, Azucena Pérez has made an important contribution to the subject, pointing out that the dragons only appear on Christian astrolabes, not on Islamic ones, and that they are not discussed in contemporary manuscript treatises describing the design and use of the instrument, despite the fact that they are actually included in some of the illustrations to Geoffrey Chaucer’s 1391 Treatise on the Astrolabe.4 Instead, she points to contemporary astrological and magic treatises which do consider dragons. Other authors have mentioned the dragons in passing: John North5 identified them merely as star pointers for the stars Calbalacrab (α Sco, Cor Scorpionis) and Denebalgedi (δ Cap, Cauda Capricorni). Paul Kunitzsch6 showed that they might be indicators of the Ptolemaic constellation Serpens. David King has shown them frequently in his extensive astrolabe publications but without a detailed discussion.7 These ideas will be discussed below but it should be pointed out that existing explanations are exclusively astronomical and thus may well miss the way in which medieval minds were working.

A Note on Terminology

In Latin, serpens refers to a snake, a real animal sometimes called a serpent in old English, and dracone to the mythical dragon.8 However, these distinctions were not always made and it is often not clear which beast is being indicated – the creature in the 13th-century wrought-ironwork on the infirmary doors of Norwich Cathedral (Fig. 2) could be either.9 Added to this, there was a variety of different types of dragon to be found in a medieval bestiary. The true dragon had two pairs of

---

Fig. 1 (a) The earliest dated Latin astrolabe of 1326 includes the head and tail of a dragon. British Museum inv. BM 1909 0617.1. Left (b) the dragon’s head. Photos by the author with permission of the Trustees of the British Museum.

Fig. 2 One of a pair of ‘dragons’ in the wrought ironwork of the infirmary doors of Norwich Cathedral c. 1280. Now in Norwich Castle Museum.
legs and a pair of wings. The ‘wyvern’ had one pair of legs and wings whilst the ‘wyrm’ had neither wings nor legs and hence looked rather like a snake though its breath was said to be poisonous. Note, though, that dragons had (external) ears which real snakes lack. One form of ‘dragon’ known as an ‘amphisbaena’ had a secondary head on its tail which might account for some of the astrolabe depictions.

By the nature of the Capricornian ring, the beasts on astrolabe retes are generally long and thin, lacking legs or wings, but they usually have visible ears so they will be referred to here generically as dragons. Robert Gunther, though, describes the creatures on Vincenzo Danti’s astrolabe (no. 27 in Table 1) as “snakes” despite the fact that both heads clearly have ears and, on this occasion, the animals have legs too, as can be seen in Fig. 3. Elsewhere, he tends to describe the English astrolabes as having “Dragons” whereas Owen Gingerich calls the figures on the ‘Painswick’ and ‘Blakene’ astrolabes (nos. 12 and 11 in Table 1 respectively) “serpents” so it seems there has been little consensus or consistency amongst modern writers. Ptolemy did know the difference and his list of 48 classical constellations includes both Draco (in the far northern sky not related to astrolabes) and Serpens, on which there is more below. Both these constellations appear amongst the 88 of the modern IAU list.

**Which Astrolabes Have Dragons?**

Table 1 lists the astrolabes which are known to feature dragons on their retes – there may be others to add to the list. The table makes several points; firstly, the earliest dated European scientific instrument, from 1326 and now in the British Museum (BM; see Fig. 1), is on the list (no. 1) and hence is the earliest dated appearance of a dragon on the Capricornian ring. Secondly, the majority of the earliest astrolabes are English but dragons became popular on Italian astrolabes from the middle of the fourteenth century, remaining until the beginning of the sixteenth century. Other nations are missing from the list – there are no instruments from Spain or Germany listed and the austere designs from the Parisian workshop of Jean Fusoris never have dragons. Thirdly, although the most common configuration is to have the head of the dragon on the right (near Scorpionis/Sagittarius on the ecliptic) and its tail on the left (near Capricornus/Aquarius), the opposite arrangement is also seen and there are even cases where there are two heads and no tail. These variations are unexplained.

It is highly likely that there were a few astrolabes in England before the BM’s 1326 instrument. For example, Adelard of Bath would have had an astrolabe when he wrote his *De Opere Astrolapsus* for Henry II in 1142 or 1149. And Walcher of Malvern evidently had one (possibly brought from his home location of Lotharingia) for timing the lunar eclipse of 18 October 1092. We have no idea whether they included dragons but it seems unlikely as their astrolabes would have followed the Islamic designs gradually being copied in the Latin parts of the Iberian peninsula.

Two other astrolabes are thought to have been made within a year or two of the BM’s 1326 instrument. One of these is the Great Sloane astrolabe, also in the BM, and the other is a very small astrolabe belonging to Gonville and Caius College, Cambridge, where it has spent most of its life. All three of these astrolabes also include calendars on their backs which list a selection of important saints’ or feast days. They were the first to adopt this feature which became a particularly English trait for the next century and they also all have connections with East Anglia which will be discussed further below. The dragon’s head on the Sloane astrolabe (Fig. 4) is in the left-hand position and is easily overlooked. That on the Caius astrolabe (Fig. 5) is not particularly well modelled but is more prominent.

**Astrological and Astronomical Origins**

The early references to dragons in an astronomical and/or astrological context come from the Islamic world though the origins are much earlier. For example, a 12th-century Arabic manuscript has a frontispiece miniature in which the head and tail of a dragon – ca-
put draconis and cauda draconis respectively – stand for the two nodes of the lunar orbit which cut the ecliptic 180° apart. These points are the result of the orbit being at approximately 5° to the ecliptic and it is only when the moon is at or very close to these points that an eclipse, either lunar or solar, is possible. The myth that it is a dragon swallowing the sun or moon that creates the eclipse goes back to the Babylonian civilisation and, in the middle ages, led to the two nodes being designated as pseudo-planets which appear on equatoria and astronomical tables with an orbit of their own.

A physical representation of symbolic representations of the pseudo-planets caput and cauda draconis amongst the other classical planets can be seen on the lid of the famous silver-inlaid bronze ‘Vasa Vescovali’ in the British Museum (Fig. 6). The vase dates to c. 1200 and is from Khurasan or possibly Herat (modern Iran and Afghanistan). The lid features eight roundels which contain personifications of the planets, including the dragon ‘Jawzahr’ who represents the lunar eclipse. An exhibition in New York in 1997 was explicitly arranged to display the images of the zodiac in Islamic art. Despite this abundance of interest in astrology in the Arab world, it must be stressed that no Islamic astrolabe is known which features dragons. Note that in Islamic astrology, the head and tail of the dragon are associated with the constellations Gemini and Sagittarius, respectively. This is not what is usually found on astrolabes where the most usual arrangement is to have the head near Sagittarius/Scorpio and the tail in Capricorn. There is an Arabic astrolabe with astrological symbols and tables, by ‘Abd al-Karīm al-Misrī dated 1227/8, in Oxford but the ends of its Capricornian ring are decorated with geometric shapes rather than dragons.

There is one astrolabe with Hebrew lettering, no. 4 in Table 1, but this is likely to be from the Catalan region of the Iberian peninsula where the translation of Arabic manuscripts into Latin often proceeded with the help of Jewish scholars.

Another image of dragons which might be thought to have influenced astrolabe design has a very early beginning; it is the ancient symbol of the Ouroboros where a dragon (or pair of dragons) circle indefinitely, swallowing its tail. The symbol was later used on the 1582 papal medal (Fig. 7) of Pope Gregory XIII, the initiator of the Gregorian calendar reform, where it circles the head of a ram representing the first point of Aries and hence shows the restitution of a stable calendar.

In the Latin West, the myth of the moon-swallowing dragon was part of the Islamic astronomical heritage that was imported through Moorish Africa and Al Andalus and translated into Latin in the program loosely known as the Convivencia. The most widely read Latin astronomical writer of the late 13th century (and later) was Johannes de Sacro Bosco (c.1195–c.1256) and a copy of his Computus shows just such a figure (Fig. 8). Here, the ‘serpent’ is continuously circling the ecliptic. This symbol would fit quite well with the dragons on the Capricornian rings of astro-
labes, lying just outside the ecliptic circle, but nowhere is this made explicit.

Sacrobosco also had the *caput* and *cauda draconis* figure, this time with two heads, showing the causes of a lunar eclipse in his most famous work, *Tractatus de Sphaera* (Fig. 9).

The head and tail of astrolabe dragons often incorporate star pointers. When the head is in the most common right hand position, the tip of its extended tongue is often used to point to *Cor Scorpionis* (†Sco, modern Antares) but it is difficult to see the heart of the scorpion’ and a dragon. This is in contrast to the use of a dog’s head as a rebus for the star *Alhabor* (Sirius, the Dog Star) or birds for *Corvus* (the Raven) and *Wega* (Altair, the Eagle) mentioned earlier. For the left-hand position, most commonly the tail, it is difficult to find a relevant bright star in the right position and although sometimes the tip of the tail is asymmetrical compared to the head, it is often necessary to use a separate star pointer rather than the tip of the tail to indicate *Deneb* or *Liedideneb* (Cauda Capricornus, δ Cap) for the ‘tail of the sea-goat’. When the head and tail of the dragon are in the other configuration, or there are two heads, it becomes even more difficult to find a logical connection to the stars. Thus it seems that the dragon is merely being used as convenient points on the rete strapwork for the base of the star pointers.

Paul Kunitzsch has discussed early manuscripts of Ascelinus’ star list (his Type III) which have annotations which he considers resolves the problem.24 One copy of the table, described by Charles Burnett25 and which dates to the second or third quarter of the 11th century, is shown in Fig. 10: it has been annotated by the original scribe with the words *caput* and *cauda serpentis*.26 These words appear against the stars Callalacrab and Liedideneb respectively and refer to the two parts of Ptolemy’s constellation Serpens. This was the only ancient constellation to be divided into two non-contiguous parts, being separated by the figure of the god Ophiuchus, the serpent-bearer. A much later drawing of the constellations is shown in Fig. 11. This then is a clear indication that the astrolabe dragons are intended to point to the general positions of the two parts of the constellation Serpens. Kunitzsch points to several examples: most of these are included in Table 1 but he also lists the drawing of a rete in the 11th century MS Vat. Regin. 598 f.120r although here there are two heads and no tail. There also remains the fact that the astrolabe figures are clearly *dracones* and not *serpentii*

---

**Fig. 7** The Ouroboros on the 1582 papal medal of Gregory XIII. It surrounds the head of a ram for Aries and thus celebrates the introduction of the Gregorian calendar.

**Fig. 8** An illustration from Sacrobosco’s *Computus*, BL Harley MS 3735 f.32v: Between 1264 and 1293. Courtesy of the Trustees of the British Library.
and that sometimes the heads and tails are reversed and associated with the wrong stars. In addition, there are no extant astrolabes with dragons until at least two centuries after these Type III manuscripts: star table Types VI and VIII which were used for the construction of dragon-bearing astrolabes never have similar annotations.

Non-astronomical Origins – The Norwich Connection

Previous attempts to explain the appearance of dragons on astrolabes have taken an entirely astronomical/astrological view of their origins, with only partial success. It is necessary to take a much wider view of the cosmos where, in the medieval mind, everything had a religious dimension and God (and the Church) was the centre of all aspects of life and ruled everything from architecture to natural philosophy, including astronomy.

One of the most common dragons in literature, at least before J.R.R. Tolkien, is that associated with St George. Although he was a Roman officer of Greek descent who lived in the 4th century and was venerated as a saint from the 5th century onwards, the story of St George and the Dragon is very much later, not being introduced until Jacobus de Voragine’s famous hagiographic Golden Legends in c. 1260. Although St George had been a popular saint in England since at least the time of Edward I, he was not the ‘patron saint’ of the country until much later, presaged by Edward III taking him as the patron of the Knights of the Garter at Windsor Castle in 1348, when George’s persona as a chivalrous knight made him an ideal figurehead. The medieval image of the dragon was that of the personification of evil and so the killing of a dragon by an heroic knight was the epitome of the triumph of good over evil and thus much used in religious imagery. One area of the country where St George was already the patron saint by the beginning of the 14th century was England’s second city, Norwich, and the surrounding area. Painted images of him on medieval roof screens still exist (see Fig. 12) for a splendid example in Filby All Saints church) in at least three churches in the area, often accompanied by images of two other dragon-killing saints, St Michael the archangel and ST Margaret of Antioch, both of whom had cults in the area. St George remained popular in Norwich for many centuries – a famous merchant’s hall (now named Dragon Hall) features a carved wooden dragon in the roof spandrel’s (see Fig. 13) and even in the late 19th century St George’s Day (23 April) was celebrated by a procession led by a model of ‘Snap’ the dragon. Other images of St George with his dragon abound locally, including a carved roof boss in the cloisters of Norwich Cathedral and also as part of the monumental brass for Sir Hugh Hastings (c. 1307–1347) in Elmington Church, Norfolk.

There is stone dragon on the Ethelbert Gate, leading into the cathedral and priory precinct in Norwich, which may have a direct relevance to the first appearance of dragons on astrolabe retes. In 1272 there was a violent uprising by the townspeople against the monks of the Benedictine Priory which led to parts of the cathedral, including the old Saxon Ethelbert Gate, being burnt down. The King (Henry III) and then the Pope had to be called in, resulting in 30 of the townspeople being hung and the whole city excommunicated. The rebuilding work, including the cloisters and the Gate, took many decades, being partly delayed by the Black Death. On the spandrels of the Ethelbert Gate, completed c. 1316, a figure with a sword is on one side attacking a dragon on the other (Fig. 14). The stonework is a faithful reproduction of the medieval original, but the original head of the dragon is preserved in the cathedral store. Note that the knight St George carried a lance in his initial battle with the dragon but later used a sword to behead it. Often, it is the archangel St Michael who is seen with a sword fighting a similar-looking dragon. The meaning of the Ethelbert dragon is a clear warning to the townspeople of Norwich not to rebel against God’s selected clergy again.
The astrolabe known as Caius B (Fig. 5, no. 3 in Table 1) has been shown almost certainly to have belonged to Walter of Elveden (a Norfolk town) who was a Cambridge University student in the first quarter of the 14th century and the writer of a Kalendarium, in 1327. Walter went on to become Bishop Bateman’s vicar of Norwich and, as executor to both the Bishop and their mutual friend Edmund Gonville, to be largely responsible for the foundation of both Gonville Hall (later Gonville & Caius College) and Trinity Hall in Cambridge. The astrolabe, which has a single plate designed and labelled for Norwich, looks to be the work of more than one hand and the rete, which shows rather amateur workmanship, includes strapwork which matches the shape of the arches in the Norwich Cathedral cloisters, then under construction. I would now like to suggest that it was the recently-constructed Ethelbert Gate which inspired the inclusion of a dragon’s head on the rete. If this hypothesis is correct, the inclusion of dragons quickly spread to other English astrolabes, becoming almost standard by the end of the century. Note that the diagrams in manuscripts of Chaucer’s famous Treatise on the Astrolabe often include dragons though there is no explicit mention of them in the text.

The inclusion of dragons next spread to Italy, where several city-states had a close trading relationship with England and had rulers who were friendly with England’s Plantagenet rulers. There was a regular interchange of gifts at the highest courtly levels which, it seems included astrolabes. One possible reason why the dragon (or serpent) emblem was so popular on Italian astrolabes might be that it appears on the coat of arms of the Visconti family who were the rulers of Milan throughout the 14th century and beyond – see Fig. 15.

**Dragon Species**

Not all dragons are created equal. Although many of the dragon designs are clearly individuals, there are some cases where a group of astrolabes have a very similar design of what might be regarded as a ’species’ of dragon and these are likely to be evidence of a workshop making a series of instruments, perhaps over many years, to the same basic design. The first instance of this is the English ‘Chaucerian’ astrolabes, made towards the end of the 14th and into the 15th centuries.

---

**Fig. 12** St George killing the dragon, medieval rood screen in All Saints’ church, Filby near Norwich. He can be identified as St George by the white surcoat with a red cross and by his use of a lance.

**Fig. 13** The carved dragon, c.1430, in the Dragon Hall, Norwich. Note the detailed appearance. Photo courtesy of Dave Guttridge, Photo Unit, Dragon Hall Heritage Volunteers.

**Fig. 14** Ethelbert Gate, Norwich Cathedral Precinct: (a) general view, (b) the original early-14th century head of the dragon, removed in the 1967 renovation (photo courtesy Roland B Harris, Norwich Cathedral Archaeologist).

**Fig. 15** The coat of arms of the Visconti family, rulers on Milan throughout the 14th century. Seen here on the archbishop’s palace in Piazza Duomo in Milan, Italy. It is blazoned ‘argent, an azure biscione [serpent] in the act of consuming a human’. (Wikimedia Commons).
These dragons have quite large heads and are characterised by their ears which are separated from the rest of the head by a pierced hole (see Fig. 16). The modelling is generally excellent. Slight variants suggest that either different workers in the workshop had their own versions or perhaps another English workshop was copying the design.

A different species of dragon can be found on a group of astrolabes which are thought to have been made in Italy (just possibly Milan) at about the same period as the Chaucerian ones. Tullio Tomba identified some of these astrolabes but others have since been found and are currently being studied further. They share a number of identifying features, not just the dragons which are quite small compared to the English species and have a ‘cricked neck’ (Fig. 17). This design evolved later into third species of dragon which can be recognised (Fig. 18) as coming from the workshop of Falcono (or Falconi) of Bergamo – some of whose astrolabes are signed.

These are rather an odd shape with a recessed lower jaw which deviates from the classical medieval shape. Their origin can be seen to have developed from that on an astrolabe made in 1462 in Urbino but unfortunately stolen from the Musée Départemental, Moulins (Allier), France in 1977 (see Fig. 19, no. 25 in Table 1). A very similar example, though smaller and with inferior workmanship, is in a private collection (no. 28).

**Dragon Extinction and Beyond**

Falcono’s workshop was operating in the early years of the 16th century and his astrolabes represent the latest to have had dragons on them. The diagrams in Johann Stoeffler’s widely-read *Elucidatio Fabricæ Ususque Astrolabii*, printed in 1564, includes an image of a rete (Fig. 20) which has a dragon, but the feeling is that this is merely for tradition rather than with any real meaning. On the real astrolabes of the same Renaissance period, particularly from the Louvain workshops which became the acknowledged leaders, dragons were totally absent – anything Gothic was distinctly out of date.

The terminations of the Capricornian ring do cry out for some sort of shaping or decoration so if a dragon is not used, makers sometimes look for other features. Pure decoration is possible with the foliate termination on Regiomontanus’ 1462 astrolabe for Bessarion although even here there may be hidden meaning.

Other modelled shapes include the pair of hands on a Sicilian (?) astrolabe in Oxford or even the pair of elephants’ heads on an Indian astrolabe (Fig. 21).

Dragons do occasionally appear on an astrolabe in locations other than on the rete. The most famous example is on the back of the great Sloane astrolabe where, rather than being purely decorative, they have important symbolic and didactic purposes. Another case is a supposedly Italian Gothic astrolabe, now in Nuremberg, which has pairs of dragons in bas-relief on the throne and underneath...
In conclusion, dragons on medieval astrolabes convey much more information about the origins of the instruments and their uses than has previously been appreciated. Further study will no doubt produce more insight into these fascinating and enigmatic artefacts.

Acknowledgements

A great many people assisted in the research for this article for which I am very grateful. They include Azucena Pérez; Richard Mattheuw; Dave Guttridge and Mary Bradford (Dragon Hall Norwich Heritage Volunteers); Seb Falk (Cambridge University, with thanks for useful discussions and much help with Latin manuscripts); David A. King for his insights into Islamic astrolabe and general information. Roland B Harris, (Norwich Cathedral Archaeologist) and Gudrun Warren (Norwich Cathedral Librarian). Lucy Blaxland and Lee Macdonald at the Oxford Museum of the History of Science; Anthony Turner; Domenico Inaudi, Irene Brightmer and Fiona Vincent for astronomical advice.
Table 1. A list of medieval astrolabes which feature dragons on the circumferential ring of the rete

<table>
<thead>
<tr>
<th>No</th>
<th>Owner/Inventory</th>
<th>IIL/CCA</th>
<th>Diam mm</th>
<th>Type</th>
<th>Date</th>
<th>Left Position Capricornus/ Aquarius*</th>
<th>Right Position Scorpionis/ Sagittarius*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BM 1909 0617.1</td>
<td>#291</td>
<td>132</td>
<td>Chaucerian</td>
<td>1326</td>
<td>Tail</td>
<td>Cor Corni</td>
</tr>
<tr>
<td>2</td>
<td>BM 'Sloane' SL MathInst-54</td>
<td>#290</td>
<td>462</td>
<td>Quatrefoil</td>
<td>c.1326</td>
<td>Head</td>
<td>(Denebalgedi)</td>
</tr>
<tr>
<td>3</td>
<td>Caius Coll Camb, 'B'</td>
<td>#301</td>
<td>88</td>
<td>Chaucerian variant</td>
<td>c. 1326</td>
<td>Tail</td>
<td>'Denebalgedi'</td>
</tr>
<tr>
<td>4</td>
<td>Adler Planetarium M-20²</td>
<td>#159</td>
<td>155</td>
<td>Quatrefoil Hebrew</td>
<td>C14a</td>
<td>Head</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>Sci Mus Tsri Herz 1880-26</td>
<td>#293</td>
<td>150</td>
<td>Quatrefoil</td>
<td>c. 1340</td>
<td>Tail</td>
<td>Cauda</td>
</tr>
<tr>
<td>6</td>
<td>OxMHS ‘Bailie’s rete’ 45133</td>
<td>#294</td>
<td>135</td>
<td>Quatrefoil</td>
<td>1330s</td>
<td>Tail</td>
<td>DENEBAL-GEDI</td>
</tr>
<tr>
<td>7</td>
<td>GNM W1.6</td>
<td>#548</td>
<td>144</td>
<td>Mixed</td>
<td></td>
<td>Tail</td>
<td>CAVILLA</td>
</tr>
<tr>
<td>8</td>
<td>NMM AST0590</td>
<td></td>
<td></td>
<td>Quatrefoil</td>
<td></td>
<td>Tail</td>
<td>(Libe)</td>
</tr>
<tr>
<td>9</td>
<td>BM ‘Chaucerian’ 1914, 0219.1</td>
<td>#298</td>
<td>123.4</td>
<td>Chaucerian</td>
<td>c. 1410</td>
<td>Tail</td>
<td>Denebalgedi</td>
</tr>
<tr>
<td>10</td>
<td>Whipple Wh.1264</td>
<td>#4752</td>
<td>295</td>
<td>Quatrefoil</td>
<td>c. 1340</td>
<td>Tail</td>
<td>DENEBAL-GEDI</td>
</tr>
<tr>
<td>11</td>
<td>BM Blakene BM 1853, 1104.1</td>
<td>#292</td>
<td>218</td>
<td>Quatrefoil</td>
<td>1342</td>
<td>Head</td>
<td>Libideneb</td>
</tr>
<tr>
<td>12</td>
<td>OxMHS Painswick 47869</td>
<td>#299</td>
<td>122</td>
<td>Chaucerian</td>
<td>c. 1370</td>
<td>Tail</td>
<td>Denebalgedi</td>
</tr>
<tr>
<td>13</td>
<td>OxMHS ‘Chaucerian’ 49359</td>
<td>#4755</td>
<td>155</td>
<td>Chaucerian</td>
<td>c. 1380</td>
<td>Tail</td>
<td>Denebalgedi</td>
</tr>
<tr>
<td>14</td>
<td>Galileo (Tomba/ Koelliker) 3931</td>
<td>#4521</td>
<td>145</td>
<td>Chaucerian</td>
<td>c.1390</td>
<td>Tail</td>
<td>Denebalged</td>
</tr>
<tr>
<td>15</td>
<td>Smithsonian ‘Parnel’s astrolabe’ 316758</td>
<td>#304</td>
<td>145</td>
<td>Chaucerian</td>
<td>c.1450</td>
<td>Tail</td>
<td>erased?</td>
</tr>
<tr>
<td>16</td>
<td>Smithsonian ‘dragons/dogs’</td>
<td>#2006</td>
<td>127.5</td>
<td>Chaucerian</td>
<td>C15</td>
<td>Head</td>
<td>denebalgedi</td>
</tr>
<tr>
<td>17</td>
<td>OxMHS 47615</td>
<td>#2043</td>
<td>140</td>
<td>Quatrefoil</td>
<td></td>
<td>Head</td>
<td>(DENEBAL-GEDI)</td>
</tr>
<tr>
<td>18</td>
<td>OxMHS 41468</td>
<td>#168</td>
<td>152</td>
<td>c. chaucerian</td>
<td></td>
<td>Head</td>
<td>LIBEDEDEDEN-EB</td>
</tr>
<tr>
<td>19</td>
<td>Innsbruck inv. no. 2957, U215</td>
<td>#4546</td>
<td>254</td>
<td>c. chaucerian</td>
<td>c.1390</td>
<td>Tail</td>
<td>(Denebalgedi)</td>
</tr>
<tr>
<td>20</td>
<td>Turin (Tomba A. Palazzo Madama 0922/b)</td>
<td>#3203</td>
<td>222</td>
<td>Quatrefoil</td>
<td>C14</td>
<td>Tail</td>
<td>(LIBIDINEP)</td>
</tr>
<tr>
<td>21</td>
<td>Koelliker, Milan As 019. (Tomba B)³</td>
<td>#4515</td>
<td>158</td>
<td>Quatrefoil</td>
<td>C14</td>
<td>Tail</td>
<td>(Denebal)</td>
</tr>
<tr>
<td>22</td>
<td>Milan Pinacoteca Ambrosiana, 1009 [Falconi]³</td>
<td>#4557</td>
<td>245</td>
<td>degraded quatrefoil</td>
<td>c. 1500</td>
<td>Head</td>
<td>Cauda Capricorni</td>
</tr>
<tr>
<td>23</td>
<td>Koelliker As 010 (Falconi)³</td>
<td></td>
<td>225</td>
<td>degraded quatrefoil</td>
<td>1505</td>
<td>Head</td>
<td>none</td>
</tr>
<tr>
<td>24</td>
<td>Munich Deutsches Museum²</td>
<td>#621</td>
<td>105</td>
<td>Latin/Hebrew</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Moulins Stolen, photos MHS²</td>
<td>#4506</td>
<td></td>
<td>Regioni’ type</td>
<td>1462</td>
<td>Head</td>
<td>–</td>
</tr>
<tr>
<td>26</td>
<td>Private collector, England</td>
<td>#4556</td>
<td>258</td>
<td>Cardinal hat</td>
<td>c.1300</td>
<td>Broken</td>
<td>DENEB KAI-TOZ</td>
</tr>
<tr>
<td>27</td>
<td>Vincenzo Danti’s astrolabe³</td>
<td>#171</td>
<td>unique</td>
<td>c. 1490</td>
<td>Head</td>
<td>none</td>
<td>Head</td>
</tr>
<tr>
<td>28</td>
<td>Private collector, France</td>
<td></td>
<td>c. 90</td>
<td>Hartmann type</td>
<td>c. 1500?</td>
<td>Tail</td>
<td>none</td>
</tr>
</tbody>
</table>
Notes to Table 1

† IIL = International Instrument List; CCA = Computer Checklist of Astrolabes.
* Names in brackets means that the star pointer is separate from the tongue/tip of tail.

a. Mensing-20, with Hebrew lettering. Webster & Webster, following Bernstein, date this astrolabe to “c.1550” which is about two centuries too late, showing the great fallacy of dating an astrolabe by its First Point of Aries.


e. Details from personal notes of Prof. David A. King.


g. Pevincenzo Dani dei Rinaldi (Per- gia, named after Dan Alighieri, d. 1512). Described in Gunther, pp. 322-325. Was in Spitzer Collin, then Hamburg Museum of Arts and Crafts. Gunther describe the Cap- ricornian ring as having the ‘heads of two snakes whose branching and intertwined tails point out extra-zodiacal stars’.

Notes and References

1. ‘Hic sunt dracones’ (here be dragons) is the apocryphal inscription supposedly found on early globes and taken by Silke Ackermann as the title for her introduction to the recent book Josefina Rodríguez-Arribas, Charles Burnett, Silke Ackermann and Ryan Szpiech, eds, Ast- rolabes in Medieval Cultures (Leiden: Brill, 2019), DOI:10.1163/9789004387867.


5. John D. North, Chaucer’s Universe (Ox- ford: Clarendon Press, 1988). In the caption of Fig. 11 (p. 59) which shows the rete from the copy of the Treatise ms Bodleian Rawlin- don D. 913, he describes the stars at the head and the tail of the dragon and makes the as- sertion that because the outer ring represents Capricorn, the head might represent that of a goat – which defies its appearance.


7. See, for example, David A. King, In Syn- chrony with the Heavens, vol. 2 pt. 2 Instru- ments of Mass Calculation, (Leiden: Brill, 2014) and David A King and Gerard L’E. Turner, Astrolabes from Renaissance Europe, (Farnham, Ashgate; 2011).

8. A discussion on the literary sources of dragons in both the East and West is Charles Gould and others, The Dragon, (London, Unicorn Bookshop; 1977) which includes ex- tracts from Edward Topsell’s 1658 The His- tory of Serpents.


13. The BM 1326 astrolabe is inv. no. 1909 0617.1 IIL #291.


21. History of Science Museum, University of Oxford, inv. no. 37148. The back has scales for the lunar mansions and zodiac symbols etc.


23. Ibid.


26. A second manuscript copy with similar annotations but by a different scribe is Avranches Bibliothèque Municipale MS 235.


30. In the bible, (especially Revelations 12) the red dragon is identified as Satan. See http://biblivlight.net/dragon.htm

31. The churches with particularly fine medieval paintings still surviving are Somerleyton St Mary, Filby All Saints and Ranworth St Helens.

32. Gould, *The Dragon* (note 8) p. 36, lists a number of other Christian saints accredited with dragon-slaying: St Phillip the apostle; St Martha; St Floret; SS Cado, Manet and Paul in Brittany; St Keyne in Cornwall; St Romain of Rouen. However, these were not generally venerated in medieval England.

33. S. Riches, *St George* (note 28) pp 128-135, which includes a photograph of the preserved dragon ‘Snap’ of c. 1795 (p.132, fig. 4.16).

34. The brass also includes Edward III as one of the surrounding figures – Sir Hugh would undoubtedly have been one of the founding Garter knights had he not died the year before after contracting dysentery in France on the Crécy campaign.


37. Ibid, Fig 9 shows the close match of the central Y-strut with the double-ogee arch of Bay 18 of the cloisters, whose boss illustrates the beheading of St John the Baptist.


45. Koenraad van Cleempoel, *De Diversis Aeribus. A catalogue raisonné of scientific instruments from the Louvain School, 1530 to 1600*, (Turnhout: Brepols, 2002).


47. The Indian astrolabe made in Jaipur for Maharaja Manna Lala is currently on loan from the Science Museum Group and on display at the Herschel Museum in Bath. The Oxford Sicilian astrolabe is inv. no. 50769 in the History of Science Museum, University of Oxford.

48. Davis, *Fit for a King*, note 16.

49. The astrolabe is in the Germanisches Nationalmuseum, Nuremberg, inv. no. WI 21 and is shown in *Focus Behaim Globus* (Nuremberg: GNW, 1993) vol II, pp. 576-578.

Author’s email address: john.davis@btinternet.com

American Christmas wireless postcard of c. 1925 reflecting the growing popularity of public broadcasting at that time. The Editor agrees wholeheartedly with the sentiment expressed.