Mem. S.A.It. Suppl. Vol. 14, 246
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Memorie della
Supplementi

The mystery of the telescopes in Jan Brueghel the Elder's paintings

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Abstract. Several early spyglasses are depicted in five paintings by Jan Brueghel the Elder completed between 1608 and 1625, as he was court painter of Archduke Albert VII of Habsburg. An optical tube that appears in the *Extensive Landscape with View of the Castle of Mariemont*, dated 1608-1612, represents the first painting of a telescope whatsoever. We collected some documents showing that Albert VII obtained spyglasses very early directly from Lipperhey or Sacharias Janssen. Thus the painting likely reproduces one of the first man-made telescopes ever. Two other instruments appear in two Allegories of Sight made in the years 1617 and 1618. These are sophisticated instruments and the structure suggests that they may be keplerian, but this is about two decades ahead this mounting was in use.

Key words. Invention of telescope, keplerian telescopes, Jan Brueghel, Galileo Galilei, International Year of Astronomy 2009

1. Introduction

Spyglasses and other astronomical instruments are present in five paintings, one landscape and four allegories, that Jan Brueghel the Elder (1568-1625) painted in the years between 1608 and 1625, often in collaboration with P. P. Rubens. The paintings were executed while the artist was court painter of Archduke Albert VII of Habsburg (1559-1621), the Spanish Governor of the catholic part of Netherlands, who had genuine scientific interests. All paintings are high quality, detailed and realistic pictures of these instruments offering interesting clues on the early evolution of the telescope where documents are scarce. Previous studies on this subject can be found in Selvelli (1997), Selvelli & Molaro (2009) and Molaro & Selvelli (2009).

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2. The first painting of a spyglass

A particular of the painting *Extensive Landscape with View of the Castle of Mariemont* conserved at the Virginia Museum of Fine Arts in Richmond, VA, USA is shown in Fig.1. The painting does not report a date but from the development of the works of the Mariemont Castle the painting has been dated between 1608 - 1612. In the detail shown in the figure the Archduke Albert VII is watching the landscape through a spyglass. The instrument has a cylindrical shape and appears to be metallic with two gilded rings on both sides. The length is about 40-46 cm and the diameter of about 5 cm. To our knowledge, this painting

represents the most ancient reproduction of a spyglass.

We provide here several documents which link this early instrument with one made by the still unknown inventor of the telescope. One first evidence comes from Guido Bentivoglio, the Papal nuncio at the court of Albert VII, who was quite close to the devote Archduke and was present when Spinola, Commander of the Spanish Army in the Flanders, came back from The Hague after having witnessed the first public demonstration of a telescope on 25th September 1608. Spinola was in The Hague in that period, as representative of the Spanish Governor for peace negotiations with the *Staatsholder* of the seven provinces prince Maurice of Nassau. The Truce was actually signed in April 1609. On the 2nd of April 1609 Bentivoglio in a letter to Cardinal Scipione Borghese, the nephew of Paul V and papal secretary, wrote: *When the marquis Spinola returned from Holland.. the Archduke and the Marquis himself were most desirous to obtain such an instrument, and indeed it came about that one came into their hands, although not of such perfection as the one owned by Count Maurice* (cfr Hensen (1923) for the entire text). A second evidence comes from Daniello Antonini, a noble from Udine and friend of Galileo, who was serving in the Archduke army in Brussels. In September 1611 Antonini wrote a letter to Galileo telling him that the Archduke owned some spyglasses obtained from the inventor: *Ho veduti de' piu' esquisiti occhiali che si fabrichino in queste parti. N'ho veduti di quegli del proprio primo inventore, dati poi a questo Serenissimo, ma son tutti dozinali*[1]. Also Maria Schyrlaeus de Rheita in its *Oculus Enoch et Eliae* (1646, p. 337) wrote that the Marques Ambrogio Spinola bought a spyglass in The Hague near the end of 1608, probably made by Lipperhey, and offered it to Archduke Albert. On the other hand Pierre Borel in the De Vero Telescopii Inventore (1656) quotes the son of Sacharias Janssen's declaration, made in 1655 to the Middelburg City Council in an investigation about the origin of the telescope suggesting that the manufacturer is Janssen. The declaration sounds: *Our artisan [Sacharias Janssen] first made tubes of 16 inches, and gave the best to Prince Maurice and Archduke Albert, as we shall see below in the testimonies, for which he received money and was asked not to divulge the thing further.* Thus this documentation shows that it is very likely that the optical tube held by the archduke in the *Extensive Landscape with View of the Castle of Mariemont* represents one of the spyglasses belonging to Albert VII obtained directly from the inventor of the telescope.

Fig. 1. Detail of the "Extensive Landscape with View of the Castle of Mariemont" by J. Brueghel the Elder, ca. 1608-1612. Museum of Fine Arts, Richmond, Virginia.

[1] I have seen the best spectacles made here. I have seen some of those done by first inventor and given to this Excellence [Albert VII], but they are all cheap.

3. The silver telescopes

The Allegory of Sight is one of the five paintings of the series of the *Allegory of the Senses*, made in collaboration with Peter Paul Rubens, which can be admired at the Museum El Prado in Madrid. The painting, oil on wood, depicts a hall in the ancient royal Palace of Brussels, residence of the Archdukes, on the hill of Coudemberg, where paintings, precious items, and scientific instruments were collected. One can note a large astrolabe, an armillary sphere, a pedestal globe, a pair of Galileian compasses, map dividers and sundials. Each instrument was meticulously characterized with true Flemish skill so that even the most minute details are accurately reproduced. The painting had been completed by 1617 as testified by the date on a roll of papers lying over the book *Cosmographie* in the lower part of the painting besides the author's signature. The telescope between Venus and Cupid shown in a detail in Fig. 2, consists of a main tube and seven draw-tubes which appear to be made of metal. The draw tubes terminates in enlarged collars made of the same material and the lenses are housed in large rounded terminals. The instrument is fixed into a curved metal sleeve support attached to a adjustable brass joint. A comparison with other objects depicted in the painting indicates a maximum width for the draw tubes of about 6-7 cm and a minimum of 2 cm in proximity of the eyepiece. The total length with the tubes all drawn and considering a tilt of about 30 degrees along the line of sight is of about 170-180 cm.

A similar telescope is reproduced in the *The Allegory of the Sight and the Sense of Smell*, an oil on canvas of considerable size, 176 for 264 cm. This painting, completed around the same period (1618-1620), was commissioned by the City of Antwerp to Jan Breughel to celebrate the visit of the Archdukes. About 12 painters, including P.P. Rubens, contributed to the painting inaugurating the *kunstkammer* style, that became fashionable afterwards. However, the painting exposed at the Prado is a copy of the original that went lost in the fire of the Castle of Coudemberg in 1731. The painting includes several of the instruments reproduced in the other *Allegory of Sight* of 1617, but the two telescopes differ in several important details. The number of draw tubes is eight and not seven, and the rings are colored. The similarity indicates the same maker, but they are likely two different instruments.

Fig. 2. Detail of the "The Allegory of Sight" by J. Bruegel and P.P. Rubens, 1617. Museo Nacional del Prado, Madrid.

3.1. First keplerian telescopes?

The technology of these telescopes is quite advanced for the epoch since there is no record of similar instruments (cfr the Catalogue of Early Telescopes by Van Helden (1999)). The closest resemblance is found with the illustrations reported in Christopher Scheiner's works (*Disquisitiones Mathematicae* 1614, and *Rosa Ursina* of 1631). More surprisingly, the telescopes depicted may represent first examples of keplerian telescopes. The origin and development of a telescope consisting of two convex lenses is uncertain and open to question. It was theoretically described by Kepler

in his *Dioptrice* in 1611 but Kepler did not make it and we have to wait till C. Scheiner 's *Rosa Ursina* (1631) for the first book containing a description of an astronomical telescope. Francesco Fontana in his *Novae Celestium Terrestriumque rerum Observationis* (1646) claimed to have manufactured an astronomical telescope already in 1608. In support Fontana produced a declaration of father Zupo stating that, together with father Staserio, he saw a two convex lenses telescope made by him in 1614.

Thus the existence of keplerian telescopes already around 1617-1618 is quite remarkable. Three circumstantial considerations seem to support this idea. Long telescopes about 2 m are much easier to make in the keplerian mounting and with a Dutch configuration these long telescopes would imply an unpractically small field of view of few arcminutes. The telescopes show a small minimal width of about 2 cm in the proximity of the eyepiece, which is also easier to be obtained with a keplerian rather than with a Dutch configuration where the beam size never decreases below the size with it reaches the concave length. But the most important element is the presence of quite large eyepieces. With a negative lens the eye needs to be brought as close as possible to the lens since the eye's pupil becomes the aperture stop and the exit pupil. With a convex lens as eyepiece the eye has to be positioned to its focus and the structure of the eyepiece is manufactered just to help the eye positioning. Finally, the first records of Keplerian telescopes are somewhat related to the Habsburgs family. Cristopher Scheiner in his *Rosa Ursina* claimed that he made a keplerian instrument in 1614-1617 and showed it to Archduke Maximilian III, brother of Albert VII. According to documents in the Tyrolean State Museum (cfr Daxecker 2004, p. 13,14), around 1615, Maximilian received a telescope with two convex lenses and Scheiner added a third one, thus manufacturing a terrestrial keplerian telescope. We note, incidentally, that Scheiner actually used a Dutch telescope for his observations of sunspots in 1611 and it is not clear when he started with a keplerian one. it was certainly not before 1615 as it appears from his manuscript *Tractatus de Tubo Optico* of 1615 (Daxecker 2001), but more likely only after 1624 (Van Helden 1977). It is quite possible that Albert VII obtained from his brother a keplerian telescope for his collection.

In the painting in Fig. 2, on the floor just behind Cupid one can note a tube held by a monkey. A close inspection shows that the tube is also a spyglass. It is remarkable that it belongs to the Archduke's collection and it could be the same spyglass depicted in Fig. 1 several years before. The monkey holding the tube while another monkey is holding two glasses has certainly an allegorical meaning. In Flemish painting the monkey is a traditional symbol for foolishness, and here it may underline the brain-storming implications of the new discoveries or, more simply, the serendipitous way in which the telescope was conceived.

Acknowledgements. We gratefully thank Virginia Museum of Fine Arts, the Adolph D. and Wilkins C. Williams Fund., Howell Perkins and Ron Jennings for the reproduction of the painting and Inge Keil and Franz Daxecker for helpful information.

References

Hensen, A. H. L., "de Verrekijkers van Prins Maurits en van Aartshertog Albertus", Mededeelingen van het nederlandisch Historisch Instituut te Rome, 1923, 199,

Daxecker, F. 2001 Beitrage zur Astronomiegeschichte Bd. 4, S 19-32,

Daxecker, F. 2004 "The Physicist and Astronomer Christopher Scheiner", Innsbruck University publ. N. 246,

Molaro, P., Selvelli, P., 2009, The Role of Astronomy in Society and Culture IAU Symp 260, D. Valls-Gabaud & A. Boksenberg, eds.,

Selvelli, P. , 1997, L'Astronomia, 175, 36,

Selvelli, P., Molaro, P., 2009, Proceedings 400 Years of Astronomical Telescopes: A Review of History, Science and Technology, ESA/ESTEC Noordwijk, The Netherlands,

Van Helden 1977, Transa. of the American Philosophical Society 67, no. 4,

Van Helden, 1999, Catalogue of early telescopes, Giunti, Firenze.