
On the telescopes in the paintings of J. Brueghel the Elder

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Abstract We have investigated the nature and the origin of the telescopes depicted in three paintings of J. Brueghel the Elder completed between 1609 and 1618. The "tube" that appears in the painting dated 1608-1612 represents a very early dutch spyglass, tentatively attributable to Sacharias Janssen or Lipperhey, prior to those made by Galileo, while the two instruments made of several drawtubes which appear in the two paintings of 1617 and 1618 are quite sophisticated and may represent early examples of Keplerian telescopes.

Keywords history of astronomy · ancient instruments

1 Introduction

The presence of spyglasses and other astronomical instruments characterizes three paintings of J. Brueghel the Elder (1568-1625) composed between 1609 and 1618. The paintings were drawn while the artist was appointed as a painter at the court of the Archduke Albert VII of Habsburg (1559-1621), spanish Governor of the catholic part of the Netherlands, and of his spouse, the Archduchess Isabella Clara Eugenia, "Infanta" of Spain and daughter of Felipe II.

The three paintings can be considered as high quality, realistic photographs and are rich in naturalistic details. This allows a detailed examination of the instruments therein depicted and an investigation of their nature.

2 The painting with the early spyglass

The painting "Extensive Landscape with View of the Castle of Mariemont" is conserved at the Virginia Museum of Fine Arts (VMFA) in Richmond, VA, USA. The Mariemont Castle, located near Bruxelles, was under reconstruction for several years, and a study

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Fig. 1 A detail of the painting "Extensive Landscape with View of the Castle of Mariemont" by J. Brueghel the Elder, ca. 1609-1612. Virginia Museum of Fine Arts, Richmond. The Adolph D. and Wilkins C. Williams Fund. Photo: Ron Jennings. The actual length of the spyglass is estimated to be about 40 cm.

of the development of the building, by comparison with paintings of ascertained dates, has made it possible to estimate that the date of the painting's completion was in the years 1608 - 1611 . In the central part of the painting one can see the important detail of the archduke Albert VII looking through a spyglass. The instrument has a cylindrical shape and appears metallic, probably made of tin, with two gilded rings at either end. (Fig. 1). By comparison with other figures and objects one can estimate that its length is about 40-45 cm and its diameter about 5 cm.

To our knowledge, this painting represents the most ancient reproduction of a spyglass, and we guess that the depicted instrument actually represents one of the first spyglasses ever built. We know from Daniello Antonini, who was serving with the Archduke in Brussels, that Albert VII owned copies of early spyglasses. Antonini, on September 2, 1611, wrote a letter to his former master Galileo (Bibl. Naz. Fir., Mss. Gal., P. VI, T. VIII, car.37) telling him that the Archduke had obtained some spyglasses from the "first inventor", although of lower quality than those owned by Galileo. Thus, it is likely that the "tube" held by the Archduke represents one of these spyglasses mentioned by Antonini. Concerning the manufacturer, it could be either Sacharias Janssen or Hans Lipperhey, both considered "fathers" of the telescope. According to Pierre Borel (Van Helden, 1977), Sacharias Janssen made some instruments measuring about 40 cm in length, and offered the best ones to Prince Maurice of Nassau and the Archduke Albert. Alternatively, according to Antonius Maria Schyrley de Rheita,

the Marquess Ambrogio Spinola, Commander of the Spanish Army in the Flanders, bought a spyglass in The Hague near the end of 1608, probably made by Lipperhey, and offered it to Archduke Albert (Van Helden, 1977). Spinola was in The Hague in that period as a representative of the Spanish Governor, for peace negotiations with Maurice of Nassau, "Stadtholder" of the seven provinces .

The presence of the spyglass in the painting can be used to exclude the year 1608 in the range of the dates for its completion, since the first spyglasses appeared in autumn 1608, while the landscape with the trees and other details in the painting indicates (late) summer as the season.

3 The telescope(s) with drawtubes

The Allegory of Sight is one of the series of paintings of Jan Brueghel known as *Allegory of the senses* or *The five senses*, made in collaboration with Peter Paul Rubens, which is conserved at the Museum of El Prado, in Madrid.

The painting (oil on wood) is drawn with great accuracy and depicts a hall in the ancient royal Palace of Brussels, on the hill of Coudenberg, residence of the Archdukes, where their collection of paintings, precious items, and scientific instruments, most of them related to astronomy, were kept. The painting had been completed by 1617 as testified by the date that appears on a roll of several papers lying over a book entitled "Cosmographie", in the lower part of the painting, next to the author's signature. One can note various astronomical instruments such as a large astrolabe, an armillary sphere, a pedestal globe, a proportional compass, map dividers and sundials, which testify the interest of the Archdukes for science, and astronomy in particular. Each instrument has been meticulously characterized with true Flemish skill so that even the minutest details are accurately reproduced.

The telescope that appears between Venus and Cupid, (Fig. 2) consists of a main tube and seven drawtubes, all of which appear to be made of metal (probably silver). Each of the intermediary drawtubes terminates in an enlarged collar that appears to be made of the same metal. The lenses are housed in large rounded terminals. The instrument is fixed into a curved metal sleeve support attached to a brass joint which can be adjusted for angle. The pedestal consists of a turned column terminating in a simple saucer-shaped round base.

A comparison with other objects depicted in the painting indicates a maximum and minimum width for the drawtubes of about 7.5 and 2.5 cm, respectively, and an estimated total length, if the tubes were all drawn, close to 170 cm.

It should be noted that a similar telescope is reproduced in a larger painting, also conserved at the museum "El Prado", named "The Allegory of the Sight and the Sense of Smell" (oil on canvas). This painting, completed around 1618-1620, was commissioned by the City of Antwerp from J. Brueghel and several other painters (following the "kunstkamer" style that was fashionable at that time), to celebrate the visit of the Archdukes to the city. The painting, which actually is a copy of the original that was lost in the fire of the Castle of Coudenberg near Bruxelles in 1731, includes several instruments that are very similar or identical to those reproduced in the previous painting.

The main difference between the two telescopes resides in the number of draw tubes (eight instead of seven) and in the color of the rings (black instead of silvery), see Fig.2 and Fig. 3. Also the pedestals are different in the two cases. Thus, despite



Fig. 2 A detail of the painting "The Allegory of Sight" by J. Brueghel and P.P. Rubens, 1617. Madrid, Museo Nacional del Prado. The actual size of the telescope is estimated to be about 70 cm.

the overall similarity in form, which clearly indicates the same origin (maker), the two telescopes are, apparently, two separate instruments. We note that Bedini (1971) described this telescope as constructed with cardboard tubes covered with white or a light-colored vellum. This seems hardly compatible with the metallic aspect of the tubes, as suggested by their color and reflectivity.



Fig. 3 A detail of the painting "The Sight and the Sense of Smell" by J. Brueghel et al., ca. 1618. Madrid, Museo Nacional del Prado. The actual size of the telescope in the painting is estimated to be of about 75 cm.

4 Dutch or Keplerian?

The origin and development of the "astronomical" telescope, the one consisting of two convex lenses, is uncertain and open to question, like the Galilean one. It was theoretically described by Kepler in his "Dioptrice" of 1611 but it is not clear when the first "astronomical" telescope was manufactured. "Rosa Ursina", completed by Scheiner in 1630, is the first book containing a reference to an astronomical telescope. In 1646, Fontana, in his "Novae Coelestium Terrestriumque Observationes" claimed to have manufactured an astronomical telescope in 1608, offering also a declaration of father Zupo stating that Fontana had shown a telescope made by two convex lenses to him and to father Staserio already in 1614.

A definite upper limit for the manufacturing of the instrument depicted in Figs. 2 and 3 is set by the paintings' completion in 1617 and 1618 respectively. What is quite surprising is that their technology appears quite sophisticated for the epoch and there is no record of similar instruments until about three decades later (cf. the "Catalogue of Early Telescopes" by Van Helden, 1999). An examination of illustrations of early telescopes yields that the closest resemblance in shape and length is with the illustrations reported in C. Scheiner's works (*Disquisitiones Mathematicae* 1614, and *Rosa Ursina* of 1631).

We argue that these instrument may represent early examples of a Keplerian telescope, which makes their presence even more striking. Three circumstantial considerations seem to support this view:

- The presence of a quite large terminal (eyepiece) seems to indicate a compound eyepiece, quite incompatible with a Galilean (Dutch) mounting. In this case, the negative lens needs the eye to be brought as close as possible so that the eye's pupil becomes the aperture stop and the exit pupil. For the same reason, if the large terminal were just a lens-screen, this configuration would be barely compatible with a Dutch mounting.
- The overall length of the telescope is estimated to be about 180 cm. Even with low powers this would imply a very small field of view.
- The first records of Keplerian telescopes are related to the Habsburgs. Cristoph Scheiner in his "Rosa Ursina" claimed that he made a Keplerian instrument in 1617 and showed it to the Archduke Maximilian III, brother of Albert VII. Scheiner, in a letter on January 4, 1615 wrote of a "newly invented instrument" which actually could be the astronomical one, and the date is consistent with the former period. According to a different source, Maximilian III, about 1615, 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 1610). Likely, Albert VII obtained it from Maximilian or heard of it and obtained a similar one for his collection.

5 The monkey's tube

In the painting of Fig. 2, on the floor, just behind Cupid, and held by a monkey, one can note a tube that "prima facie" looks like an early spy-glass. Belloni (1964) described it as an "optical tube", while Bedini (1971) interpreted it as a microscope, of the Janssen type.

We recall that Willem Boreel, born in Middelburg and Dutch ambassador in France, when mentioning that a microscope made by Janssen was presented to the Archduke Albert VII, reported a description made by Cornelis Drebbel according to whom *the microscope had a tube made of gilded brass, resting on three dolphins made of brass which were supported by the disc of the base made of ebony* (Van Helden, 1977).

A close inspection on a high-quality reproduction of the painting has instead clearly shown that the tube appears to be made of metal (tin or silver) without any evidence of the above-mentioned supporting structures. The object is clearly a spyglass and its aspect and size clearly indicate that, most likely, it corresponds to the spyglass depicted in Fig. 1.

This confirms that the "tube" represents an early Dutch instrument, as suggested by Selvelli (1997), on the grounds of the painting of Fig. 2 only.

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References

1. Bedini, S.A. "Physis" Vol. 13, 149, 1971
2. Belloni, L. Rendiconti Istituto Lombardo B98, 238, 1964
3. Selvelli, P. L'Astronomia, 175, 36 1997
4. Van Helden Transact. of the American Philosophical Society 67, no. 4, 1977
5. Van Helden Catalogue of early telescopes, Giunti, Firenze, 1999