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Prague

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## Astronomy and *Musaeum Mathematicum* at Clementinum College in Prague

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Praha

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*Musaeum Mathematicum Collegii Clementini*, first mentioned in 1638, was the oldest museum in the Bohemian Kingdom open to public and one of the oldest in Europe at all. The collections in Clementinum grew spontaneously until 1722 when Franciscus Retz, rector of the Prague University and later Superior General of the Jesuit Order (1730–1750), officially constituted the Museum and opened it for public visitors. The Museum is reported in the year-book of Bohemian Jesuits (*Annuae provinciae Bohemicae Societatis Jesu*, Univ. Library Vienna) in the years 1722, 1723, 1724, 1732. Mechanician and watchmaker Caspar Pflieger (1665–1730), author of the largest globes in the Baroque Hall of Clementinum, was appointed the first custodian of the Museum. Mechanician and watchmaker Johann Klein (1684–1762) succeeded him for the next 30 years and enriched the collections by constructing unique mechanisms and instruments, e.g. two astronomical clocks, with Copernican and Tychoonian planetaria. The next custodians were Joseph Stepling (1716–1778) and Franciscus Zeno (1734–1781). After 1773, when the Jesuit Order was suppressed and dissolved, the collections were administrated by Antonín Strnad (1746–1799).

Since no earlier catalogues remained preserved, we can recognise the extent and diversity of collections only from the inventory written by Strnad in 1781 (*Consignatio rerum in Museo Mathematico Caesareo Regio. Die 5. Augusti 1781.*). Clementinum became a state institution Astronomical Observatory, University Library and many rooms were used for lectures etc., the collections were concentrated in only 3 rooms instead of original 5 large rooms close to the New Ma-

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thematical Hall, and finally the Museum was abolished in 1785. The astronomical and meteorological instruments remained at the observatory, physical instruments were transferred to the High Polytechnic School and the exhibits connected with natural sciences and so called *curiosa* were granted to the Learned Society of Bohemian Kingdom. Astronomical instruments are since 1951 in the National Technical Museum in Prague, the astronomical clocks are displayed in Clementinum and several dozen of other exhibits were identified among the collections of the National Museum in Prague.

Dr. Lubomír Sršeň from the National Museum in Prague selected some exhibits from *Musaeum Mathematicum*, that he identified in the collections of the National Museum, and prepared together with the second author of this article and with Ing. Antonín Švejda from the National Technical Museum the exhibition in Carolinum, main building of Charles University, on the occasion of the 650. anniversary of Charles University in spring 1998. Thus, after several hundreds of years, the instruments and other exhibits of *Musaeum Mathematicum* came from a short time again together.

Example of some exhibits:

*Geographical clock*

Prague, Jan Klein, S. j. (1684–1762), 1732

National library of Czech Republic

The clock shows time on various longitudes. The glass half-sphere demonstrates how the night shadow changes its position during a day and year, so that the clock shows also the time of sunrise and sunset for all places on the Earth.

*Trauttmansdorf clock*

1596

National library of Czech Republic

This astronomical clock shows the time and positions of the Sun, Moon and zodiac in the sky and calendar data. On its sides are alegoric figures of Astronomy a Physics. The inscription inside – “Ex munificentia Francisci Adami a Trauttmansdorf” reveals the donator.

*Copernican clock*

Prague, Jan Klein, S. j. (1684–1762), 1752

National library of Czech Republic

The planetarium of this clock displays positions of the Sun, Moon and planets according to the Copernican heliocentric system. On the rear side one can read time and calendar dates, lunar phases are also shown. The look of this clock is similar as by the Tychoonian clock.

### *Sextant*

Prague, Erasmus Habermel, 1600

National technical museum Prague

The iron sextant with radius of 1317 mm and gilt copper scale for reading angles. The pointing rule – alidade – can be moved by a small handle and toothed wheels. Angular distance between two objects in the sky was measured with a precision better than 5'. The sextant is affixed by a joint screw in its centre of mass so that it can be move without force. The massive stand is of later baroque origin. On the ceiling fresco of the Old Mathematical Hall of Clementinum College, Tycho Brahe is depicted holding this sextant in his hands (after 1722).

### *Sextant*

Prague, Joost Bürgi, about 1600

National technical museum Prague

The iron sextant with radius of 1122 mm and gilt brass scale for reading angles. The pointing rule – alidade – can be moved by a small handle and toothed wheels. Angular distance between two objects in the sky measured with a precision of 1'. The sextant is affixed by a joint screw in its centre of mass so that it can be moved without force. The stand is probably original.

### *Meteorite Tábor (Strkov)*

National museum Prague

Fall on July 3, 1753 in the region of Tábor in South-Bohemia, olivin-bronzite chondrite (H5).

### *Quadrant*

Prague, Jan Klein, S. J. (1684–1762), 1762

National technical museum Prague

The iron quadrant with radius of 1057 mm and gilt brass parts was never finished. It was manufactured similarly to the sextant by Erasmus Habermel, but the toothed wheel mechanism added by Klein does not reach sufficient accuracy in reading the angle.

### **The rooms of Musaeum Mathematicum:**

The “New mathematical hall” of Clementinum College was designated to display the most precious exhibit of Mathematical museum in the corresponding milieu. On the ceiling fresco, little angels manipulate instruments and symbols of natural and exact sciences – telescope, globe, circle, rule, optical prism, balance, vacuum pump. The stars in the sky above are encircled by their planetary systems according to the ideas of Giordano Bruno, René Descartes and Leonhard Euler. Comets on parabolic orbits are integrated into this concept of the plurality of worlds. Two little angels bear an inscription “SAPIENTISSIMI OPUS” – work of the superior

wisdom. Astronomical tower is depicted as it is today, after the reconstruction by Stepling in 1748–1751.

### **Workroom of the department of manuscripts and old prints**

One of originally five halls of the Mathematical museum, next to the “New mathematical hall”.

### **“Baroque hall”**

was the central place of the Clementinum library. Nowadays, globes from the collection of the National library are exhibited here, in the foreground the large celestial globe (diameter 1.27 m) manufactured about 1725 by Caspar Pfluger, the first custos of the Mathematical museum. Figures of constellations are cut out from brass sheet and covered by coloured parchment. Globus was moved by a clockwork in the stand. The latitude of Prague is engraved in the equator (“40 Pragae”) and an escutcheon of the donator – Johann Rudolph Sporck, later bishop of Prague – is placed on the northpole.

### **References**

Some papers and observational data related to the Musaeum Mathematicum:

“De pluvia lapidea Anni MDCCLIII ad Strkov et ejus causis meditatio”

“On the stony rain of 1773 at Strkov and consideration about its causes”

Prague, Joseph Stepling, S. J. (1716–1778), 1753

National library of Czech Republic

Detailed study of the meteorite fall near Strkov by Tábor on July 3, 1753. Stepling collected and studied not only the stones, but also what the eye-witnesses reported. In the conclusion he preferred the volcanic origin of the stones rather than the extra-terrestrial one.

Meteorological records by Joseph Stepling, from about 1752

Meteorological observations at the Clementinum College with help of thermometers, barometers, precipitation-meters and later also the geomagnetic observations were not regular and the instrument were not yet installed on permanent places. Only those instruments, that were not frequently used, shared the fate of other exhibits of the Mathematical museum.

Daily meteorological records by Anton Strnad, since January 1, 1775

Within few years about 1775, regular daily meteorological observations started at Paris, Berlin and Prague. The Prague measurements are carried out without interruption until today on the same place in Clementinum College and in the same manner as they were started by Anton Strnad (1749–1799) on January 1, 1775.



Fig. 1 Some exhibits from the collections of Musaeum Mathematicum are depicted on the ceiling of the New Mathematical Hall in Clementinum. The fresco can be dated to the period after the Stepling's reconstruction of the Astronomical tower in about 1755, and the abolishment of the Jesuit order. Particularly, the vacuum pump (last instrument on the right side) made by Flascher was known from the literature and so it was unambiguously identified.

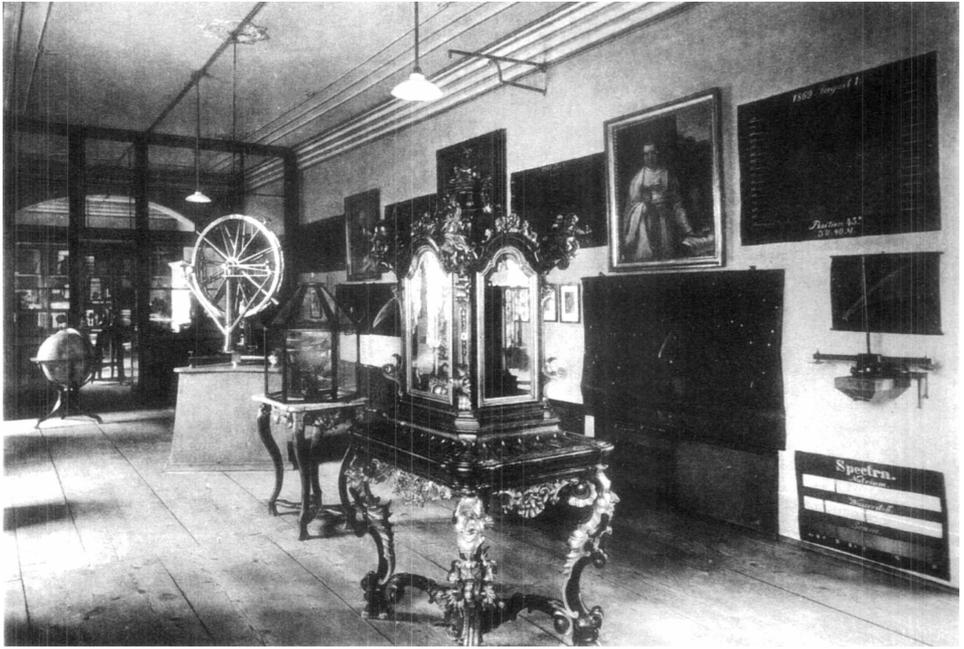


Fig. 2 Exhibit in the rooms of the State Observatory in Clementinum, in about 1895, picture by Ladislaus Weinek. "Trautmannsdorf Clock" is in the middle.

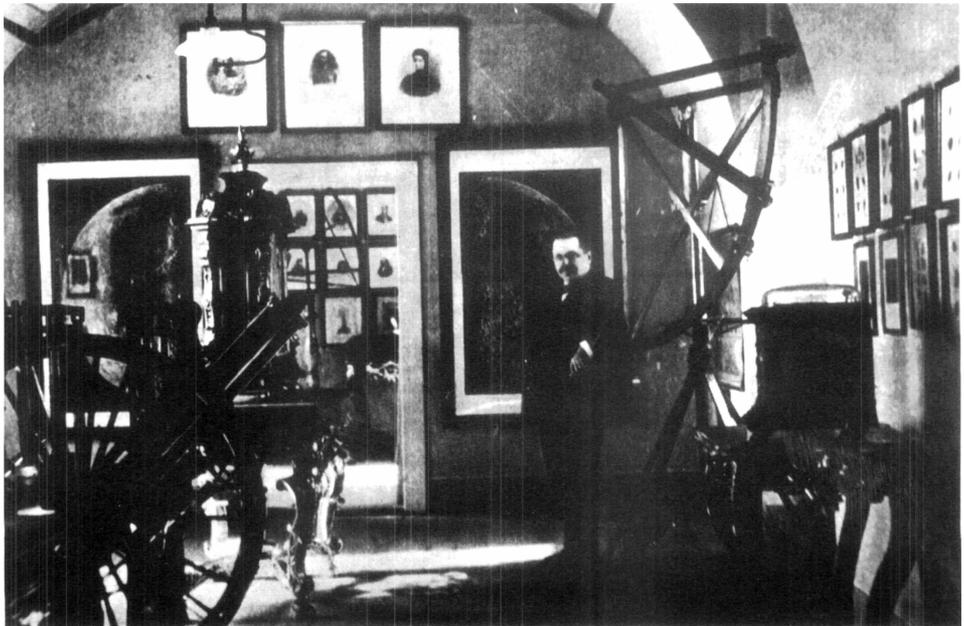


Fig. 3 Professor Ladislaus Weinek in the collections, in about 1895.



Fig. 4 The "Trautmannsdorf Clock" in the rooms of the State Observatory in Clementinum, in 1928, picture probably by J. Klepešta.

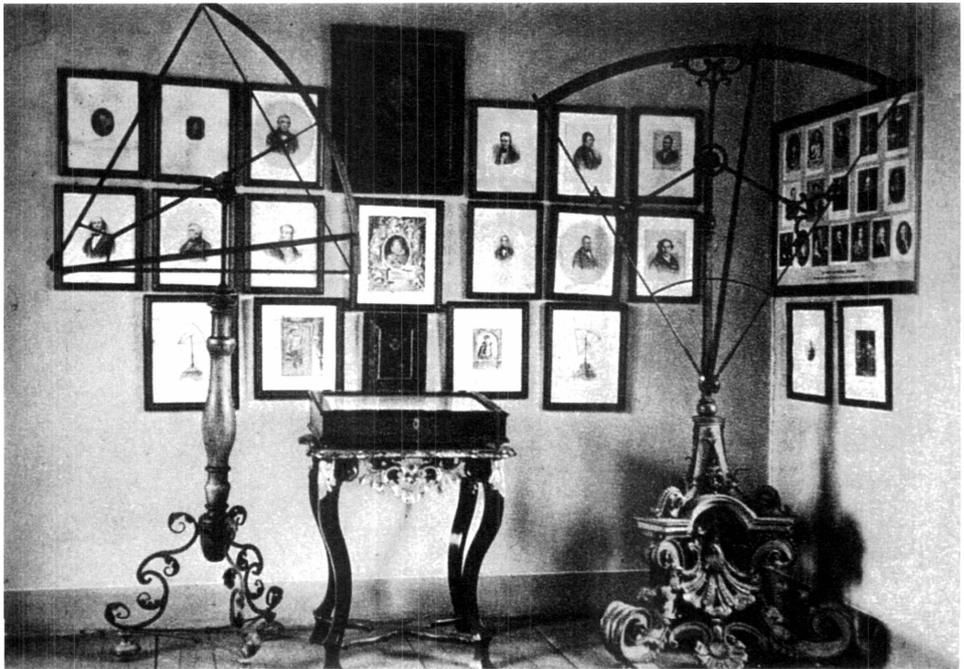


Fig. 5 Sextants by Joost Bürgi and Erasmus Habermel (dated 1600) in the rooms of the State Observatory in Clementinum, in 1928, picture probably by J. Klepešta. The pictures from the gallery of portraits of astronomers, mathematicians and physicists remained preserved and nowadays are being installed in the exhibition in the Astronomical Tower of Clementinum.

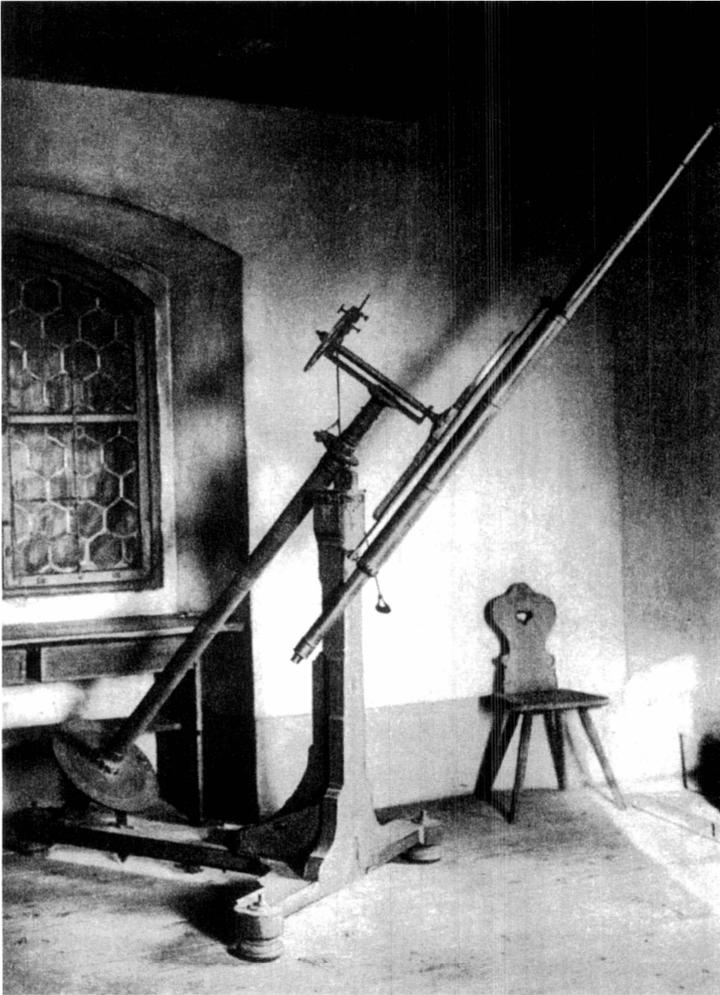


Fig. 6 One of the old portable telescopes in the working room of the Astronomical Tower of Clementinum, in 1928, picture probably by J. Klepešta.

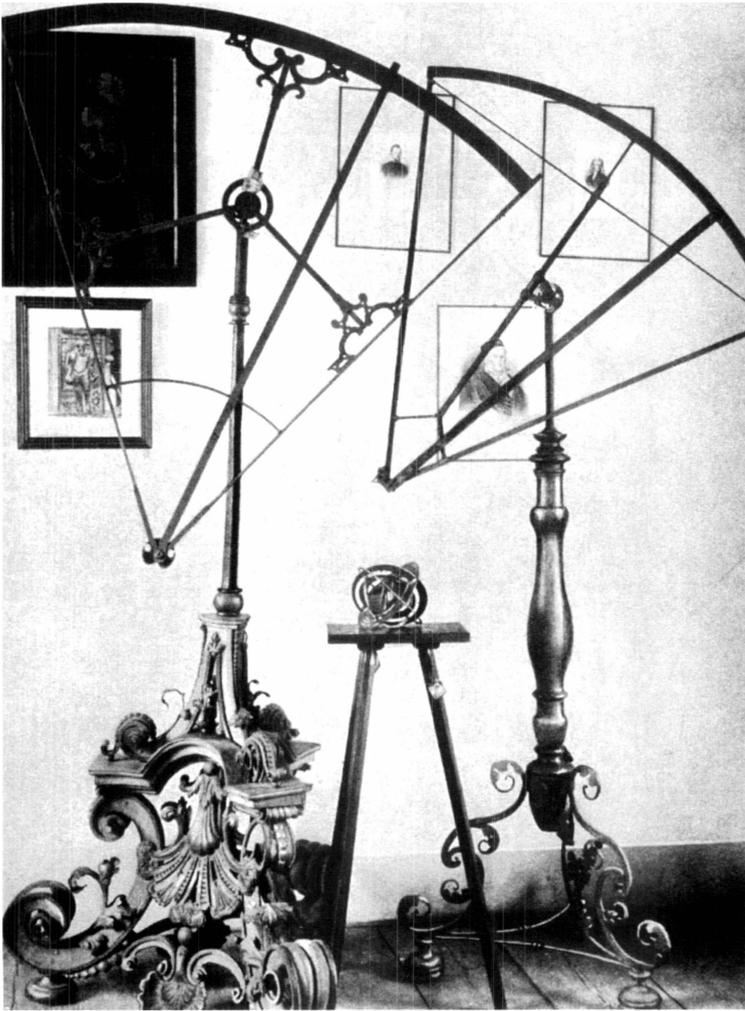


Fig. 7 Small Renaissance planetarium, supposed from the possession of Tycho Brahe, and sextants by Joost Bürgi and Erasmus Habermel (dated 1600) in the rooms of the State Observatory in Clementinum, in the rooms of the State Observatory in Clementinum, in about 1895 (picture by Ladislaus Weinek).

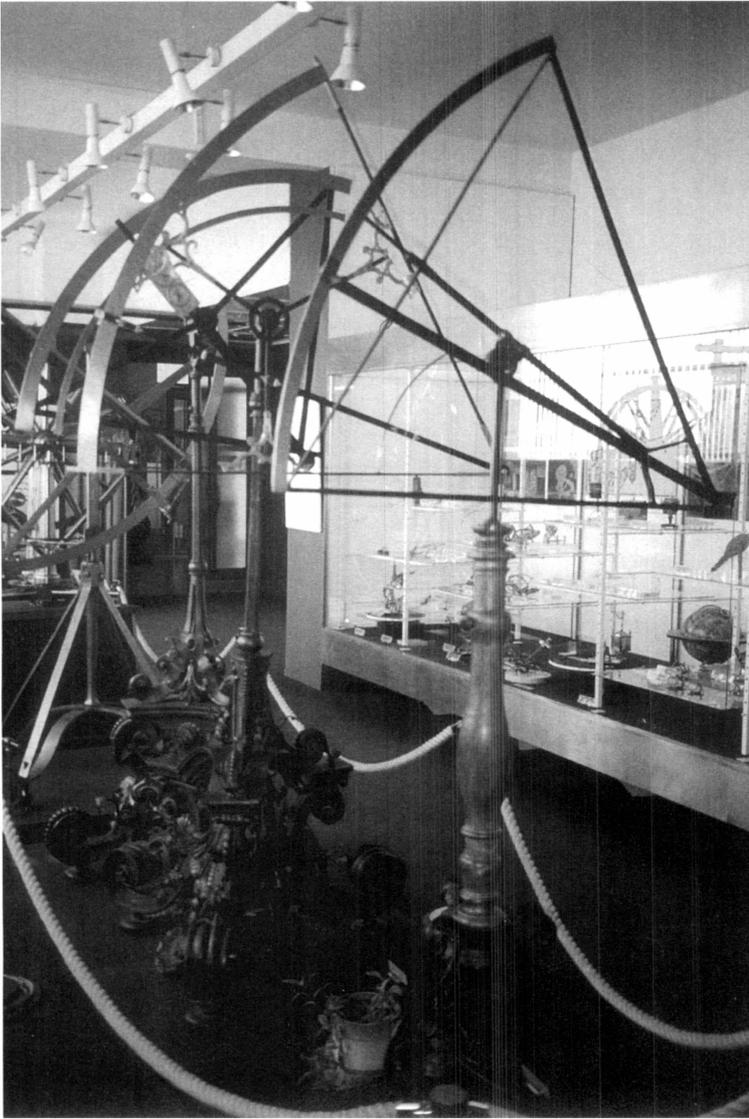


Fig. 8 View of the permanent exhibition in the National Technical Museum in Prague. First two instruments are the sextants by Joost Bürgi and Erasmus Habermel.

