

The mystery of Johannes Kepler's place of residence in the Linzer Hofgasse

Abstract

400 years ago, on May 15, 1618, Johannes Kepler discovered in Linz his third law of planetary motion. The residence of Kepler at that time, and thus also the place of discovery of the third Kepler law, was previously unknown. After lengthy research, the amateur astronomer Erich Meyer succeeded in identifying this house as Hofgasse No. 7 without a doubt.

Introduction

On May 15, 2018, Johannes Kepler's discovery of his third law¹ will be celebrated for the 400th time. Albert Einstein on Kepler: "[...] *How much inventive power, how much tireless, obstinate work was necessary to reveal this laws and to establish their certainty great precision – naturally can hardly be evaluated by anyone.*" (Princeton, New Jersey, 1951). Although Kepler's life and work in Linz is reasonably well documented, the place where Kepler discovered his famous law in 1618 and also created other important works (see Appendix) is in the dark. Various well-known historians represent in this respect different partly contradictory opinions. So far, the only certainty is that the 'Mathematicus' Kepler and his family used to live in Hofgasse in Linz at that time.

As an amateur astronomer², I was interested in the task to find out, as far as possible using original sources, which residence in the Hofgasse Kepler had actually lived.

Why Kepler moved from Prague to Linz

In December 1610, Helmhard Jörger d. J. von Tollet (councilor of the aristocrats of Upper Austria), whom Kepler already knew from his together study time in Tübingen, preferred the astronomer to relocate to Linz in order to enter the service of the Upper Austrian estates. After the death of his wife Barbara (3.7.1611) and the death of his employer Emperor Rudolph II in Prague (20.1.1612) Kepler moved with the consent of King Matthias his job to Linz. Prague was experiencing very turbulent times and Kepler hoped for peaceful living conditions in Linz. Johannes Kepler arrived in Linz in mid-May 1612 and stayed for 14 years, longer than in any other city.

As his tasks were defined in the certificate of appointment³ (employment contract) the completion of the *Tabulae Rudolphinae*⁴ and the preparation of a map of Upper Austria.

Residences of Kepler in Linz

By letter addresses is known where Kepler lived in Linz. From May 1612 to July 1613 he lived in citizen-houses, first with Johann Memhard (house unknown) and then with Christoph Plattl (presumably Hirschgasse). From Oct. 1613 to Sept. 1620 Kepler lived with his second wife Susanne in a hitherto unknown house in Hofgasse. From Oct. 1621 to Nov. 1626 Kepler's family lived in the citizen-house, Rathausgasse No. 5⁵.

¹ Kepler Johannes: *Harmonices mundi V* (Linz 1619); the date of his discovery he documented on page 189; details concerning his third law see additional informations (last page)

² Erich Meyer, member of the Astronomical Society of Linz Johannes Kepler

³ Proschko, Franz Isidor: *Kepler in Linz*. In: *Streifzüge im Gebiete der österreichischen Geschichte und Sage* (Leipzig 1854) 21-22

⁴ J. Johannes Kepler was commissioned by Emperor Rudolph II in 1601 to develop calculation methods to calculate the exact positions of the planets in the sky (including solar- and lunar eclipses) for each time - replacing the inadequate Prutenic tables; Kepler was able to complete this enormous work in Linz in 1624; users: astronomers, astrologers, writer of calendars and sailors

⁵ After the Catholics won the Battle of the White Mountain against the Protestants on November 8, 1620, the Protestants had hard times in the future. Citizens and noblemen who "did not take comfort in becoming Catholic" had to emigrate. Kepler's aristocratic friends and patrons were politically beaten or out of favor with the emperor, the goods were withdrawn from them and they were arrested. Therefore it was impossible for the convinced Protestant Kepler to return to Hofgasse. In the house of the Protestant Andreas Altenstrasser, Rathausgasse 5, Kepler found a new accommodation. During his stay in Wuerttemberg (defense of his mother in the witch trial), Kepler doubted in a letter whether he could even return to his 'second home country' (Linz, Upper Austria).

From July - October 1613 Kepler stayed at the imperial diet in Regensburg and between Oct. 1620 - Oct. 1621 in Württemberg, where he defended his mother during her witch trial.

What the individual searches have revealed

There is a large number of reports regarding the topic where Kepler might have lived with his family in the Hofgasse. The historians indicate different. Rudolf Reicherstorfer: Hofgasse 6 or 8 (1937) or Hofgasse 7 or 9 (1943); Justus Schmidt: Hofgasse 21 (1970) and Martha List: Hofgasse 22 (1970). In Kepler's lifetime it was unusual to write exact addresses, only "Linz" or "Linz in the Hofgassen" was given in letters. While studying the detailed records of the inheritance-homage of King Matthias of Hungary from May 1609 in Linz⁶, I found that the former Hofgasse included only the current house numbers 1 to 15. The houses of Hofgasse 21 and 22, favored by Schmidt and List, can therefore definitely be excluded.

Since Johannes Kepler had always lived in citizen-houses before and after his living-time in the Hofgasse, I started my research by checking all the houses owned by the citizens (Hofgasse 1-6, 8, 10-15), working in lengthy work on various documents such as birth or death statutes, godparenthood, funeral sermons, guarantees, tax books, etc., were looking for clues. Furthermore, I informed myself about Kepler's acquaintances and friends, the religious affiliation as well as the private and business environment of the individual homeowners in Hofgasse. An extraordinarily rich source were the 25 volumes of "Keplers gesammelte Werke"⁷ ("KGW" for short), in which the 1.153 letters written by or to Kepler and also his works are supplemented by commentary. Much hope I put on the house Hofgasse No. 8, I found the two then-owner Lorentz Griesmayr and Lorentz Perckhamer repeatedly mentioned in the KGW. Both citizens, like many other Protestants, emigrated from Linz to Regensburg in 1626 and both signed after Johannes Kepler's death there together with the widow Susanna Kepler and the son-in-law Dr. Jakob Bartsch an indemnification^{8 9}. In this they committed to the imperial city of Regensburg to cover any claims from the estate of the deceased.

Unfortunately, the obvious assumption that Kepler and his family might have lived in building Hofgasse 8 was invalidated by the Linz tax book of 1620. In this tax book are all "residents" (subtenants) with first and last name and their job title registered. However, for this house no corresponding entry can be found. Johannes Kepler therefore could not have lived in the house Hofgasse 8.

I then extended my search to houses 1 - 15. In the almost 190-page Linz tax book of 1620¹⁰, I could not find a single entry "Kepler"¹¹, which means that the Kepler family in Hofgasse can not have lived in a citizen house. Thus, six months of painstaking research had remained without result.

It was now the only way that Kepler's family lived in a 'free of tax house'¹². In the Hofgasse there were at that time only two free of tax houses, the Polheimer (No. 7) and the Starhemberger (No. 9). In free of tax houses there are in the Linz tax book of 1620 no entries from subtenants, since according to an imperial order of 1568 the nobility owners of a free tax house, the collection of a rent was prohibited.

Month-long searches in archives from Austria, Germany and the USA gave several indications of a closer connection of the families Polheim and Starhemberg with Kepler. The fact that both aristocratic families had also adopted godparenthood for Kepler's children is also proof of the close friendship between the families.

However, I was soon able to exclude the building Hofgasse 9 of the Starhemberg, as it was already dilapidated in 1599 according to the Linzer Regesten¹³ and was rebuilt between 1616 and 1619¹⁴. The Kepler family could not

⁶ Municipal collections Linz (Städtische Sammlungen Linz): Linzer Regesten A II A9 Annalen 1604-1613 (Linz 1953) 61 (Nr. 11317 19.5.1609)

⁷ publisher: Bavarian Academy of Science and Humanities in Munich; authored between 1938 and 2016

⁸ Regional State Library of Regensburg (Staatliche Bibliothek Regensburg), Sign.: 99 IP/Rat/.civ.571, S. 31-34

⁹ KGW XIX 243-244

¹⁰ However, with regard to these dates, it is important to note that the Linz tax books are only valid at 10-year intervals (1595, 1620, 1630, 1640, ...); The intervening tax books were destroyed in the 19th century for reasons of space.

¹¹ Linz tax book 1620 43

¹² The mostly sumptuously furnished "Free House" in Linz were inhabited by the nobility when meetings of the estates or the state parliaments were scheduled in Linz. Depending on their position, their owners had more or less staff: janitors, secretaries, cooks, personal servants, pioneers, stable masters, gardeners, cooks and bellboys. The "Free Houses" were mostly exempt from all taxes, hence the name "Free House".

¹³ Municipal collections Linz: Linzer Regesten BII A13 Landschaftsakten (Linz 1955) 189 (Nr. 13780 12.3.1599)

¹⁴ Grill, Georg: Die Freihäuser in Linz (Linz 1955) 162-167

have lived in it.

That left the house Hofgasse 7¹⁵!

I now wanted to check this house found by the exclusion process to see whether it can be substantiated by descriptions Kepler in his various astronomical observation reports.

Hints in Kepler's astronomical reports, which refer to a specific house

Kepler was an avid observer of solar- and lunar eclipses, to improve his predictions of future eclipses he urgently needed for the Tabulae Rudolphinae. He has kept accurate records about it. For example, Kepler explained in a letter¹⁶ why he had chosen the mountain 'Poestlingberg' closely to Linz as the observation site for the observation of the lunar eclipse (MoFi) of 26.8.1616: "[...] because the pretty high castle robs all the distant view of my dwelling." This means that Kepler was unable to see to the west from his building through the dominant castle.

I now examined how this description fits in with the circumstances of the relevant buildings (Hofgasse 7 and as security also 8, 9, 21 and 22). For this purpose, it was necessary to excavate the respective architectural history and especially the overall height of Kepler's time for the respective houses. Thankfully, I was very much supported by the apartment owners in these searches on site, since it was necessary to check the visibility from the windows of the respective houses in the direction of the castle. In addition, the course of MoFi from August 1616 (and other MoFi, see below) had to be calculated exactly.¹⁷ I also compared all other records of Kepler's for other lunar eclipses (16.8.1617, 26.6.1619, 20.12.1619 and 14.6.1620)¹⁸ observed in Linz to their agreement with the local conditions.

The result of this extensive and lengthy research is clear:

Kepler's description of the visibility of his house for the MoFi of 26.8.1616 is only correct for one house in the Hofgasse (see also Fig. 1). Also all other eclipse records fit exactly to this realization.

The mystery of Johannes Kepler's residence from 1613 to 1620 in the Linzer Hofgasse can therefore be regarded as having been solved without any doubt after 400 years!¹⁹ His address was:

**Johannes Kepler
Hofgasse 7
Linz**

I close my remarks with a quotation from Arthur Fischer-Colbrie, in which he acknowledged the importance of Hofgasse and Kepler: "In the (unknown, note) house in Hofgasse (the true house was still unknown at the time.), which is so significant for the history of astronomy, [...] May 15, 1618, is the greatest date in the history of the city of Linz - Kepler discovered the third planet law."²⁰

¹⁵ Grill, Georg: Die Freihäuser in Linz (Linz 1955) 93

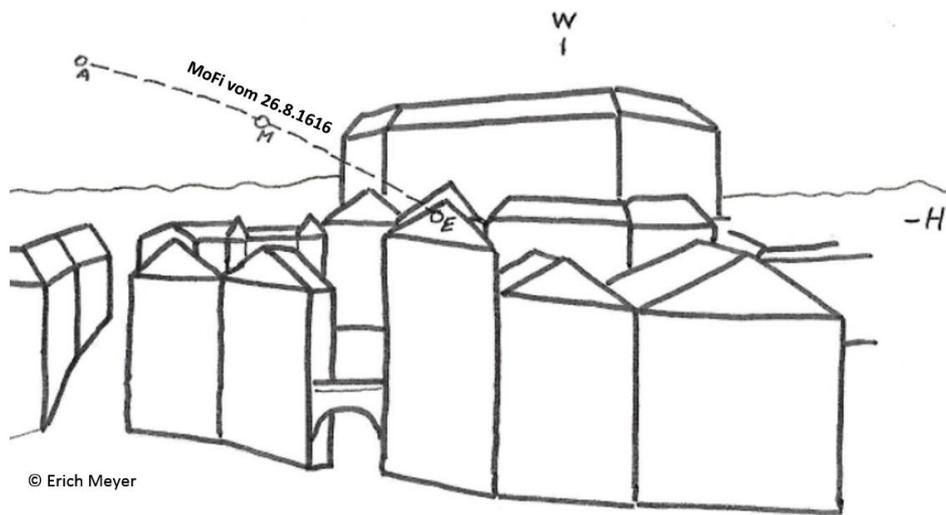
¹⁶ KGW XVII letter No. 750 from 22.12.1616 (Kepler in Linz to Michael Mästlin in Tübingen)

¹⁷ These complex calculations of Lunar Eclipses were compiled by Mr. Herbert Raab from the Linz Astronomical Society Johannes Kepler.

¹⁸ KGW XXI, 1: 16./26.8.1616 page 75-76, 6./16.8.1617 page 79, 16./26.6.1619 page 81, 10./20.12.1619 page 82-83, 4./14.6.1620 page 86-87

¹⁹ My complete documentation will be published in summer 2018 in: Notifications of the Archives of Upper Austria, 2018 (publisher: Archives of Upper Austria)

²⁰ Fischer-Colbrie, Arthur: Lebensbilder aus Oberösterreich: Johannes Kepler. In: Heimatland 1958 OÖLB II 14099



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Fig. 1 View from the building of Hofgasse 7 (without house Hofgasse 9, as this was demolished at the time of the mentioned moon eclipse) Registered is the course of the Lunar Eclipse of 26.8.1616. Only from this house in Hofgasse 7 you can see the high castle as described by Kepler. H=mathematical horizon, W=West.



Fig. 2 Linz, Hofgasse 7, former “Freihaus” of the aristocrates Polheim (Photo Erich Meyer) Kepler lived here with his family from October 1613 until September 1620. His brother Heinrich and his daughters Anna Maria and Maria (1614/1615), his mother Katharina (December 1616 - September 1617) and his mathematical assistants Benjamin Ursinus (October 1613 - fall 1614) and Gringalettus from Savoy (1617 - September 1620) were with him for some time.

Additional information on Johannes Kepler

Kepler was born on 27.11.1571 in Weil der Stadt; he died on November 15, 1630 in Regensburg²¹; he was imperial court mathematician in the service of Emperor Rudolph II, Mathias and Ferdinand II.

Johannes Kepler is the founder of modern celestial mechanics. With the introduction of the concept of force (he thought of a kind of magnetic force) into planetary theory, Kepler succeeded in transforming astronomy from 'celestial geometry' into 'celestial physics'. This new celestial physics was so revolutionary that it was rejected by eminent scholars of its time. Tycho Brahe, Galileo Galileo, the Tübingen professor Wilhelm Schickard but also his professor Michael Mästlin said: *"One should only treat astronomical things astronomically and not mix them with earthly physics."* Kepler was guided by the principle that a scientific statement must be in quantitative agreement with empirical data.

Important books from Kepler's time in Linz:

- Nova Stereometria Doliorum Vinariorum, Linz 1615
(mathematical treatises on the volume calculation of bodies of revolution²²)
- Ephemerides Novae Motuum Coelestium, from anno vulgaris aerae 1617 - 1620, Linz 1616
(annual calendars in which the daily position of the planets, solar- and lunar-eclipses are calculated in advance)
- Epitome Astronomiae Copernicanae, Lib I, II, III: Linz 1618, Lib IV: Linz 1620
(Seven books on Copernican astronomy, which for several decades was the most widely read Work on theoretical astronomy in Europe)
- Harmonices Mundi libri V, Linz 1619
(five books on world harmony, in Book V is the 3rd Kepler's Law formulated)
- Prodromus Dissertationum Cosmographicarum continens Mysterium Cosmographicum
(based on the Copernican system Kepler has filled the interstices of the six planets with the five regular bodies of geometry; Revision in Linz 1620-21)
- Somnium, Seu Opus Posthumum de Astronomia Lunari; 1609 (Prague) and 1622 (finished in Linz)
(first science fiction story in which Kepler describes a drive to the moon; he also describes astronomical knowledge of the moon.)
- Tabulae Rudolphinae, completed 1624 in Linz²³
(Formulas for the calculation of the exact positions of the planets for any date, as well as from Solar- and lunar eclipses)

The third Kepler's law

With the law discovered on 15.5.1618 by Kepler in Linz, the relative distances of the planets could be calculated exactly for the first time. This law, which Kepler describes in his book "Harmonices Mundi", printed in Linz in 1619, reads:

$$T_1^2 / T_2^2 = a_1^3 / a_2^3$$

Square of any planet's orbital period is proportional to cube of its mean distance from Sun.

In his book on page 190, Kepler provides a simple calculation example for the orbit of the planet Saturn:
The transformation the above formula yields:

$$\sqrt[3]{(T_{Saturn}/T_{Erde})^2} = a_{Saturn}/a_{Erde} \rightarrow \sqrt[3]{(30_{Saturn}/1_{Erde})^2} = 9,65_{Saturn}/1_{Erde}$$

Known parameters: orbital period of the planet Saturn: 30 years and the earth: 1 year; this results in a mean distance of the planet Saturn of 9.65 times the distance to the mean distance of the earth to the sun. That was fundamentally new!

Author: Ing. Erich Meyer, F. Marklstr. 1/62, 4040 Linz; office@astrokepler.at

²¹ Kepler was on the way from Sagan to Linz, to pick up the interest of capital invested in the estates of Upper Austria

²² Several technical terms that Kepler had created in this work are still used today, such as "Conic sections."

²³ the printing took place in Ulm, because the Linzer printing company burned out in the Lederergasse no. 8 on 30.6.1626 as a result of the peasants' war