

The Merz Company: A Global Player of 19th Century

Gudrun Wolfschmidt and Jürgen Kost

1 Joseph von Fraunhofer: A Sort of Hagiography

In the early 19th century, as a result of the Continental System, the Bavarian workshops achieved global leadership in high quality optical-mechanical instrument-making thanks to the work of Fraunhofer and his successors (Jackson 1993).

Joseph von Fraunhofer (1787–1826) began his career in 1806 at the Mathematical-mechanical Institute of Munich. In 1809, he became leader of the glassworks in Benediktbeuern (Seitz 1929), where he invented a device used to stir the glass melting in the furnace, in order to make it free of streaks (see Brenni, in this volume). He also developed methods to produce flint and crown glass of a given dispersion (first, by calculation of the dispersions, and second, by using the correct mixture of ingredients). With this expertise, he could make large high quality achromatic lenses, like the one for the Dorpat refractor (1824).

In 1821, he was appointed as an extraordinary member of the Bavarian Academy of Sciences and, two years later, professor and conservator of the physical cabinet of the Bavarian Academy of Sciences.

This brilliant ascent was interrupted in 1826, when Fraunhofer died, at the age of 39 years, in Munich.

The Institute of Mathematical Mechanics, founded in Munich in 1804 by Joseph von Utzschneider (1763–1840), Georg Reichenbach (1771–1826), and Joseph Liebherr (1767–1840), was one of the most important starting points for this hegemony. Most literature about Fraunhofer was written on special occasions, such as the jubilee of his birthday, the anniversary of his death or the inauguration of a

G. Wolfschmidt (✉)
Hamburg University, Hamburg, Germany
e-mail: gudrun.wolfschmidt@uni-hamburg.de

J. Kost
Tübingen University, Tübingen, Germany

monument or of the Benediktbeuern Museum. Some examples of the topic ... *aus Fraunhofers Hand* (... made by Fraunhofer) are highlighted below:

- *Der nach Pulkowa (bei Petersburg) gelieferte Refractor Fraunhofers [...]* (Preyß 2008, 72)
(The Fraunhofer refractor delivered to Pulkowa (near St. Petersburg) [...])—
Fraunhofer had already been dead from thirteen years, when the instrument was delivered, in 1839!
- *[...] es war ehrliches Bemühen tüchtiger Leute, – aber ohne Wissen um den Weg in die Zukunft und die Fähigkeit, auf Fraunhofers Fundament wissenschaftlich und technisch weiterzubauen.* (Preyß 2008)
(Capable people tried hard, but without any knowledge about the path to the future and without the skill to build on Fraunhofer's fundament in a scientific and technological way).
- *[...] nie mehr so gute Instrumente gebaut wurden wie zu Fraunhofers Zeiten* (Sang 1987, 133)
(Such good instruments, as were made in Fraunhofer's time, were never built anymore).
- *[...] unaufhaltsamen Niedergang dieses Betriebes nach Fraunhofers Tod.* (Sang 1987, 27)
(The inexorable decline of this workshop after Fraunhofer's death).



Fig. 1 Fraunhofer as a hero: Joseph von Fraunhofer demonstrates the spectroscope. *From the left* Joseph von Utzschneider, Joseph von Fraunhofer, Georg von Reichenbach, Joseph Liebherr (?) and Georg Merz (painting by R. Wimmer 1897)

This overestimation of Fraunhofer, in comparison to his successor Merz, is a trend of many biographers and a classic example of hagiography, as these historians completely neglect the importance of the Merz Workshop.

A famous painting by Rudolf Wimmer (1897) (Fig. 1) shows Joseph von Fraunhofer as a hero, while demonstrating his new spectroscope. You can also see Georg Merz here, relegated to the background of Wimmer's painting—despite the fact that he was Fraunhofer's successor and the new head of the glassworks!

It is a myth that this tradition in making optical instruments ended with Fraunhofer's death. A prominent feature, by which the company G. & S. Merz can be characterized, is their introduction of many technical innovations over a period lasting more than a century (from 1826 to 1932), thus achieving a leading position in scientific instrument-making.

2 The Merz Company—Sources and Traces

2.1 *Sources and Methods of Research*

Some questions should be considered as a starting point for research carried out about the Merz Company:

- How did the Company develop under Fraunhofer's successors—the Merz family?
- How successful was the Company and which seller's markets did they open up?
- What role did the instruments of the Merz Company play in the field of science?
- What was the reason for the final collapse of the firm?
- Why did the Merz Company disappear after being in operation for more than 100 years?

The sources and methods used for the research work on the Merz Company are listed below:

- Compilation of biographies of the important protagonists of the Optical Institute after 1826.
- Analysis of different inheritances, e.g., Sigmund Merz papers (Deutsches Museum Munich) and the collection of the optician Rudolf Loher (Stadtmuseum Munich, NL Loher) (Loher 1964).
- Looking for traces in Munich and Benediktbeuern (oral history).
- Three-dimensional sources—looking for instruments in museums and private collections.
- Compiling a register of instruments by considering the customers.
- Constructing a portfolio of the products of the Merz firm.

Many printed sources, such as company publications, trade literature, advertisements and publications in journals like *Astronomische Nachrichten* and *Zeitschrift für Instrumentenkunde*, etc., have also been used.

2.2 Trade Literature and Account Books

The Optical Institute and the Merz Company published schedules of prices (*Preiscurant*, *Verzeichniß der optischen Instrumente*) from 1811 to 1930.

The trade literature (*Firmenschriften*) comprises, as a whole, 36 advertising brochures (catalogues and technical communications from customers) from the years 1826 to 1932, which could be analysed. But the real portfolio of the products of the Merz firm was considerably larger!¹

The Account Books (business records) of the Merz Firm document the years from 1835 to 1881; there are 13 volumes, with about 1800 pages preserved. In these books, you can find, e.g.:

- Instrument descriptions, construction elements, etc.
- Information about customers
- Delivery dates of the instruments
- Payment arrangements
- Repair orders.

This was the most important source for the registry of instruments!

Fraunhofer's successors shaped the company significantly and opened up new sales markets. In addition, the large collection inherited by the historian of optics Rudolf Loher (1900–1975) is a very valuable source; it contains a large number of photographs, papers and instruments.²

In Munich, one can look for traces of the Merz firm. The residential Merz building and workshop at Müllerstraße 11 still exists (Fig. 2). Another important photograph shows how the Fraunhofer/Merz Workshop was arranged in an exhibit held at the City Museum (Stadtmuseum) in Munich (1964); one can recognize many original tools and instruments. Finally, there is the gravestone of the Merz family (Fig. 3) in the Old Southern Cemetery in Munich.

¹About Merz catalogues of the years 1832, 1878, 1900, see: Kost 2015.

²For example, a filar micrometer (1880) and an objective-glass $d = 38$ cm (Bordeaux II).



Fig. 2 Residential building and Workshop of Merz at Müllerstraße 11 in Munich, around 1900 and in the year 2012. On the roof, the observatory for testing the instruments! (Stadtmuseum Munich [StAM, NL Loher]; credit Jürgen Kost)



Fig. 3 Family grave stone of Merz in the Old Southern Cemetery in Munich, around 1905 and in 2012. The right plaque in the *left* image is empty, awaiting the portrait of Sigmund Merz. (StAM, credit Kost)

3 Epochs of the Optical Institute and Merz Company

The epochs of the Optical Institute and the Merz Company are given below, from its establishment to the cessation of its activity, together with the name of the Company, which changed over the years.

- (1809)—Founding of the Optical Institute
- (1809–1826)—Fraunhofer (17 years)
- (1826–1839)—Utzschneider and Merz (13 years)
- (1839–1845)—Merz and Mahler (6 years)
- (1845–1858)—Merz and Söhne (13 years)
- (1858–1867)—Georg and Sigmund Merz (9 years)
- (1867–1883)—Sigmund Merz (16 years)
- (1883–1903)—Jakob and Matthias Merz (20 years)
- (1903–1932)—Paul Zschokke (29 years).

It is worth noting the brevity of the Fraunhofer epoch in comparison to the many years of the Merz Company (Fig. 4).

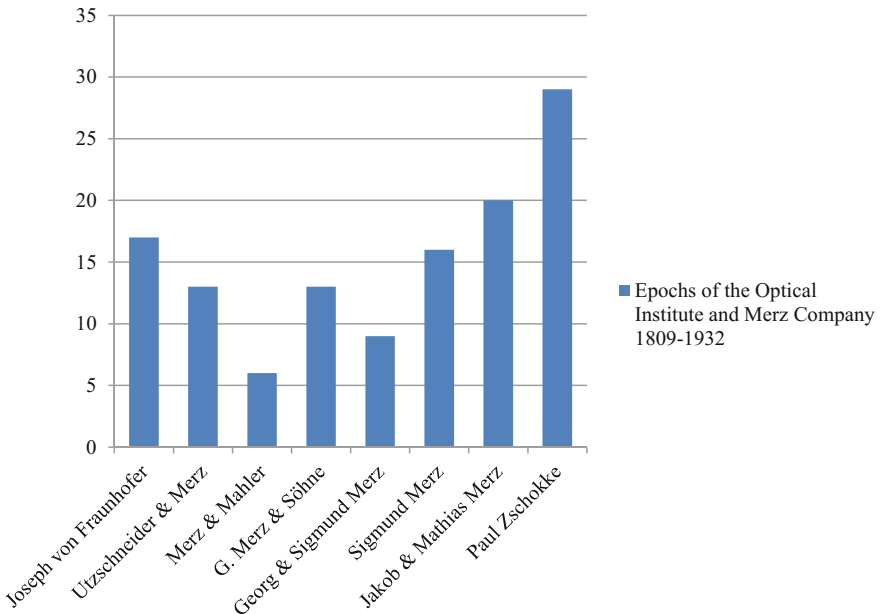


Fig. 4 Epochs of the Optical Institute and Merz Company, from 1826 to 1932. (*Graphics Jürgen Kost*)

3.1 *The Founders of the Merz Company: Georg Merz and Joseph Mahler*

After gaining considerable experience as a co-worker of Fraunhofer and, later, of Utzschneider, Georg Merz (1793–1867) founded the Merz workshop (Merz 1868) with the financial support of his friend Joseph Mahler (1795–1845).

The main products and activities of his workshop were:

- Large refractors and heliometers, very successful instruments at the beginning of the 19th century, including: the Bonn heliometer (1841); the 38-cm-aperture refractors at the Pulkovo Observatory (1839) and at the Cambridge Observatory (1847).
- Improvements of microscopes (i.e., the prismatic microscope, designed by G. Merz).
- Optics (spectacles, magnifying lenses, etc.).

Around 1858, the Merz workshop for glass grinding and polishing was located behind the *Viktualienmarkt* in Munich (Fig. 5a). Tools for the lens grinding machine and for polishing are kept today in the Fraunhofer Glashütte Museum in Benediktbeuern (Fig. 5b).

3.2 *The Period of Prosperity—Sigmund Merz: 1845–1883*

This period includes three epochs, during which the leadership of the company gradually passed from Georg Merz to other members of his family (Fig. 6), starting with his son, Sigmund (1824–1908):

(1845–1858)—G. Merz and Söhne

(1858–1867)—Georg and Sigmund Merz

(1867–1883)—Sigmund Merz.

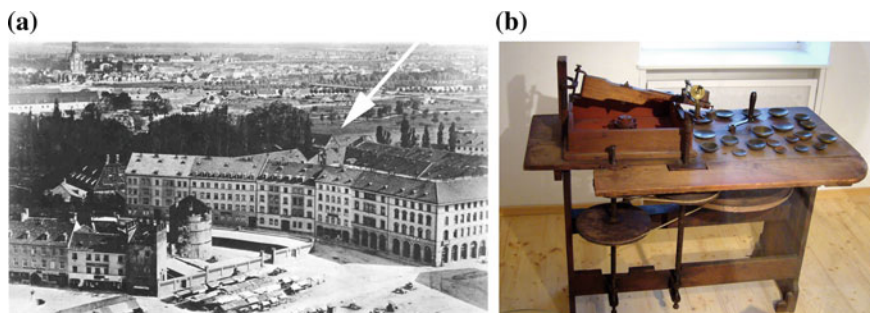


Fig. 5 **a** Merz workshop in Munich, after 1858. **b** A small lens grinding machine and polishing bowls, (Stadtmuseum/City Museum Munich [StAM], Museum Fraunhofer Glashütte in Benedikt-beuern)

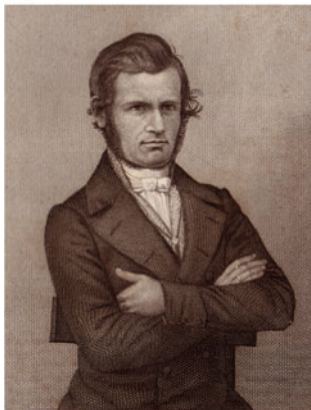
(a)



(b)



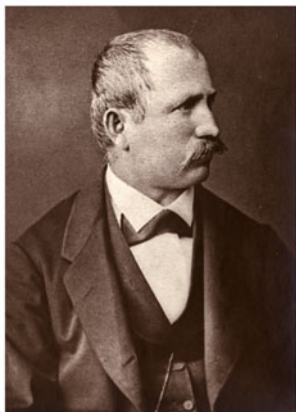
(c)



(d)



(e)



(f)



◀**Fig. 6** The Merz family: **a** Georg Merz with his improved aplanatic microscope **b** Joseph Mahler (Private collection, Stadtarchiv Immenstadt). **c** Ludwig Merz (1817–1858), **d** Sigmund Merz, (Engraving by: A. Schleich, Bayerische Staatsbibliothek Munich). **e** Jakob Merz and **f** Matthias Merz, photography, around 1880, (Private collection, Stadtmuseum Munich [StAM, NL Loher])

The second workshop of the Merz Company was set up at Blumenstraße 31 in Munich, and was used from 1867 to 1907, up until the epoch of Jakob Merz.

The typical products of this period were:

- New refractors, including: the 24-cm aperture refractor at the Quito Observatory (1875); the 18-cm refractor at the Calcutta Observatory (1876).
- Improved microscopes for physicians, students, meat inspectors, etc., such as: the small Merz Microscope (1862); the Dissection Microscope (1868); the Trommel Microscope (1860).
- Military optics, such as: marine double binoculars (1885); Bavarian military telescope (1867); Marine double binoculars (1865); Marine double binoculars “Fürstenmodel”; distance-measuring instruments.
- Optics for photography (photography had become an emerging field for the public since the 1880s, spurred by the introduction of the dry photographic plate process).
- Spectroscopes and objective-prisms (e.g., 16-cm diameter objective-prism 1869). Merz began the first serialized production of astronomical spectroscopes, such as the large universal star spectroscope and the small universal star spectroscope (1910).
- Objectives and optical elements for many well-known workshops (Breithaupt of Kassel, Ertel of Munich, Repsold of Hamburg), as well as spectacles and glasses for Rodenstock Company of Munich.

One of Sigmund Merz’s most important contributions was a list of glass-melting processes in the Benediktbeuern Glassworks from 1842 to 1885. This list of 431 glass meltings gives very good insight into the production process. There were 113 crown glasses in comparison to 318 flint glass meltings, thus giving a ratio of about 1 to 2.8.

3.3 The Last Active Members of the Merz Company—Jakob and Matthias Merz: 1883–1903

After the death of Sigmund Merz, the company passed into the hands of his brothers, Jakob (1833–1906) and Matthias (1826–1883), in collaboration with Paul Zschokke (1853–1932) (Fig. 7a) (Zschokke 1818).

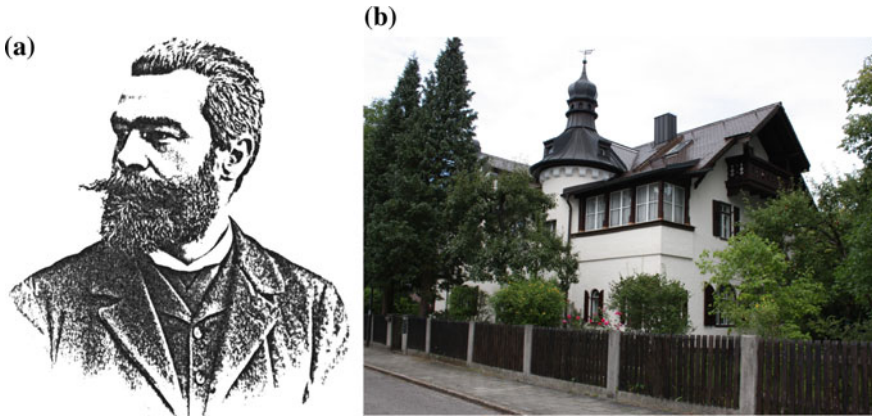


Fig. 7 **a** Paul Zschokke, **b**: Zschokke Villa at, Hauptstraße 21, Munich-Pasing in 1902, (Zschokke family archives, Flüh/Schweiz, Kost, 2013/StAM)

Their main products and activities were:

- Scholastic and amateur telescopes for the educated class (Bildungsbürgertum).
- Repairing and maintenance of large telescopes.

3.4 The Final Epoch—Merz-Zschokke: 1903–1932

In the years from 1903–1932, the company was renamed G. & S. Merz G.m.b.H.—*G. & S. Merz, Optisches Institut, ehemals Utzschneider & Fraunhofer*. In the catalogue from 1911, 332 instruments were listed.

The main product was:

- Schupmann Medial telescope (Fig. 8), mainly for amateur astronomers.

There exists a Merz advertising brochure for this instrument, *Das Medial-Fernrohr* (1924), which is known in English-speaking countries as the Schupmann telescope (Schupmann 1913). Merz also built a successful 38.5-cm aperture medial telescope for the private Landstuhl Observatory (1912). Only amateur astronomers were interested in the medial telescope, but it was too expensive for many of them. The professional astronomers disliked its catadioptric design, which was a cross between a refractor and a reflector.

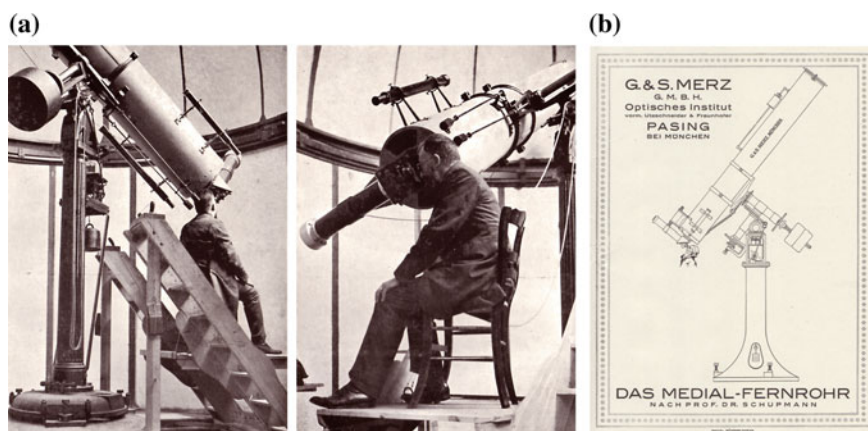


Fig. 8 **a** Medial telescope, used by Philipp Johann Heinrich Fauth (1867–1941), in his private observatory at Landstuhl, Palatinate, later Munich-Grünwald. **b** Medial Merz Telescope advertising flyer (1924), (From: Merz-Medialfernrohr Werbeschrift 1924, Fauth P. 1912, Tafel 1)

3.5 Staff of the Merz Company—Invisible Hands

It would be very complicated to compile a complete list of the company's employees, including opticians, precision mechanics and assistants (Hentschel 2008); however, a list of the staff of the Merz firm in 1883 has recently been published (Kost 2015). One of the most important employees was Rudolph Weiss (1809–1882), who worked at the Merz Company for 54 years, acquiring good expertise in optical production.

4 Data from Account Books and Other Sources

From the Account Books, a list of refracting telescopes, objectives and lens tubes made by Merz has been compiled (Kost 2015); the list includes 43 refractors and 93 objectives/lens tubes.

Additional information can be extracted from this source; for example, here is a list of all the Merz instruments delivered to Angelo Secchi (1818–1878), many of which are devices for spectroscopy and solar physics:

- *Januar 1853—2 Doppelring-Mikrometer*
- *August 1854—9—zölliger Merz-Refractor, Beugungs-Apparat*
- *Juni 1856—Mikrometerokular zum 9 Zöller*
- *März 1863—Zylinderlinsen mit 13"Öffnung*
- *Oktober 1865—Spektralapparat mit Doppelprismen 24"*
- *April 1866—Kompensations-Prisma for den Spektral-Apparat*

- *Oktober 1866—Zylinderlinse 12" Öffnung*
- *März 1868—Kompensations-Prisma 8°*
- *Juni 1868—Schraubenmikrometer*
- *September 1869—Objective-Spektral-Apparat 6" Öffnung*
- *Dezember 1871—Spektralapparat Nr. 80*
- *Mai 1872—2 Prismen 90°, 12 Stück Sonnengläser*
- *Mai 1873—2 Refl. Prismen und 2 kleine Objective*
- *Mai 1874—Spektral-Prisma 18–33 mm, 1 Rautenprisma*
- *November 1875—Flintglasprisma 60° 22"*
- *Februar 1876—2 Spektral-Prismen 18–24 mm.*

Moreover, many hidden treasures were found by Kost in 2015 in the depot of the City Museum of Munich, including 100 engineering drawings from the inheritance of the Merz family (StAM, Sammlung Grafik 32/168 ff.) which will be analysed in the near future.

Archival materials related to the Merz company have been found at:

- The Carl Zeiss Archive, Jena
- The Archive and Collections of the Deutsches Museum in München
- The Dr. Johannes Heidenhain GmbH in Traunreut
- The Institute for Astronomy and Astrophysics of Tübingen University
- The Stadtmuseum (Citymuseum), Munich
- The Stadtarchiv Oberstaufen
- The SAO/NASA Astrophysics Data System
- The Tübingen University Archive
- Private collections and archives.

5 Merz as a Global Player—Different Types of Instrument

In particular, the analysis of the account books and the correspondence of the Merz Company, which have remained unscrutinized up to now, reveal the company's extensive economic ties as a supplier of lenses and optics for no less than 30 firms in Germany and abroad (Figs. 9 and 12).

Below is a list of the main types of instrument manufactured by Merz (Kost 2015).

Objectives and Spectroscopic devices (Fig. 10)

- 12" objective lens
- Objective prism (c.f. Collegio Romano 1869, Berlin Observatory, Dun Echt Observatory 1873)
- Large Merz-Universal-Star Spectroscope Nr. 78

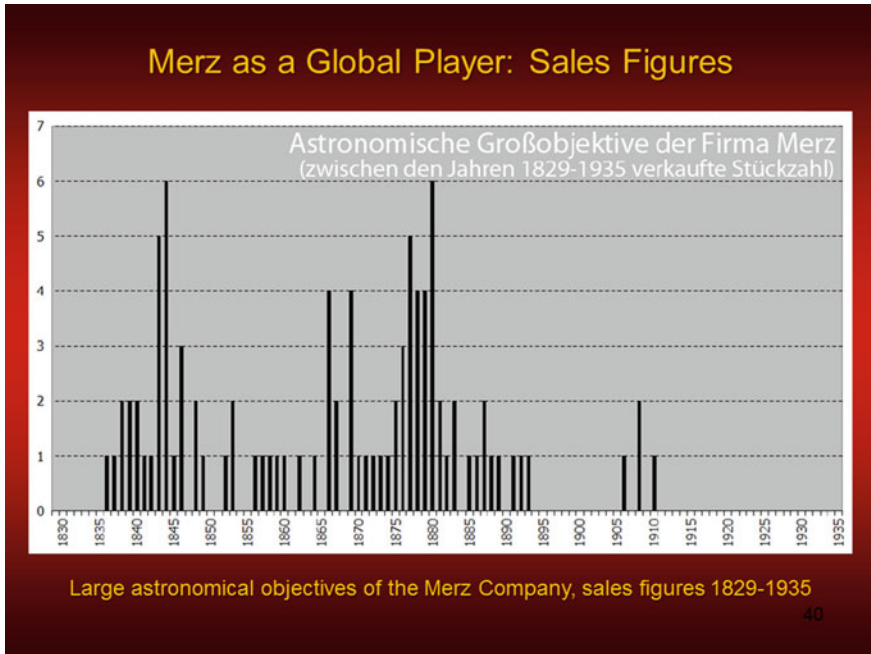


Fig. 9 Large astronomical objectives of the Merz Company, sales figures 1829–1935 (Graphics Jürgen Kost)

- Spectroscope, sold to Steinheil
- Merz/Cooke 7" Refractor with a 5-prism spectroscope, (Kalocsa Observatory 1878).
- Helioscope for solar physics (1876)

Transit Instruments, Meridian and Vertical Circles

- Repsold/Merz Meridian Circle, Pulkovo Observatory, 1838
- Meridian Circle, Spain, 1852
- Meridian Circle, Strasbourg/Straßburg, 1875 + 1877
- Meridian Circle, Tokyo, 1878
- Meridian Circle, Munich, 1891
- Meridian Circle, Bonn, 1893
- Repsold/Merz Transit Instrument, Pulkovo Observatory, 1834/39
- Repsold/Merz Vertical Circle, Pulkovo Observatory, 1834/39

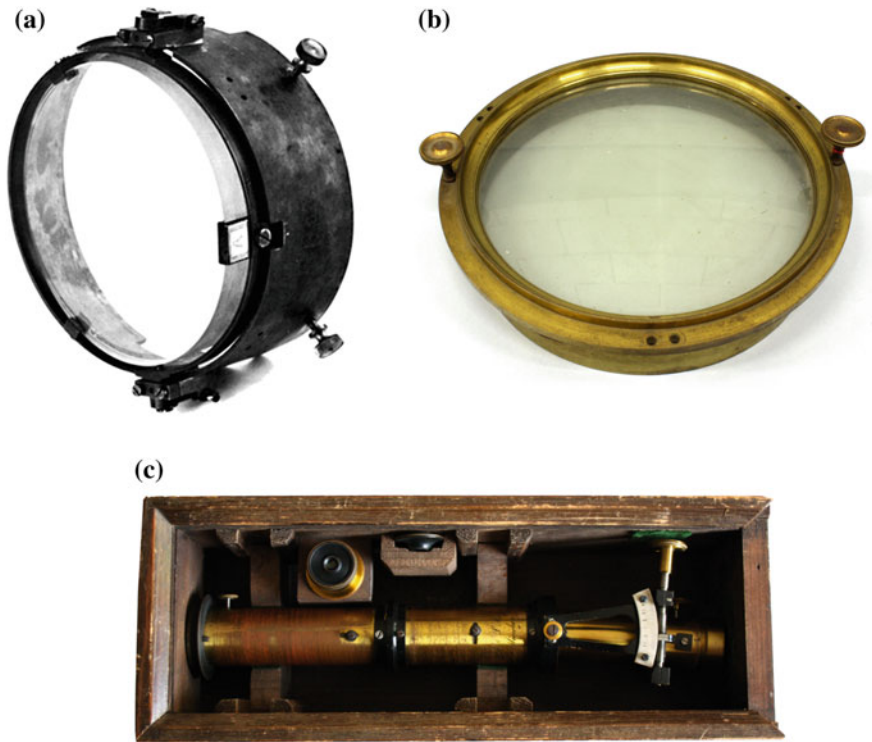


Fig. 10 Astronomical optics, made by Merz: **a** Objective prism of Collegio Romano Observatory, 1869 (INAF-OAR), **b** 12'' objective with brass mounting (StAm, NL Loher), **c** small star small star spectroscope, around 1910 (collection Rolf Riekher, Berlin)

Heliometers

- Königsberg Heliometer (Kaliningrad, Russia), 1829. (It was commissioned by Friedrich Wilhelm Bessel (1784–1846). Fraunhofer secured the contract and created the glass-melting procedure. Merz took up the project in 1827, immediately after Fraunhofer's death, effecting the cutting of the lenses, which was a very complicated operation).
- Bonn Heliometer, 1841 (restored in 1893) (Fig. 11a)
- Radcliffe Observatory Heliometer, Oxford, 1844
- Yale College 6-inch Heliometer, New Haven, Connecticut, 1880
- Capetown Observatory Merz/Repsold 7-inch Heliometer, 1887—the largest heliometer in the Southern hemisphere.
- Remeis Observatory Repsold/Merz 7-inch Heliometer, Bamberg, 1889—the largest heliometer in the Northern hemisphere.
- Munich Heliometer, 1891

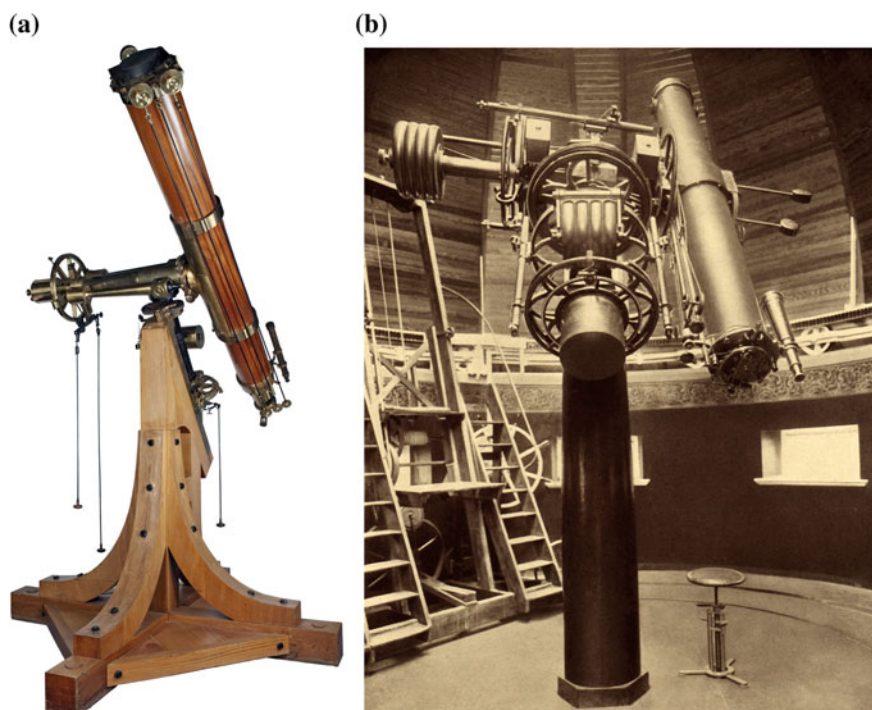


Fig. 11 Merz Instruments: Heliometer and Equatorial. **a** 6" Merz Heliometer of the Bonn Observatory, 1841, (restored in 1898). **b** Repsold/Merz Equatorial, Hamburg, old Millerntor Observatory, 1864 (now in Bergedorf), (Deutsches Museum Bonn, Hamburg Observatory)

Equatorial telescopes (Kost [2011](#))

- Millerntor Observatory 9-inch Repsold/Merz Equatorial, Hamburg, 1867 (this was a special new type of instrument, to be used in place of meridian circles for compiling precise star catalogues) (Fig. [11b](#))
- Christiania/Oslo Observatory Equatorial, 1842
- Altona Observatory Equatorial, 1858
- Gotha Observatory Equatorial, 1860

Astrographs

- 9-inch Astrograph with Micrometer, Kiev Observatory (an astrograph is a special double refractor for photographing the sky; one lens is corrected for the blue wavelength range—as early photographic plates were only sensitive in that range—and the other for visual observations).

Refracting Telescopes (Fig. [13](#))

- 14-inch refractor, Harvard College, Cambridge, Mass., 1847
- 9-inch refractor, Collegio Romano, 1854

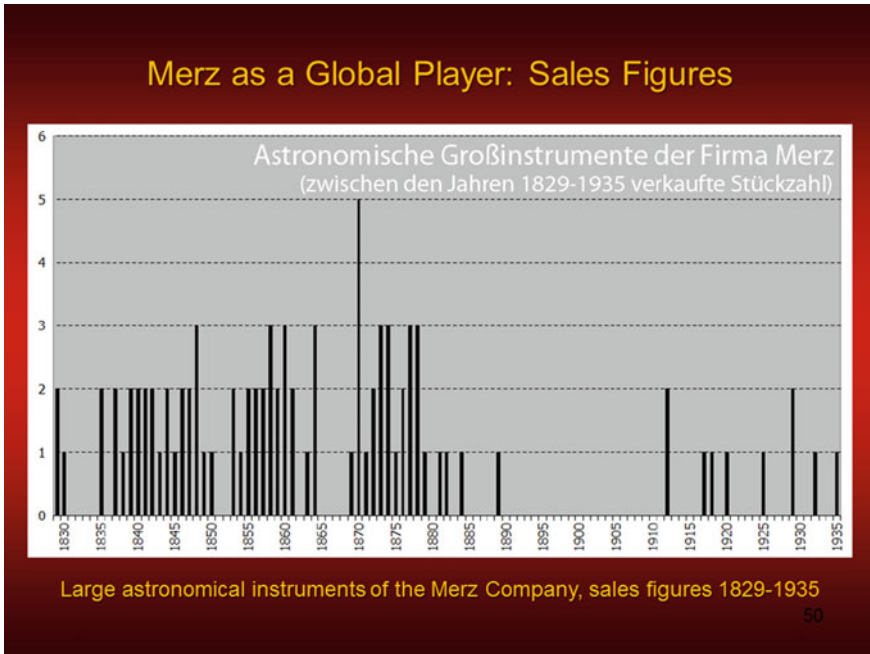


Fig. 12 Large astronomical instruments of the Merz Company, sales figures 1829–1935 (Graphics Jürgen Kost)

- Lisbon Observatory, 1861
- Santiago Observatory, 1869
- Nikolajew Observatory, Kiev, 1874
- Stockholm Observatory, 1876
- 18-inch Repsold/Merz refractor, Strasbourg Observatory, 1870s
- Altazimut Refractor, Strasbourg Observatory, 1877
- Berlin Observatory, 1880
- Milan Observatory, 1881

Comet Seekers (Fig. 14)

- Göttingen Observatory, 1870
- Merz/Repsold Comet Seeker, Bamberg Observatory, 1889

Mass Production of Telescopes

- 6-inch refractor, World Fair in Chicago, 1893
- School Telescope, 1910
- Reflecting Telescope G. & S. Merz, 1920

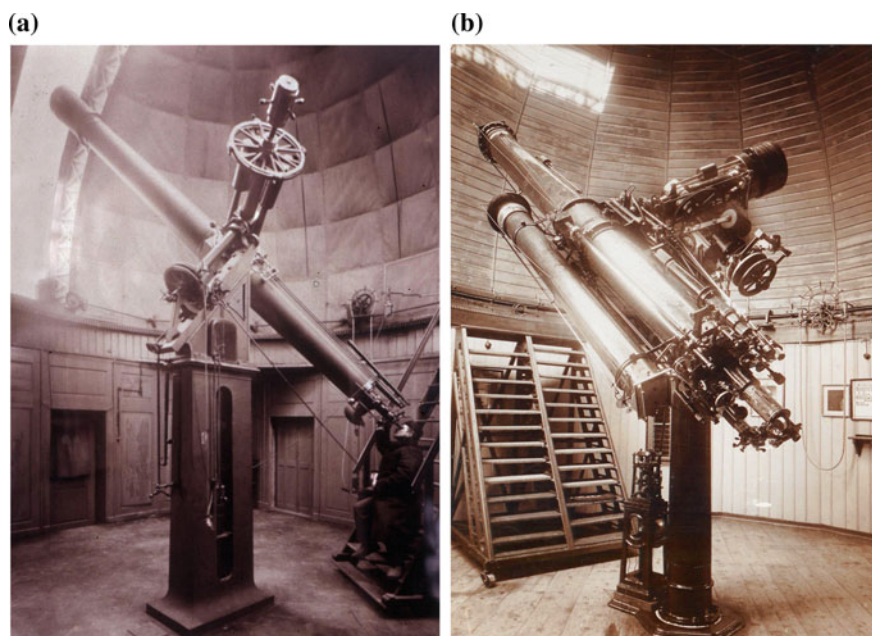


Fig. 13 Merz Refracting telescopes, **a** 10½" Telescope, Munich-Bogenhausen Observatory, 1835. **b** 9" Telescope, O'Gyalla Observatory, Hungary (now Hurbanovo, Slovakia): the Zeiss astrograph, on the left, was added in 1904 (Leiden Observatory Archives)

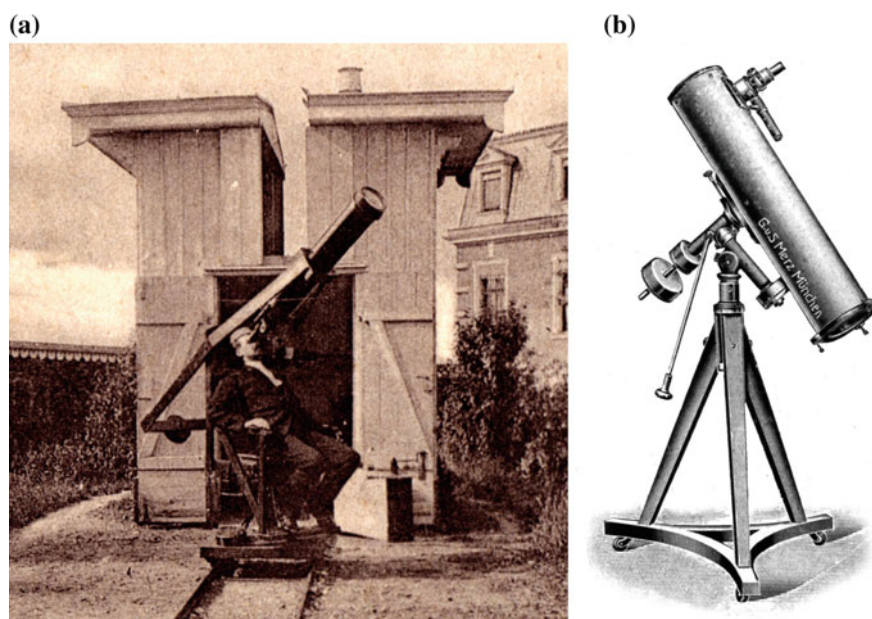


Fig. 14 Merz Instruments for Amateurs: Comet Seekers and Reflectors, **a** Merz/Repsold comet seeker of the Bamberg Observatory with the so-called comet villa, around 1900. **b** Reflecting Telescope Newtonian type, G. & S. Merz, 1920, (Picture postcard, Merz advertising flyer, around 1920)

- 6-inch telescope for street astronomers, 1880 (in comparison with people who presented electrical, optical or chemical experiments to market places).

Between 1839 and 1932, the Merz Company delivered worldwide (Fig. 15), to practically all notable observatories, astro-optics, refracting telescopes, heliometers, etc. (Riekher 1990).

They not only produced astronomical instruments (meridian circles, transit instruments, heliometers, comet seekers, astrographs), but also military optics, surveying instruments, microscopes, and spectroscopes.

Merz produced approximately 90 large refractors and about 100 astronomical lenses. They were sold in England, France, Italy, the Americas, Russia, South Africa, India, the Philippines, Japan, and Australia. A list of these instruments is given in this book in Appendix B.

The Merz Company and their instruments made crucial contributions to the solution of many scientific problems, especially in the fields of astrometry, astro-physics, and geodetic instruments (theodolits), although bacteriology and medical diagnostics also deserve to be mentioned. Merz produced microscopes for biology and cristallography (Merz 1844) and also for medical purposes; Robert Koch (1843–1910) and Max Josef Pettenkofer (1818–1901) both used Merz instruments for their research. Microscopes continued to be delivered by Merz until roughly the 1880s, when more sophisticated microscopes began to be constructed by Leitz of

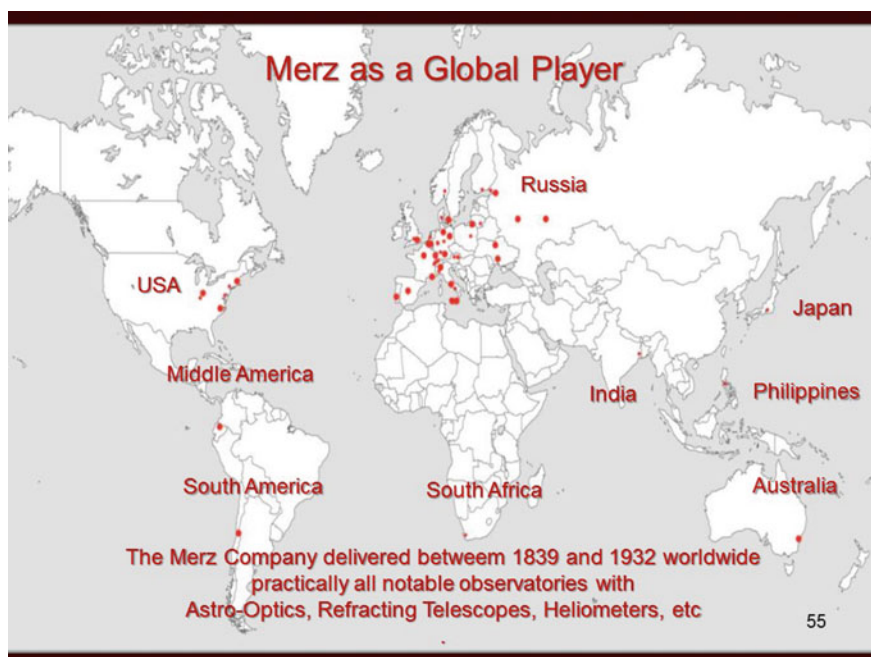


Fig. 15 Merz as a Global Player—world map of sold instruments, (Graphics Jürgen Kost)

Wetzlar (founded in 1869), Fuess of Berlin (founded in 1865), Hartnack of Potsdam (founded in 1864), Winkel of Göttingen (founded in 1857) and especially by Carl Zeiss of Jena (founded in 1846).

6 Why Did the Merz Company not Survive?

There are several reasons, which, when combined, could explain the demise of the Merz Company. They are listed below.

- Missed opportunities: The company failed to extend the important sector of photo optics and prism spy glass (Prismen-Feldstecher) going into the 1920s.
- Merz did not like to employ people from abroad, maintaining a strict policy of only hiring Bavarians.
- Merz only sold instruments out of their office in Munich, missing the opportunity to build up a dealer network like Carl Zeiss and Schott of Jena and Emil Busch of Rathenow did, with offices not only in other parts of Europe, but also in the USA, South America and Japan.
- New competitors began to spring up around 1900, e.g., Zeiss of Jena or Askania of Berlin.
- Paul Zschokke was not open to new developments like the medial telescope. Thus, he missed the opportunity to properly advertise this instrument. In addition, when Zschokke died in 1932, he had not prepared a successor.

6.1 The Output of the Merz Company

Sigmund Merz stated: *Ohne ein Fraunhofer'sches oder Merz'sches Objectivglas irgendwelcher Dimensionen wird es wohl keine Sternwarte geben* (Without a Fraunhofer or a Merz objective lens of any dimension, there will be no observatory).

The Merz Company was an extremely successful organization during the more than 100 years that they existed. Their impressive market areas characterize Merz as one of the early global players in the field of scientific instruments, especially in building of optical-mechanical instruments of high precision. Its influence on scientific instrument-making by far exceeded Fraunhofer's work.

“Sie brachten uns die Sterne näher!”

(They brought us nearer to the stars!)

References

- HENTSCHEL, KLAUS: *Unsichtbare Hände*. Diepholz, Stuttgart, Berlin: GNT Verlag 2008.
- JACKSON, MYLES W.: Die britische Antwort auf Fraunhofer und die deutsche Hegemonie in der Optik. In: *Deutsches Museum: Wissenschaftliches Jahrbuch 1992–1993* (1993), S. 117–138.
- KOST, JÜRGEN: Die Äquatoreale der Firma Repsold in Hamburg. In: WOLFSCHMIDT, GUDRUN (Hg.): *Hamburgs Geschichte einmal anders – Entwicklung der Naturwissenschaften, Medizin und Technik, Teil 3*. Hamburg: tredition science (Nuncius Hamburgensis – Beiträge zur Geschichte der Naturwissenschaften; Bd. 20) 2011, S. 62–77.
- KOST, JÜRGEN: Heliometer von Merz. In: WOLFSCHMIDT, GUDRUN (Hg.): *Von den Anfängen bis zur modernen Astrophysik. 125 Jahre Dr. Remeis-Sternwarte Bamberg (1889)*. Proceedings der Tagung des Arbeitskreises Astronomiegeschichte in der Astronomischen Gesellschaft 2014. Hamburg: tredition (Nuncius Hamburgensis – Beiträge zur Geschichte der Naturwissenschaften; Bd. 31) 2015, S. 330–345.
- KOST, JÜRGEN: *Wissenschaftlicher Instrumentenbau der Firma Merz in München (1838–1932)*. Bearbeitet und herausgegeben von GUDRUN WOLFSCHMIDT. Hamburg: tredition (Nuncius Hamburgensis – Beiträge zur Geschichte der Naturwissenschaften; Band 40) 2015.
- LOHER, RUDOLF: Die große Schau. In: *Foto-Magazin, Sonderdruck 4* (1964), S. 82–84.
- MERZ, LUDWIG: *Die neueren Verbesserungen am Microscope nebst den sie begleitenden Aenderungen in der Dioptrik*. München: Palm 1844.
- MERZ, SIGMUND: Kurzer Lebensabriss von Georg Merz. Mitgeteilt von Herrn Dr. Sigmund Merz. In: *Astronomische Nachrichten* 70 (1868), Nr. 1679, S. 361–364.
- PREYß, CARL R.: Joseph von Fraunhofer, Physiker und Industriepionier. München 2008.
- RIEKHER, ROLF: *Fernrohre und ihre Meister*. Berlin: Verlag Technik (2. vollständ. überarb. Auflage) 1990.
- SANG, HANS-PETER: *Joseph von Fraunhofer – Forscher, Erfinder, Unternehmer*. München: Verlag Dr. Peter Glas 1987.
- SCHUPMANN, LUDWIG: Das Medial-Fernrohr zu Landstuhl. In: *Astronomische Nachrichten* 196 (1913), Nr. 4686, S. 101–106.
- SEITZ, ADOLF: Die Utzschneider-Fraunhofersche optische Werkstätte nach Fraunhofers Tode und das Leben Georg Merzs des ersten Besitzers der Anstalt Utzschneider. In: *Deutsche Optische Wochenschrift* 5, 6, 7, 8 (1929), S. 55–59, 72–75, 87–89, 105–109.
- WOLFSCHMIDT, GUDRUN (Hg.): *Von den Anfängen bis zur modernen Astrophysik. 125 Jahre Dr. Remeis-Sternwarte Bamberg (1889)*. Proceedings der Tagung des Arbeitskreises Astronomiegeschichte in der Astronomischen Gesellschaft 2014. Hamburg: tredition (Nuncius Hamburgensis Beiträge zur Geschichte der Naturwissenschaften; Bd. 31) 2015.
- ZSCHOKKE, H.: Die Werkstätten in Benediktbeuern, insbesondere das optische Institut. In: *Gilberts Annalen der Physik* 29 (1818), S. 196–205.

Merz Telescopes

A global heritage worth preserving

Chinnici, I. (Ed.)

2017, IX, 185 p. 108 illus., 30 illus. in color., Hardcover

ISBN: 978-3-319-41485-0