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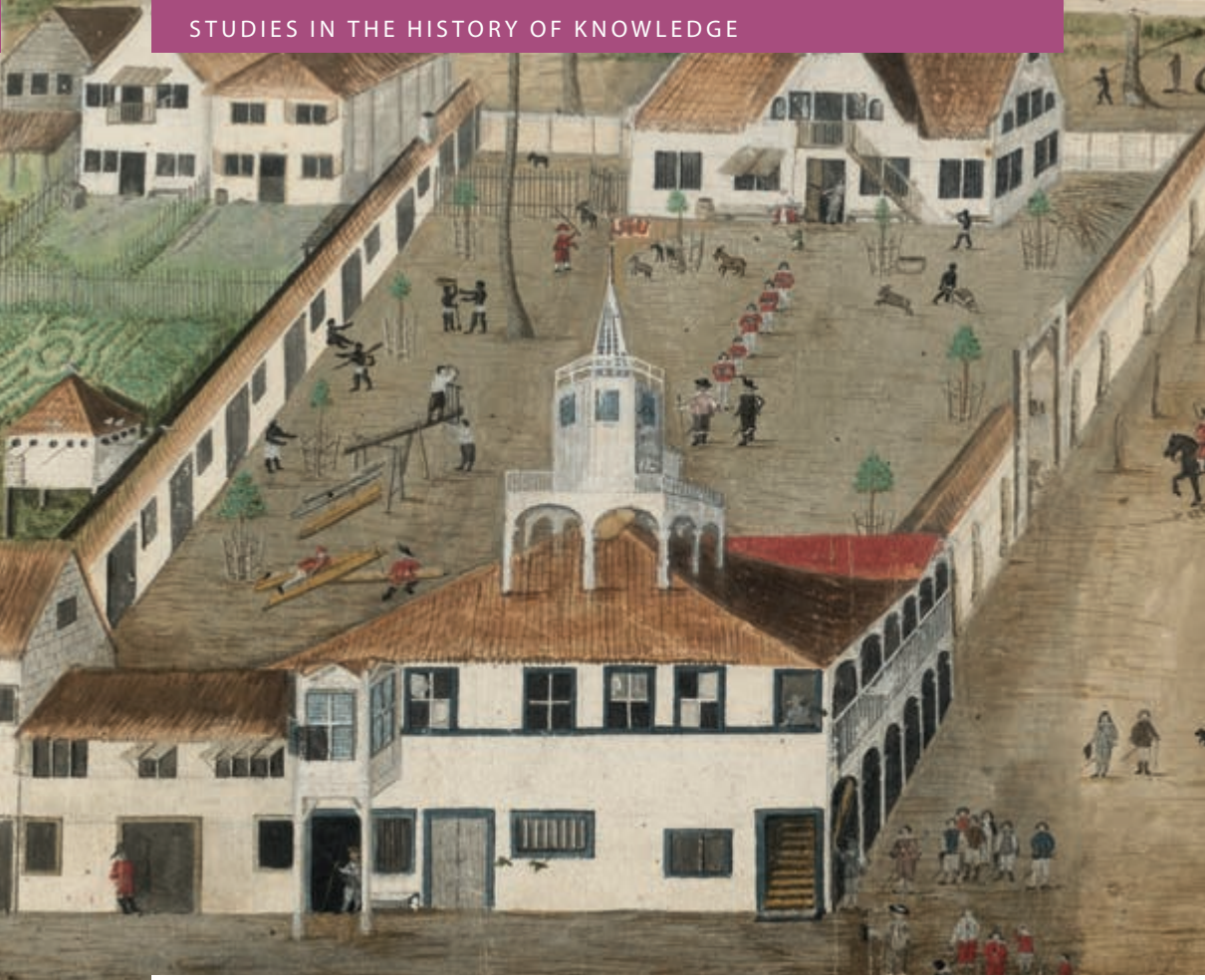

Huib J. Zuidervaart & Oscar T. Matsuura

Astronomer, Cartographer and Naturalist of the New World

The Life and Scholarly Achievements of Georg Marggrafe (1610-1643) in Colonial Dutch Brazil

Amsterdam University Press

VOLUME 1
Life, Work and Legacy

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This book highlights the scientific achievements of the astronomer, cartographer and naturalist Georg Marggrafe (1601-1643).
It consists of two volumes:
Vol. 1. Discusses his biography and legacy.
Vol. 2. Presents his previously unpublished astronomical observations, collected in colonial Dutch Brazil between 1638 and 1643. This volume contains the earliest known series of observations of the Southern Hemisphere, collected by scientific instruments made according to the European standards of the time.
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Cover illustration: Former Portuguese house at Antonio Vaz. First residence of the Dutch governor-general Johan Maurits von Nassau-Siegen, depicted in 1639 by Zacharias Wagener. On top of the house stands the observatory constructed on behalf of Georg Marggrafe. (Thierbuch, Ca 226, fol. 107. Kupferstich-Kabinett, Staatliche Kunstsammlungen Dresden, Photo: Herbert Boswank.

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CONTENTS

Volume 1
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FIG. 1. Both authors at the 'Instituto Ricardo Brennand', Recife, in September 2010, investigating one of the eight surviving coloured copies of the *Historiae Naturalis Brasiliae* (Leiden, 1648), in which Marggrafe's 'Historiae Rerum Naturalium Brasiliae' is published.
Right: Oscar Matsuura. *Middle*: Curator 'Instituto Ricardo Brennand'.
Left: Huib Zuidervaart. Photo: the authors.

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PREFACE

This book has a long history. It started in 2009, in Budapest, Hungary, when the two authors of this book, Oscar Matsuura and Huib Zuidervaart, met for the first time during the XXIII International Congress of History of Science and Technology. Oscar had already done a lot of research into Marggrafe's astronomical legacy, both in Paris and Leiden. From the Budapest program, he learned about Huib's presentation on the use of the telescope in the Dutch Republic, and approached him with the question whether he could tell him something more about Leiden Observatory in the seventeenth century. Huib was very surprised by this question. Why on earth would an astronomer from Brazil be interested in specifically that observatory, at this early period of its existence? Like most Dutch citizens, Huib was then barely aware of the fact that a Dutch colony had once existed in Northern Brazil. Oscar was able to quickly fill that gap in Huib's knowledge, and concisely told what he knew about Georg Marggrafe's pioneering astronomical work in seventeenth-century colonial Dutch Brazil. It was a very inspiring meeting, which led to both researchers joining forces. Oscar's archival research could be supplemented with some additional research by Huib. This led to joint presentations, first, in September 2010, in Recife, Brazil, during a symposium celebrating 'Georg Marcgrave's fourth centennial' (*see photo*), and in October 2012, during the XXXI Symposium of the Scientific Instrument Commission in Rio de Janeiro, Brazil.

In the proceedings of this last symposium a joint paper was published, but long before that the idea had already arisen to extend this piece into a larger biography of Georg Marggrafe in the English language; this to supplement Oscar's own book on Marggrafe's astronomical work, published in the Portuguese language in Recife in 2011.

Busy work on both sides hampered any progress for a long time, which in hindsight was actually a fortunate circumstance, as it allowed the study of a previously unknown second Marggrafe manuscript in Lisbon, as well as a series of Marggrafe draft letters, which in 2017 – by a happy coincidence – were found again in the Leiden City Archives (ELO), after being missing for more than a century. The ongoing digitalisation of libraries and archives – such as the fully digitized archive of the Dutch West India Company at the Dutch National Archive in The Hague – has further largely expanded the possibilities of research into Marggrafe's life. This book therefore presents much more information than would have been possible a decade ago. The long time of preparation and research for this book implies that many people in libraries, archives and other institutions have contributed to this project; far too many to mention here. We would like to make an exception for the following persons, who each contributed in their own way to the completion of this book.

On Huib's account, he desires to honour Luís Tirapicos, who alerted him to the existence of Marggrafe's Lisbon Manuscript, and Ingrid Pot-Noordman, librarian of *Erfgoed Leiden en Omstreken*, who, after the unexpectedly trouvaille of Marggrafe's long-lost draft letters, remembered that we had searched for these seven years earlier, and was keen to inform us of this recovered treasure. Unfortunately, efforts to recover a missing Marggrafe manuscript in Spain, among others through the network of Marta Lourenço, have yielded nothing. Nevertheless, she is greatly thanked for her efforts. Further, Huib pays gratitude to his colleague and friend Ilja Nieuwland, who, together his spouse Marieke van der Duin, has constantly listened, stimulated and helped him; to Marika Keblusek, who inspired the writing process with perseverance and enthusiasm; to Albert van Helden, who was always ready to answer questions; to Peter Louwman, who in word and deed has supported Huib's historical research of astronomy for decades; to Milo van de Pol and David Baneke, who both commented meticulously on the manuscript, and to Douglas Anderson, who, as a native speaker, patiently corrected our English.

Oscar wishes to thank Christoph Ostendorf, director of the Brazil-Germany Cultural Center in Recife, for providing him with key contacts, enabling him to organize in Brazil the international meetings promoting Marggrafe's scientific work. Without those meetings, this book would never have come into existence; to Carlos Ziller Camenietski, then head of the Research Department of the Museum of Astronomy and Related Sciences (MAST/MCTI) in Rio de Janeiro,

for providing xerographic copies of Marggrafe's manuscripts deposited at the Paris Observatory; to D. José Rodrigues Leandro da Costa, OSB (in memoriam), of the Monastery of São Bento in São Paulo, for reviewing the preliminary translation of Marggrafe's Latin manuscripts; to André Luiz da Silva, at the time intern at the Planetarium of Ibirapuera, São Paulo, for the positional identification of the Southern stars observed by Marggrafe; to the architect Filipe Jacopucci dos Reis for the suggestion to use SketchUp for the 3D modeling of Marggrafe's observatory with its astronomical instruments and to Companhia Editora de Pernambuco (CEPE) for the publication of *O observatório no telhado*, celebrating the 400th anniversary of Marggrafe's birth, the forerunner of this book.

In addition to these dear supporters, over the years there have been many unnamed individuals, who also deserve the authors credit. We are of course also very grateful to them.

Leiden / São Paulo, May 2022

Huib Zuidervaart / Oscar Matsuura

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PART I

CONTEXT

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CHAPTER 1

INTRODUCTION

A forgotten astronomer

Maybe it's still there ... the seventeenth-century astronomical manuscript that gave cause to this book. Maybe it is still there …, somewhere in Spain. Perhaps in the attic of a house from one of the descendants of the Spanish admiral Antonio de Ulloa. After all, he was the last known owner, a man who after his death in 1795 left a huge load of books and documents. The manuscript was last seen when De Ulloa bought it around 1770, so will it ever be found again? Fortunately, in the eighteenth century two accurate copies of this extremely interesting manuscript were made. These are now preserved and cherished, one in a Paris library, and the other (partly preserved) in Lisbon.[1] They contain nothing more or less than the astronomical legacy of Georg Marggrafe (1610-1643), the first person who attempted to map the heavenly bodies in the southern sky in a systematic way. He did this, using contemporary state-of-the-art instruments on an European-style astronomical observatory, built specifically for that purpose.

Marggrafe had the ambition to become famous in astronomy, and he indeed became famous. But he achieved his fame in a scholarly field he originally did not seek. Georg Marggrafe (erroneously mostly named *Marcgraf, Markgraf, or Marcgrave*), worked more than five years in colonial Dutch Brazil; to be exact from the spring of 1638 to mid-August 1643. Posthumously he obtained many credits for his important and innovative contributions to the *Historia Naturalis Brasiliae* (1648). This book was the influential first account of Brazil's zoology and botany, in which also an early form of ethnography is presented. It became the standard work for knowledge about Brazilian nature for more than two centuries. In it Marggrafe also presented the first daily meteorological records made in Brazil, as well as one of the first microscopical surveys of insects made in the Dutch scholarly

community. Marggrafe is also hailed for his construction of four maps of Dutch Brazil, which are regarded as one of the most accurate and elegant products of seventeenth century Dutch cartography.

But Marggrafe's first and foremost desire was to become a famous astronomer. He came to Brazil with the firm intention to chart the Southern Hemisphere in a similar systematic way to what Tycho Brahe (1546-1601) had done for the northern part of the heavens at the end of the sixteenth century. Brahe was a Danish nobleman, who in the years 1576-1596 had founded and used two astronomical observatories (*Uraniborg* and *Stjerneborg*) on the Island Hven in the strait Øresund, today situated between Denmark and Sweden. There he developed several new measuring instruments for the naked eye, including a large quadrant and sextants with aligning sights that enabled him to measure stellar positions with an accuracy of one arc minute. With these instruments Tycho systematically mapped around a thousand stars in the Northern Hemisphere for the first time. His *Astronomiae Instauratae Progymnasmata* with his star catalogue, including an elaborate description of his observatories and instruments, was published in the years 1598-1602. The title that Marggrafe had outlined for his intended – but never finalized – book about the southern stars was *Progymnastica Mathematica Americana*.[2] This title was evidently inspired by Tycho Brahe's monumental book, which also showed that he wanted to follow in Tycho's footsteps.

To fulfil his dream, the governor of Dutch Brazil, Johan Maurits van Nassau-Siegen, enabled Marggrafe to build on top of his residence the first European-style observatory on the American continents. There, on the island of Antonio Vaz in present-day Recife, the capital of the Brazilian province of Pernambuco, Marggrafe pursued an ambitious astronomical observation program. However, this program was interrupted several times when he was assigned to other tasks, for instance when he was sent on an expedition to the inland of Brazil, where he devoted himself to botanical, zoological, cartographic and ethnographic researches. In August 1643, shortly before he would return to the Netherlands, Marggrafe received the order to map the recently conquered Dutch territories in Africa (Sao Thomé and Angola), where, unfortunately, he fell ill and died a few weeks later, aged only thirty-three.

The aim of this book

If Marggrafe had succeeded in completing his observation program and published its results, he could have become the southern Tycho Brahe, following in the footsteps of his great role model. Unfortunately, due to bad luck, virtually all the observations he completed before his sudden death have remained unpublished to this very day. Therefore, the aim of this book is as follows:

(1) First, we provide some context by presenting a brief outline of the current historiography of seventeenth-century scholarship in a Dutch context and an introduction to colonial Dutch Brazil during Marggrafe's stay.

(2) Then we give a new biography of Georg Marggrafe, based on the current literature, supplemented by various previously unpublished archival finds. We also pay extensive attention to the way in which his scholarly legacy with regard to his findings on Brazilian botany, zoology, ethnography, meteorology, cartography and astronomy was processed after his death.

(3) Further, we give a description and virtual reconstruction of Marggrafe's astronomical observatory and the equipment he used, followed by an analysis of his astronomical achievements, both during his training in Leiden (1637), as well as during his research in Recife (1638-1643).

(4) Then we use Marggrafe's case to investigate questions with regard to knowledge formation, organisation and transfer in the Early Modern Period. His case, touching divergent fields like astronomy, meteorology, natural history and cartography, is very interesting, because his work predates the time in which the institutional foundations were laid for the development of modern science. In his day, a scientific infrastructure was still lacking. After all, scholarly societies and scholarly journals would emerge only in the 1660s. For the dissemination of new knowledge, a scholar had to rely on newly published books or on written correspondence distributed through the informal channels of the 'Republic of Letters'. And, of course, in order to be able to do any scholarly work, one needed time and funds. So in most cases a form of financial support – royal or otherwise – was essential. So, what exactly made Marggrafe's work in Brazil possible? Was it only the support of a semi-royal court that enabled him to pursue his scientific curiosity, or were other factors also relevant? For instance, what was the role of the West

Indian Company, a trading company active in the whole Atlantic area?

(5) Finally, in a number of appendices, we present a new chronology of Marggrafe's life, an overview of the horoscopes he made for various persons, and a correction of some false attributions made in the past. And we finally present in a supplemented (digitally published) Volume 2, Marggrafe's astronomical observations, both in the original Latin text and in English translation. In this translation each observed star is identified according to modern astronomical nomenclature. The Latin text was already prepared for the printing press by – or under the supervision of – the Leiden professor of astronomy and oriental languages Jacob Golius. Due to the sudden death, in 1667 and 1668 respectively, of both this professor and his assistant Samuel Kechel, its publication was unfortunately prevented.

A publication postponed by more than three centuries

Thanks to Georg's youngest brother Christian Marggrafe, it is known what Golius intended to do with the rare Brazilian observations he had received. In a letter to the astronomer Johannes Hevelius in Danzig, Christian wrote in July 1652:

> At last, I saw the astronomical observations of my brother George. They concern a new theory of the planets, especially Mercury, which in the place where he lived, could be better seen than with us. These [observations] will be published shortly by the honorable Golius, together with other astronomical observations transmitted [to him] from Arabia.[3]

So, strangely enough, Golius planned to publish Marggrafe's observations together with another astronomical text he was working on. This concerned the Latin translation of a manuscript by the Persian astronomer Ahmad ibn Muhammad ibn Kathīr al-Farghānī, a man who lived in the ninth (!) century. Golius had obtained this manuscript during a tour through the Middle East in the 1620s, and desired to publish it in Latin, together with elaborate annotations. Golius's unfortunate decision to combine both astronomical texts not only delayed the publication of Marggrafe's observations, but in the end also forestalled it.

When Golius suddenly died in 1667, his work on Al-Farghānī was not yet published, and the unknown person who eventually led the book through the printing press understandably decided *not* to include contemporary observations from Brazil in a book on ninth-century Persian astronomy.[4] As a consequence, Marggrafe's astronomical work never became known to his contemporaries. Although he had been the first to map the southern sky with state-of-the-art instruments, *nota bene* from a newly built European-style astronomical observatory, this made in fact his efforts worthless. Had Marggrafe's observations been published in the 1650s, they would have greatly increased his fame. He would have been remembered as an important astronomer who had contributed substantially to the knowledge of the Southern Hemisphere. But as it turned out, his gathering of astronomical data did not contribute to the contemporary corpus of astronomical knowledge.

So, why do we now want to finish this publishing project that got stuck in the middle of the seventeenth century? Here, two reasons are relevant. Firstly, Marggrafe's astronomical observations represent the earliest systematic research of the southern sky performed with state-of-the-art scientific instruments, on a Tychonic observatory especially constructed for that purpose. As such, this corpus of early modern observations deserves to be known to the present-day astronomical community. Further, this concerns a unique document that testifies about early modern science in action in a colonial setting. It shows in detail how science was done in these early days of scientific endeavour. Reasons why – in our view – this manuscript that was made ready for the printing press in the late 1650s still deserves to be published.

Marggrafe's surviving astronomical documents in Leiden and Paris were first touched upon in 1979 by the historian of astronomy John North (1934–2008).[5] North rejected the exaggerated thesis of Eugene Gudger (1866-1956), one of Marggrafe's early biographers, that, had Marggrafe survived, he would have developed himself into 'possibly the greatest natural historian since Aristotle'.[6] But having said that, North, too, concluded that indeed it had been Marggrafe's ambition to become a second Tycho Brahe, but that by an unfortunate twist of fate 'his astronomical efforts were to be without significant consequence for the advancement of the subject'.[7] North also concluded that Marggrafe 'simply did not live long enough to accumulate or assemble the materials for the promised book'.[8]

So, what results did Marggrafe want to deliver? The answer to this question is provided by his editor Johannes de Laet, who wrote – based on documents he had found in Marggrafe's chest – that Marggrafe intended to include the following in his astronomical book.

I. The first section would be on astronomy and optics. It would contain:
   i. An overview of all the southern stars found between the Tropic of Cancer and the Antarctic Pole;
   ii. Observations of all the planets and of eclipses of the sun and moon, 'worked out in an original way';
   iii. New and true theories of the inferior planets Venus and Mercury, based on his own observations;
   iv. A theory of astronomical refraction and parallax;
   v. A new figure for the obliquity of the ecliptic;
   vi. Accidental data, not only on sunspots, but also on other astronomical rarities.

II. The second part would be geographic and geodetic in nature. It would discuss:
   i. A theory of the longitude of the earth and a manner of computing the same;
   ii. A demonstration of the true dimensions of the earth, based on his own observations;
   iii. A discussion of previous geographical errors.

III. The third section would be based on the two preceding ones and would contain the *Tabulae Mauritii Astronomicae*.[9]

The name of the tables in this last section was again a reference to Marggrafe's ambition to parallel Tycho Brahe's work for the Southern Hemisphere. In 1627 Brahe's assistant in Prague, Johannes Kepler, published the so-called *Tabulae Rudolphinae*, a catalogue of observational data collected by Brahe, listing the positions of stars and planets, named in memory of Rudolph II, the Holy Roman Emperor in whose service they both had worked. Georg Marggrafe evidently had a similar role in mind for his patron and employer, the governor of Dutch Brazil, Count Johan Maurits van Nassau-Siegen.

Without running ahead of the details, it can already be said that North was correct in his remark that Marggrafe's ambitious program had not been completed in its entirety. However, as we will

demonstrate in part III of this book, a large part of Marggrafe's ambitions formulated in the first section have been fulfilled. In his paper, North gave an excellent first review of Marggrafe's astronomical achievements. But unfortunately, North also misinterpreted a few things. One of these mistakes was that North thought that Marggrafe's observatory, which was built in 1639 on top of the first residence of Johan Maurits, was relocated to one of the two towers of the count's new residence *Vrijburg*, built during the years 1641-1642. This erroneous supposition is repeated as a fact in numerous publications. In 1984 the Brazilian amateur astronomer and teacher of astronomy Jorge Polman already argued that North's analysis was wrong and that the observatory stayed on top of Johan Maurits's first house.[10] North also thought that Marggrafe's prime inspiration for his observatory was the description of Tycho Brahe's *Uraniborg*, as published in the *Astronomiae Instauratae*. However, as we have demonstrated in an earlier article, in Brazil, Marggrafe almost exactly copied the site, as well as the equipment and working methods, of Leiden observatory, the place where he had been trained in practical astronomy.[11]

A more thorough assessment of Marggrafe's astronomical achievements was published in 2011, by one of the present authors – Oscar Matsuura – but as this book was written in Portuguese, it did not receive the attention it deserved outside the domain of this language.[12] Our joint publication, published in Brazil in 2014, also touched only a small part of what deserves a deeper attention. Our promise made in that article to return to Marggrafe's life and work more in detail is hereby fulfilled.

The correct spelling of Georg Marggrafe's surname

Over the years, the spelling of Marggrafe's surname has been extremely polymorphic. In 1648, Johannes de Laet, the editor of the *Historia Naturalis Brasiliae*, used the Latin spelling 'Marcgravi' and 'Marcgravius', reason why, in 1912, his biographer the fish biologist Eugene Gudger used the German 'Marcgrave'; Theo Meijer (1972) wrote 'Marggraf' and John North (1979) noted 'Markgraf'. But the same year, when there still was no autograph available, Peter Whitehead introduced the spelling 'Marcgraf', arguing that the German family name would have been written in this way, overlooking the fact that in the birth register of Liebstadt, published by

Victor Hantzsch in 1896, the surname was spelled as 'Marggravij' and that the first biography, published in 1685 by Marggrafe's youngest brother, was titled 'Vitae Georgii Marggravii' (both with the letter 'g' twice).[13]

However, since 1979 four original signatures have been found. Two are located on draft letters in the Leiden archive (*fig. 2a*).[14] These letters were missing for decades, but luckily they were retrieved in 2017. A third signature can be found on the title page of book in the Universitäts- und Landesbibliothek of Bonn,[15] and a fourth is shown in an *Album Amicorum* preserved in the Universitäts- und Landesbibliothek of Sachsen–Anhalt in Halle.[16] All these documents show the same spelling 'Marggrafe'. This way of writing is confirmed by the spelling on Marggrafe's Wittenberg disputation (1634 – *fig. 2b*) as well as below three Latin poems by Marggrafe, two made in Stettin for the astronomer Lorenz Eichstädt (1634; 1636), and one made in Rostock for a fellow student (*fig. 2c*). Finally, Marggrafe's only surviving manuscript map of the coast of Brazil (1643) is signed 'Georgius Marggrafius', the Latin way of writing his name, also spelled with the letter 'g' twice. This is the only time Marggrafe himself used a Latin spelling for his name, indicating an increased self-awareness. After all, the Latinization of a name stands for the identification of the person concerned with the milieu of the literate, if not the scholars. On his academic Wittenberg thesis he did not yet dare to take that step.

In conclusion, we therefore restore in our book the correct German spelling 'Marggrafe', despite the fact that most modern literature has followed Whitehead in his incorrect assumption of writing 'Marcgraf'.[17]

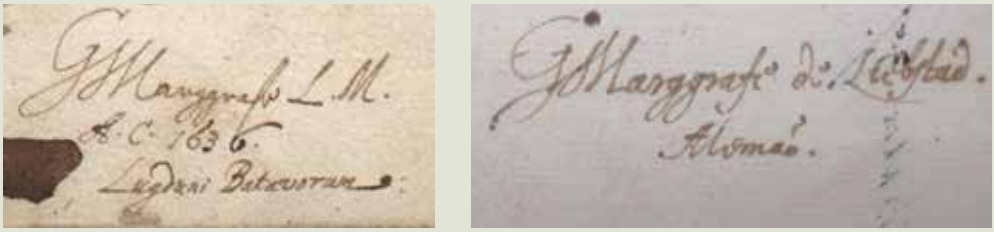

FIG. 2a. Two examples of Marggrafe's signature (Erfgoed Leiden en Omstreken (ELO)

FIG. 2b. The spelling of the name on his 1634 Wittenberg disputation (Universitäts- und Landesbibliothek Sachsen-Anhalt, Halle)

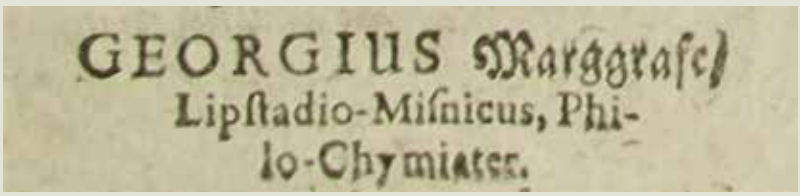

FIG. 2c. Marggrafe proudly presenting himself with the academic degree of *Philo-Chymiater* ('a practitioner of alchemical medicine', or Medical Candidate) obtained at Wittenberg University. Signature below a poem in a Rostock collection of verses for the graduation of a fellow student (1635; Sächsische Landesbibliothek und Universitätsbibliothek Dresden).

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