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THE SCIENCE OF THE STARS IN DANZIG
FROM RHETICUS TO HEVELIUS

A dissertation submitted in partial satisfaction of the requirements for the degree
Doctor of Philosophy

in

History (Science Studies)

by

Derek Jensen

Committee in charge:

Professor Robert S. Westman, Chair
Professor Luce Giard
Professor John Marino
Professor Naomi Oreskes
Professor Donald Rutherford

2006

The dissertation of Derek Jensen is approved, and it is acceptable in quality and form for publication on microfilm:

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Chair

University of California, San Diego

2006

FOR SARA

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ACKNOWLEDGEMENTS

This dissertation is the result of a journey that began in 1999, when I took a paraprofessional position in the L. Tom Perry Special Collections at Brigham Young University (BYU) in Provo, Utah. It was there that Dean Larsen introduced me to the greatest intellectual treasures of the Rocky Mountains. In the vaults of Special Collections, Dean showed me the library's millionth-volume acquisition, Johannes Hevelius's manuscript catalog of stars. He also introduced me to the works and manuscripts of Hevelius that the library owned, as well as the rich resources available in Special Collections related to early modern astronomy and astrology. Although I only knew Dean briefly and conversed with him only a couple of times before his death, he deeply impacted the course of my subsequent studies. I would also like to thank Scott Duvall and Russ Taylor of Special Collections for their patronage and patience.

I am deeply indebted to support I had from libraries in California. A small grant from the University of California made it possible for me to travel to the Bancroft library at Berkeley, where I was able to research a rare copy of Abraham von Franckenberg's *Oculus Sidereus* (1644), as well as study rare periodicals from Eastern Europe. The Special Collections staffs at the University of California, San Diego (UCSD) and at San Diego State University have also made it possible for me to examine books and pamphlets. I am especially indebted to Joe Bray of the Mandeville Special Collections at UCSD for his infectious enthusiasm for rare books.

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The history of science reading group at BYU generously read through an earlier draft of this dissertation. For spirited conversations, enjoyable evenings of cookies, brownies and intellectual treats, as well as their suggestions for this dissertation, I am deeply indebted to Allen Buskirk, Glen Cooper, David Grandy and Steve Peck.

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VITA

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PUBLICATIONS

"The City of the Stars. The Astronomical Heritage in Gdańsk/Danzig from Rheticus to Hevelius" in *Heritage of Technology - Gdansk Outlook 4 Proceedings*, eds. Edmund Wittbrodt and Waldemar Affelt (Gdańsk: Gdansk University of Technology, 2005), 141-148.

"'One of them was nearest unto the throne of God': Nineteenth-Century Cosmologies and the Book of Abraham" in *Archive of Restoration Culture: Summer Fellows' Papers 2000-2002* (Provo, Ut.: Brigham Young University, 2005), 49-55

Review of Andreas Kühne and Stefan Kirschner, eds. *Biographia Copernicana: Die Copernicus Biographien des 16. bis 18. Jahrhunderts*, in *Isis* 97 (2006): 352.

Articles on "Albert Curtz" "Nicholas Greenwood" "Bartholomew Keckermann" "Nicolas Claude Fabri de Peiresc" and "Johannes Schöner" for the *Biographical Encyclopedia of Astronomers*, ed. Thomas Hockey (Springer Science, forthcoming)

FIELDS OF STUDY

Major Field:	Early Modern European Science	Professor Robert S. Westman
Minor Fields:	Early Modern European History	Professor Luce Giard
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A NOTE ON DATING AND PLACE NAMES

Concerning dates and place names mentioned in this study, I have concentrated on using the dating schemes and place names that those in Prussia would have used during the sixteenth and seventeenth centuries. The focus of this study is Danzig (the city's German name), which is today, Gdańsk, Poland. During the sixteenth and seventeenth centuries, the official languages of civic government and schooling in Danzig were Latin and German. I have opted to use the German vernacular names for cities, so those cities that had Polish, German and Latin names will be referred to by their German names. Concerning the dating scheme, Danzig used the Julian calendar until 1582 when it converted to the Gregorian calendar, as did much of continental Europe, especially cities in the Polish area. Dates before 1582 are given according to the Julian calendar system. Dates after 1582 are given according to the Gregorian calendar system. Because I have opted to use Gregorian calendar system for dates after 1582, I have converted some dates given in the correspondence of Henry Oldenburg, the secretary of the Royal Society of London, who dated his material according to the Julian calendar following the trend of those living in London and England who used the Julian calendar until 1752.

ABSTRACT OF THE DISSERTATION

THE SCIENCE OF THE STARS IN DANZIG FROM RHETICUS TO HEVELIUS

by

Derek Jensen

Doctor of Philosophy in History (Science Studies)

University of California, San Diego, 2006

Professor Robert S. Westman, Chair

This dissertation asks how civic institutions (the city council and the academic gymnasium), socio-economic structures (civic and private patronage) and religion and civic ideals in the city of Danzig shaped creative thought about the science of the stars during the sixteenth and seventeenth centuries. Reciprocally, it looks at how the use of scientific knowledge created distinctive representations of the city both as it appeared to its own citizens and as it was presented to others outside of the city walls. By employing a variety of sources, including Latin texts, printed prognostications, astrological and astronomical pamphlets, handwritten marginalia, German poetry, artwork (both printed illustrations and freestanding pieces), travelers' accounts, personal correspondence and

funeral sermons, I explore how those who lived in Danzig represented their observations of the stars.

While concentrating on Danzig, the dissertation compares and contrasts experiences in Danzig to other places. Examples of comparisons are those in chapters 1 and 4, which compare systems of courtly patronage found in other European cities with systems of civic and private patronage found in Danzig.

Chapter 2 considers the books of Peter Crüger (1580-1639), professor of mathematics and poetry in the Danzig gymnasium, and his concern to remain within the bounds of correct Lutheran doctrine. He wrote at a time when Lutherans held powerful positions within city government and in the administration of the gymnasium. In chapter 3, I focus on the writings of Peter Crüger's pupil, Andreas Gryphius (1616-1664). Gryphius later became a celebrated German poet and statesman. Understanding his stay in Danzig and his studies under Crüger, I argue, are vital to understanding his poetry, plays and prose. Chapters 5 through 7 concentrate on another of Crüger's students, namely, Johannes Hevelius (1611-1687). Chapter 5 studies Hevelius's first major publication, *Selenographia* (1647) and argues that Hevelius's concern to honor his city was intimately connected to the creation and final production of *Selenographia*. In Chapter 6, I examine the frontispiece to Hevelius's posthumously published *Uranographia* (1690). The frontispiece is an allegorical depiction of the "Last Judgment" of Hevelius and his astronomical works. Hevelius's "Last Judgment" resembles in form and content other judgment scene paintings in Danzig. The final chapter compares and contrasts the lives of Hevelius and Tycho Brahe (1546-1601) using a sermon given at Hevelius's funeral as the primary text of analysis.

Introduction

In his introduction "To the Reader" of his *Discovrse concerning A New Planet*, the English divine John Wilkins (1614-1672) penned a truism concerning the relationship between knowledge and place. "All men have not the same way of apprehending things; but according to the varietie of their temper, custome, and abilities, their Vnderstandings are severally fashioned to different assents."[1] This dissertation focuses on the "custome" of one locale – the city of Danzig. The argument is that city life in Danzig created a matrix for intellectual activities and motivations seldom discussed in science studies literature. Subjects discussed in this dissertation dedicated their works to the city's town council, undertook the labor of observing the sun, moon and stars in order to bring honor and fame to the city, were supported financially by the city town council, the gymnasium and private individuals in order to write about the stars, and they used artwork and ideas found particularly in the city in their publications about the heavens. Their intellectual lives were intimately connected to their city lives.

Concentration on the location of knowledge-making is not a new venture in recent science studies literature dealing with the early modern period. Much attention has been given to alchemical laboratories, universities, the semi-public arena of the Royal Society of London, the court of the Medici and other places as well. What is unique in the approach of this dissertation is the use of the city as the primary site of study. For the

[1] John Wilkins, *A Discovrse concerning A New Planet. Tending to prove, That 'tis probable our Earth is one of the* Planets. (London: R.H. for John Maynard, 1640), aa4^{v}.

early modern period (1500-1700), it is not exactly clear yet what city histories of science would look like. The emphasis in social histories of science on structures of patronage (especially in the cases of Galileo and Tycho Brahe) and on the conduct of gentlemen (in the case of members of the Royal Society of London) has left the urban forms of government, civic patronage and the mutual interactions between knowledge makers and city authorities largely untouched.

Concern for cities is only beginning to surface in the history of science. This dissertation follows the lead of the editors of a recent *Osiris* issue dedicated to exploring *Science in the City* (2003). In their introductory article, Sven Dierig, Jens Lachmund and Andrew Mendelsohn point to several of the intersections between scientific practice and city life. They discuss the "relationship between scientific expertise and urban politics," "science's role in the cultural representation of the city," "the embedment of scientific activity in the social and material infrastructure of the city" and "the interaction between science and urban everyday life."[2] While the subject matter of this dissertation concerns the representation of heavenly objects in familiar publications of religious tracts, poetry, philosophical works, visual images and histories of astronomy, it is the understanding of these works in the context of city life that creates unopened paths of perspective seldom portrayed in histories of science.

Chapter 1 begins with an analysis of the first printed synopsis of Copernicus's ideas, the *Narratio prima* (1540) of Georg Joachim Rheticus (1514-1574) to which Rheticus appended an ode to Prussia. I argue that part of Rheticus's motive to include

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[2] Sven Dierig, Jens Lachmund, and Andrew Mendelsohn, "Introduction: Toward an Urban History of Science" *Osiris* Second Series, 18 (2003): 1-19.

the ode to Prussia was to garner patronage and support from the Danzig City Senate and that he was successful in doing so. The Senate also provided annual stipends to Franz Rhode (d. 1559), the printer of the *Narratio prima* and later astronomical and astrological works, and Wilhelm Misocacus (d. 1595), the city's first regular prognosticator. The chapter ends with a discussion of the Danzig Gymnasium and its support of Bartholomew Keckermann (1571/73-1609) at the turn of the sixteenth to the seventeenth century. In turn, the chapter discusses Keckermann's educational reforms, which shaped the study of the stars in the city during the seventeenth century.

After discussing civic patronage and the Gymnasium during the sixteenth century in chapter one, the dissertation transitions to the seventeenth century in chapter 2, which examines the writings of Peter Crüger (1580-1639), the professor of mathematics and poetry in the Gymnasium during the first third of the seventeenth century, as well as the writings of the Rosicrucian Paul Nagel (d. 1621) that were printed in Danzig. Crüger and Nagel clashed over the meanings of prophecy and prognostication and Crüger spent much of his energy writing against Nagel. The chapter argues that Crüger engaged in an extended argument with Nagel largely because of his position in the Gymnasium, which had become more solidly Lutheran at the beginning of the seventeenth century.

Continuing with Peter Crüger, chapter 3 examines the writings of one of his more famous pupils, Andreas Gryphius (1616-1664). Commentators agree that Gryphius's literary and poetical output make him one of the most important of the German baroque poets. There has been, however, little or no discussion of how Gryphius's encounters with Crüger and his teachings may have shaped his writings. Chapter 3 argues that explanations can be found for some of the inexplicable features of Gryphius's poetry by

examining what he may have gleaned from Peter Crüger during his student years in Danzig. In the Gymnasium, Crüger was a professor of mathematics and poetry, subjects for which Gryphius showed a keen interest. Peter Crüger and the Danzig Gymnasium, therefore, are integral to understanding Andreas Gryphius and his writings.

Chapter 4 is a snapshot of life in Danzig in the middle of the seventeenth century and describes briefly the intellectual, social and cultural environment within which the Silesian refugee Abraham von Franckenberg (1593-1652) did his thinking and writing. Von Franckenberg lived in Danzig during the 1640s, the decade after his fellow Silesian Gryphius studied at the Gymnasium. Although von Franckenberg never felt home in Danzig, he stayed because it offered him opportunities for conversations and interactions that he would not be able to find elsewhere. In Danzig, he also completed and published his extraordinary text *Oculus Sidereus* (1644), which contained his thoughts about the plurality of worlds, the possibility of life on other worlds, as well as a summary of the teachings of Giordano Bruno.

The last three chapters of the book, chapters 5 through 7, deal with Johannes Hevelius (1611-1687), an excellent example of one whose work and life created a Danziger identity for others in Europe and whose scientific activities were bound to the city. Chapter 5 continues the cultural history of Danzig during the 1640s discussed with relationship to Abraham von Franckenberg in chapter 4, and it relates life in the city to the concerns of Hevelius in his first major publication *Selenographia* (1647), a massive treatise on the moon and its features. Several recent authors have looked at *Selenographia* and its role in the history of lunar cartography as well as its significance in the history of scientific illustrations. What this chapter adds to existing accounts of the

history of *Selenographia* is an explanation for Hevelius's motives in undertaking the project and including what he did in the book. Chapter 5 argues that his motives were intimately connected to his desires to bring fame to his city. In this respect, the city served to shape the final presentation of Hevelius's studies of the moon and was therefore a major actor in the production of the book. Dierig, Lachmund and Mendelsohn point out that the city "has been a sociospatial setting affecting the production of knowledge in various ways: how scientists chose their research topics and framed them conceptually; how they organized their research practices; and how they articulated and stabilized certain beliefs as valid scientific claims."[3] While it would be anachronistic to characterize Hevelius or any of the actors of this dissertation as "scientists," Chapter 5 follows Dierig, Lachmund and Mendelsohn maintaining that city life created a space of possibilities in which those interested in the stars could choose what they studied and wrote, manage practices and represent results.

In Chapter 6, Hevelius is again the central figure. This chapter is largely concerned with judgments of Hevelius and particularly with the "Last Judgment" frontispiece to his posthumously published star atlas. Recent historiographical accounts of early modern science would suggest that the primary structures for the judgment of scientific truths were found in the systems of continental princely patronage and of codes of conduct for English gentlemen. As opposed to these recent trends, chapter 6 contends that Hevelius sought truth and judgment by different means. He was hurt by judgments based on gentlemanly codes of conduct of the Royal Society of London. Such judgments did not take into consideration the multiple witnesses that Hevelius could supply from

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[3] Dierig, Lachmund, Mendelsohn, "Toward an Urban History of Science," 2.

those who assisted him, nor the years he had spent observing the heavens. The "Last Judgment" frontispiece to his star atlas represents Hevelius as allegorically turning himself to a heavenly court of astronomers that included past and contemporary observers of the stars who could judge him not according to codes of conduct, but according to the measure of his experience. Hevelius's "Last Judgment" resembles in form and content depictions of the Last Judgment of Christ and of other judgment scenes that hung on the walls of the Danzig City Hall and of St. Mary's Church in Danzig. Far from structures of judgment in the Royal Society, Hevelius's "Last Judgment" directly invokes his local surroundings.

Finally, chapter 7 examines the funeral sermon for Hevelius by his pastor Andreas Barth (fl. 1687). Barth concluded that there was a wide divide between Hevelius and his predecessor in observational astronomy, Tycho Brahe (1546-1601). Between Tycho and Hevelius stood both time and differences (both cultural and physical) in the places where they worked. Above all, Barth regarded the separation between Tycho and Hevelius as resulting from their differing attitudes toward astrology. Chapter 7 outlines some of the differences between Tycho's gown and Hevelius's town. Whereas the noble Tycho could afford to import to his isolated isle both assistants and materials, Hevelius could operate much at the same level but only because he lived in a rich town with a strong craft tradition.

From the publication of Georg Joachim Rheticus's *Narratio prima* in Danzig in 1540 to the death of the long-lived Danzig astronomer Johannes Hevelius in 1687, both outsiders and citizens looked to Danzig as a place that fostered the science of the stars. Near the end of the period I examine in this dissertation, Hevelius's friend Stanislaw

Lubieniecki (1623-1675) admired Danzig in a letter he sent to the famed baroque natural philosopher Athanasius Kircher (1602-1680). "Prussia," in his estimation was "the most noble of provinces," for it could pride itself in fostering Nicolaus Copernicus, Peter Crüger and Johannes Hevelius. "In particular, it is the widely-famed city of Danzig, which through the arts of Pallas as well as through those of Mercury that deserves our gratitude for those heavenly stars."[4] Lubieniecki's play on the word stars most likely referred to Copernicus, Crüger and Hevelius as well as to the heavenly stars that they studied. This dissertation will explore the social, cultural and intellectual conditions in Danzig in order to reconstruct how such contexts may have molded the writings and lives that Lubieniecki esteemed.

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[4] Stanislaw Lubieniecki to Athanasius Kircher, 24 June 1665, in Franz August Brandstäter, *Johannes Hevelius, der berühmte Danziger Astronom: Sein Leben und seine Bedeutsamkeit* (Danzig: Edwin Groening, 1861), xxx.

Chapter 1

Civic Patronage in Sixteenth-Century Danzig: Rheticus, Rhode, Misocacus and Keckermann

This chapter argues that in the sixteenth and seventeenth centuries, there were multiple forms of patronage that could have shaped scientific activity in different ways.[1] In Danzig, as in many German towns and cities, civic patronage (a form of collective patronage) was the principal instigator and source of support for those involved in producing knowledge about the stars. Georg Joachim Rheticus received 31 Marks from the Danzig Senate for his "Praise of Prussia" that he added to end of his *Narratio prima*, the first account of Copernicus's heliostatic system in print. Franz Rhode, the printer of the *Narratio prima* among other works, and Wilhelm Misocacus, Danzig's first regular prognosticator in the sixteenth century, both received annual stipends from the Senate in support of their work. Finally, Bartholomew Keckermann found a home and support in the Danzig Gymnasium, a collective patron governed by the Senate. In the cases of Rheticus, Rhode, Misocacus and Keckermann, the support they received from collective city sources shaped what they did. This chapter will explore their experiences and the possible ways in which the city as an actor (in this case as patron) shaped their work.

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[1] Contrast the recent article: Peter Barker and Bernard R. Goldstein, "Patronage and the Production of *De Revolutionibus*" *Journal for the History of Astronomy* 34 (2003): 345-368, which seems to follow the analytical construction of Mario Biagioli's "logic of patronage" put forth in Mario Biagioli, *Galileo Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: The University of Chicago Press, 1993),19-30, 36-54. See page 345 of Barker and Goldstein for the reference to Biagioli and page 358 for Barker and Goldstein's interpretation of "the logic of patronage."

Georg Joachim Rheticus's "Praise of Prussia"

Among the first books ever published in Danzig was Georg Joachim Rheticus's *Narratio prima*, which was to be the first account in print of Copernicus's idea that the earth revolves around the sun. It is this book that initiated the history of astronomical publications in the city. An unusual text, the *Narratio prima* commanded little attention when it was first printed.[2] Nevertheless, it was an important text in that it was an initial introduction of Copernicus's ideas to important figures like Gemma Frisius (1508-1555), professor of medicine and mathematics at the University of Louvain, and it accelerated the writing and printing of Copernicus's more famous work *De revolutionibus*.[3]

The story of the printing of Rheticus's *Narratio prima* in Danzig tells a lot about the city, its support of the science of the stars and why it became a haven for later astronomers like Johannes Hevelius. Rheticus first arrived in the Prussian city

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[2] To his census of Copernicus's *De revolutionibus*, Owen Gingerich has appended a survey of existing copies of Rheticus's *Narratio prima*, of which he counts 24 copies of the Danzig edition. At least two other copies of the Danzig edition survived into the twentieth century, but are now missing from the holdings of the Bibliothèque de l'Observatoire in Paris and the Pulkovo Observatory in St. Petersburg, Russia. See Owen Gingerich, *An Annotated Census of Copernicus'* De revolutionibus *(Nuremberg, 1543 and Basel, 1566*) (Leiden, Boston, Köln: Brill, 2002), 378-379. Gingerich's count almost doubles the number of copies that Karl Heinz Burmeister could find in the late 1960s. According to Burmeister, 9 of the 13 remaining copies of the Danzig edition that he could find were in east European libraries (Gingerich's survey confirms that number), whereas only 2 Danziger editions made it to west European libraries (Gingerich's count adds several more). See Karl Heinz Burmeister, *Georg Joachim Rhetikus, 1514-1574: Eine Bio-Bibliographie*, 3 vols. (Wiesbaden: Pressler-Verlag, 1967-1968), 1:47.

[3] On Frisius's reception of Copernicus's theory, see Cindy Lammens, "Sic patet iter ad astra: A critical examination of Gemma Frisius's annotations in Copernicus' De Revolutionibus and his qualified appraisal of the Copernican theory" PhD diss. Universiteit Ghent, 2002. See also, Steven Vanden Broecke, *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology* (Leiden and Boston: Brill, 2003), ch. 6.; and Barker and Goldstein, "Patronage and *De Revolutionibus*," n.12, 364.

Frauenberg sometime around the end of May 1539 seeking out Copernicus and his theory.[4] After a short summer with Copernicus, Rheticus prepared a summary of Copernicus's theories that was ready for publication by September 23, 1539. Both Copernicus and Bishop Tiedemann Giese (1480-1550) approved of the draft for the *Narratio prima*.[5] The problem however was where to publish it. Before leaving Frauenberg (today Frombork, Poland), Rheticus received an invitation from Johannes von Werden, a close friend of Copernicus as well as a Bürgermeister of Danzig, to visit him and to publish the *Narratio prima* there before he traveled back to his post in Wittenberg.[6] Copernicus advised Rheticus to accept the invitation, for von Werden was a lover of the sciences. Above all, Rheticus hoped that von Werden would also be able to help him find a printer. While presses had been established in Königsberg and Malbork, cities closer to Frauenberg than Danzig, Rheticus chose to go to Danzig. In the *Narratio prima*, Rheticus praised the city fathers for their wisdom and power and their willingness to support the renaissance of science and literature by their support of printing.

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[4] Burmeister, *Rhetikus*, 1:43.

[5] Ibid., 1:46.

[6] Johannes von Werden was Bürgermeister from 1526-1554. See Reinhold Curicke, *Der Stadt Danzigs Historische Beschreibung* (Amsterdam and Danzig: Johan und Gillis Janssons von Waesberge, 1687), 96, 116. There is no record in Curicke that von Werden was ever on the Bench or in the Senate. Concerning the relationship between Johannes von Werden and Copernicus, editors H.M. Nobis and Menso Folkerts of volume 6 part 1, *Briefe: Texte und Übersetzungen* (Berlin: Akademie Verlag, 1994), 293-294 of the *Nicolaus Copernicus Gesamtausgabe* (*NCG*) note that von Werden shared a cordial relationship with Copernicus. See also Leopold Prowe, *Nicolaus Coppernicus*, 2 vols. (Orig. pub. 1883-1884; Osnabrück: Otto Zeller, 1967), I/II:398.

The Danzig that greeted Rheticus was widely known for several reasons. At the end of the *Narratio prima* Rheticus appended a "Praise of Prussia" in which he lauded Danzig as the "metropolis of Prussia."[7] Ambrosius Calepinus (1435-1511) defined a "metropolis" as a mother city that nurtured and colonized surrounding cities with inhabitants and goods. "Metropolis" was also the name given to chief cities of provinces.[8] In an analytical sense, Danzig was a metropolis to her immediate neighbors in that she was at least twice as large as any other city in Prussia, and for those further away, the city was a well-known port with a vast hinterland. In 1500 there were approximately 30,000 denizens of Danzig. This number rose to 50,000 by the end of the sixteenth century due to increasing immigration and the number reached 70-100,000 in the first half of the seventeenth century, making Danzig not only one of the fastest growing cities in Europe but also one of the three largest German cities.[9] In terms of growth and size patterns, Danzig was roughly the same as Prague during the sixteenth through the seventeenth centuries.[10]

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[7] Translation mine. See the Rosen translation in Georg Joachim Rheticus, *Narratio prima*, Edward Rosen, trans. *Three Copernican Treatises: The* Commentarialus *of Copernicus, The* Letter against Werner*, The* Narratio prima *of Rheticus*, 2nd edition (New York: Dover, 1959): 107-196, *190*. See also Prowe, I/2:450.

[8] Ambrosius Calepinus, *Ambrosii Calepini dictionarivm* (Venice: Paulus Manutius, 1558), pt. 2, lf. 17.

[9] According to Étienne François, the three largest German cities around 1600 were Danzig, Vienna and Prague with roughly 50,000 inhabitants each. See Étienne François "The German Urban Network between the Sixteenth and Eighteenth Centuries: Cultural and Demographic Indicators" in Ad van der Woude, Akira Hayami and Jan de Vries, eds. *Urbanization in History: A Process of Dynamic Interactions* (Oxford: Clarendon Press, 1990), 84-100, *84-85*.

In many ways, the city provided fertile soil for intellectual activity and growth. As Lucien Febvre and Henri-Jean Martin note in *The Coming of the Book*, cities that were already ports or centers of trade lent themselves to intellectual commerce as well.[11] Danzig stood near the Baltic along the mouth of the Vistula river, which carried along its back a large portion of grain from Poland that fed most of Europe. The reputation of Danzig as a port of grain was widespread. During the fifteenth century, France was the major exporter of grain in Europe, but due to war devastations, she could not meet the demands of other European ports. Major cities like Amsterdam turned to the Baltic, which was not yet heavily urbanized and where the gentry still ruled; and the principal trading port in the Baltic for Amsterdam and others was Danzig.[12] Danzig's reputation grew during the sixteenth century and passed into the seventeenth century. After floods in the valleys of Tuscany in 1590 for example, "The Grand Duke was obliged to go to

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[10] Maria Bogucka, "Krakau-Warshau-Danzig Funktionen und Wandel von Metropolen 1450-1650" reprinted as the eleventh article in Bogucka, *Gdańsk/Danzig and its Polish Context* (Aldershot, England; Burlington, Vt.: Ashgate, 2003). All articles in Bogucka, *Gdańsk/Danzig and its Polish Context* have retained their original pagination. For the comparison with Prague, see Bogucka, "The Towns of East-Central Europe from the XIVth to the XVIIth Century" in A. Maczak, H. Samsonowicz, P. Burke, eds. *East-Central Europe in Transition* (Cambridge, 1985): 97-108, *97-100*; reprinted as the ninth article in Bogucka, *Gdańsk/Danzig and its Polish Context*.

[11] See for example, Lucien Febvre and Henri-Jean Martin, *The Coming of the Book: The Impact of Printing 1450-1800*, trans. David Gerard (London and New York: Verso, 1997), 222-233.

[12] Maria Bogucka reports that 53.3% of Amsterdam trade to the Baltic went to Danzig. See Bogucka, "Amsterdam and the Baltic in the First Half of the XVII Century," 434 and her article "Role of Baltic Trade in European Development from the XVIth to the XVIIIth Centuries," articles one and four in Bogucka, *Gdańsk/Danzig and its Polish Context*.

Danzig (for the first time) in search of grain."[13] In addition, Danzig was part of the Hanseatic League and her citizens were mostly artisans, who were known for their woodwork, metalwork, glass, precision instruments (including famous clocks), paper and books.

The city also took pride in its republican government. Looking to ancient Roman ideals and Venetian structures of government as models, Danzig held government representation at three different orders that governed and ruled daily life in the city. The lowest order was the house of commons called the "Hundred Men" that represented the interests of laborers and of the four principal guilds of the city. Before the sixteenth century, there was no regulation for the size of this order, but a royal edict of King Sigismund of Poland in 1526 limited the representation to no more than a hundred men-hence the name. The representation actually stood between forty and fifty during the sixteenth and seventeenth centuries.[14] The second order was the *Schöppe*, or Bench, made up of young judicial appointees who served as notaries and judges in both civil and criminal cases and who could expect later to be raised to the first order or the City Senate itself. In the Senate (also called the Council), there were nineteen Consuls or Senators as well as four Bürgermeister who were appointed for life. And although the city historian Reinhold Curicke praised the rule of Danzig for being "tempered from both aristocracy and democracy, that is, the rule stands not only with the Council and the Bench but also

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[13] Fernand Braudel, *The Mediterranean*, Siân Reynolds, trans., 2 vols. (New York: Harper and Row, 1972), 63.

[14] Curicke, *Historische Beschreibung*, 123-124.

with the Commoners,"[15] it was of course not equally tempered. Curicke quoted from the sixteenth-century commentator Stanislaw Sarnicki who extolled Danzig's Senate for governing the commoners and keeping them obedient. In the region where the city was located, Sarnicki noted with a hint of pride that he did not know of a city "whose government was more similar to the government of the city of Venice" than Danzig's.[16]

As part of a multifaceted strategy of praising several persons and places in the *Narratio prima*, Rheticus praised Danzig and her government in his "In Praise of Prussia" at the end of the book. While Rheticus dedicated the *Narratio prima* to Johannes Schöner, it was through his praises of Danzig, its citizens and leaders (specifically Tiedemann Giese and Johannes von Werden, whom he names specifically as patrons), as well as his praises of Prussia and the Duke of Prussia, that he intended to garner patronage. Peter Barker and Bernard Goldstein speculate that part of Rheticus's intention was to find protection from the Duke of Prussia for Copernicus, who was under accusations of alleged illicit relations with his housekeeper, Anna Schilling.[17] Barker and Goldstein argue that Rheticus's "Praise of Prussia" was "directed to the Duke of Prussia" even though Rheticus mentioned the Duke's name only once within his praise.[18] That the Duke of Prussia later commissioned Rheticus to perform geographical surveys of Prussia

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[15] Ibid., 126.

[16] As quoted in Curicke, *Historische Beschreibung*, 84.

[17] Barker and Goldstein, "Patronage and *De Revolutionibus*," 353-354.

[18] Ibid., 355.

and called Copernicus to his court is simply added evidence that Rheticus succeeded in seeking patronage from multiple sources.[19]

An alternative reading of the "Praise" analyzed below suggests that Rheticus was trying to gain patronage support from a variety of sources for different reasons, of which protection from the Duke of Prussia for Copernicus could have been one. In other words, according to such a reading of Rheticus's "Praise," he was not tied down to a standard logic of patronage that would require him to seek ever-more powerful patrons in stable one-on-one relationships, rather, he sought support wherever he thought he could gather it, including the Danzig Senate which could provide powerful and rich collective patronage. While Rheticus most likely did not foresee the exact outcome of what his "Praise" would garner, in 1540, the same year that the *Narratio prima* was published, Max Foltz documented that the Danzig Senate awarded 31 Marks to "a mathematician, for his praise of this city in print."[20] While the quote Foltz recorded does not specifically

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[19] In addition to their concentration on the patronage relationship between Rheticus and the Duke of Prussia, Barker and Goldstein also argue for a connection between the patronage strategies of Rheticus in the *Narratio prima* and those of Copernicus in *De revolutionibus*, but multiple acounts of patronage, as opposed to a single, universal logic of patronage, mitigate against such a connection. Rheticus's *Narratio prima* and its accompanying "Praise of Prussia" were the products of a youthful scholar seeking both to spread as far as he could what he had learned from his master and at the same time seeking to gain recognition for himself. Copernicus's preface to *De revolutionibus*, on the other hand, showed his desires to maintain the goodwill of his patrons within the church, but it is obvious that he did not covet a higher position in the church or more wealth. On Copernicus's preface, see Robert S. Westman, "Proof, poetics, and patronage: Copernicus's preface to *De revolutionibus*," in *Reappraisals of the Scientific Revolution*, eds. David C. Lindberg and Robert S. Westman (Cambridge: Cambridge University Press, 1990), 167-205, esp. 175-178.

[20] Max Foltz, *Geschichte des Danziger Stadthaushalts* (Danzig: A.W. Kafemann, 1912), 160.

mention Rheticus, as far as I can tell, there were no other mathematicians praising Danzig in print around the year 1540 other than Rheticus. I will discuss below reasons why the Danzig Senate felt honored by Rheticus's praise, examining both the rhetorical flourishes of Rheticus's "Praise," as well as its reflection of the living Danzig that facilitated the publication of his work.

Running underneath his dedicatory-type "Praise" was Rheticus's commentary on the mathematically-inclined Prussians and Danzigers who retained the type of good governance that he and his colleague at Wittenberg Philip Melanchthon argued would result from mathematical thinking. To Rheticus, Danzig was the type of republic that Plato had envisioned and that Melanchthon wanted to establish. Part of Melanchthon's project in his overall curricular reforms was to emphasize the teaching and learning of mathematical subjects at the beginning levels of education. Melanchthon's reasons were many, but above all, mathematical subjects, like astronomy and astrology, taught knowledge of God's governance of the universe.[21]

If one could grasp knowledge of God's governance, by extension one could likewise be better prepared to know and act out proper governance for institutions on earth. Like Plato, Melanchthon hoped to raise contemplative rulers who would be active practitioners of mathematical sciences and who would support mathematicians through patronage and other means. Rheticus agreed with Melanchthon in his vision for

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[21] Sachiko Kusukawa, *The Transformation of Natural Philosophy: The Case of Philip Melanchthon* (Cambridge: Cambridge University Press, 1995), 134-144. According to Kusukawa, Melanchthon strove to reform the curriculum of schools according to Luther's vision in his *Address to the German Nobility*.

reformation in civic government and education and with Melanchthon, he argued that the foundation for the philosophical education of obedient citizens and beneficent rulers was in arithmetic and geometry.[22] They both followed the sign posted above the doorway to Plato's school that read "Let no one enter who is not trained in geometry."[23] "The arts that are the true beginning of philosophy" according to Rheticus were the mathematical arts that "provide access to the other parts of philosophy, although even on their own they are of great nobility and benefit."[24] Melanchthon likewise encouraged students at Wittenberg to study mathematical subjects "both for their own sake and for that of the state."[25]

So what was the connection between mathematics and good governance? One motivation for the purpose of learning geometry was to teach "students of philosophy, that they should preserve in all duties a certain moderateness and impartiality by analogy with geometry."[26] Along with moderation and impartiality, the study of geometry demanded patience, orderly thinking, demonstrations, fortitude, strength and the "keenest

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[22] Rheticus, "Preface to arithmetic (1536)" in Philip Melanchthon, *Orations on Philosophy and Education*, ed. Sachiko Kusukawa, trans. Christine F. Salazar (Cambridge: Cambridge University Press, 1999): 90-97, *96*.

[23] Quoted by Melanchthon in his "Preface to Johannes Vogelin's *Book on the Elements of Geometry*" (1536) in Melanchthon, *Orations*, 98-104, *98*.

[24] Rheticus, "Preface to arithmetic," 90, 92. See also Melanchthon, "Preface to *Geometry*," 98 and Melanchthon, "On natural philosophy (1542)" in Melanchthon, *Orations*, 133-138, *133*.

[25] Melanchthon, "On astronomy and geography," (1536) in Melanchthon, *Orations*, 113-119, *119*.

[26] Melanchthon, "Preface to *Geometry*," 98.

striving of the minds,"[27] all attributes and qualities that good citizens and rulers should possess. By requiring geometry and other mathematical subjects at the beginning of one's education, both Melanchthon and Rheticus hoped to mold minds that would be prepared for the rigors of government. "The state needs excellent knowledge," argued Melanchthon, "because everywhere many – be it from lack of judgment, or because they cannot explain anything clearly – have spread or defend[ed] absurd and miscellaneous beliefs, from which great struggles and great discord in the Church have emerged."[28]

Furthermore, Melanchthon paraphrased from book five of the *Ethics*, where Aristotle "most sagaciously establishes two forms of justice, one of which orders the ranking of persons in choosing magistrates in positions of authority, in a city and in families. The other rules not only contracts, but any exchange of things, such as merchandise, damage, harm and penalties."[29] The structure of civic authority (and hence civic equality) was geometrical. "Aristotle took this comparison from Plato, who states with the greatest elegance and dignity that equality must be achieved in the cities, because equality creates mutual love."[30] Geometrical republicanism was the middle way between hierarchical tyranny and arithmetical democracy, which dangerously offered an equal share of power to all regardless of their merits.

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[27] Ibid., 101.

[28] Ibid., 100.

[29] Ibid., 102.

[30] Ibid., 102.

At the beginning of his "Praise of Prussia," Rheticus likened Prussia to the ancient Greek isle of Rhodes asserting that the Rhodians "gained a reputation for wisdom and education." Apollo also spoiled Rhodes with his own gifts including "the medical and prophetic arts," a propensity for hunting and the natural resources of amber. "Doubtless the same divinities would be found to be presiding over this region [Prussia, as those who preside over the land of Rhodes], should some skillful astrologer make careful inquiry about the stars that rule over this most beautiful, most fertile, and most fortunate area," Rheticus insisted. He assumed that Johannes Schöner, the Nuremberger mathematician to whom the *Narratio* is dedicated, must have surely already known of the splendors of Prussia "and since they are treated in other books, wholly devoted to this subject, I refrain from further praise."[31] Indeed the beauty and fortunes of Prussia and of Danzig in particular were attested to by Rheticus's contemporary Olaus Magnus(1490-1557) of Sweden, who spent time living in Danzig during the years 1526-1537. Like Rheticus, Magnus made note of Danzig's amber resources. In addition, he referred to Danzig as "the staple of the Duke of Prussia" and as "that much frequented trading port in Prussia."[32] The trade in Polish grain to other ports in Europe- above all Amsterdam-

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[31] Rheticus, *Narratio prima*, 188-190.

[32] Olaus Magnus, *Historia De Gentibus Septentrionalibus* (Rome, 1555), [*Description of the Northern Peoples*] Peter Fisher and Humphrey Higgins, trans. Second Series, nos. 182, 187, 188 (London: The Hakluyt Society, 1996-1998), bk. 6, ch. 17 (2:306); bk. 8, ch. 28 (2:381).

made Danzig "a city of abundant wealth."[33] Noteworthy also were the restorative properties of Danziger beer.[34]

Rheticus's likening of Prussia to Rhodes emphasized the love of geometry that both peoples shared, and this played into the purpose for Rheticus's "Praise of Prussia," which was to celebrate Danzig and her fellow cities as the realization of Melanchthon's vision for a Platonic society. Rheticus followed Melanchthon, who had earlier lamented what he saw as a poor state of geometry teaching in early education. In his efforts to bolster support for the teaching of geometry, Melanchthon recounted the legend of Aristippus and his fellow shipmates who found themselves castaways on the shores of Rhodes. In the preface to book six of his *De Architectura*, Vitruvius recounted that "The philosopher Aristippus, a follower of Socrates, was shipwrecked on the coast at Rhodes, and observing geometrical diagrams drawn upon the sand, he is said to have shouted to his companions: 'There are good hopes for us; for I see human footsteps!'"[35] For Aristippus, in the Vitruvian account, geometry was the symbol of humanity and

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[33] Ibid., bk. 13, ch. 10 (2:627).

[34] Magnus recounted different methods of making beer in order to achieve certain effects such as adding wormwood to get rid of intestinal worms and sweetening it (by not brewing it long) to make it a laxative. "The more than six hundred beer-makers or brewers of Gdansk [Danzig] all either sell for profit many thousands of casks of fine, healthy beer in their own harbour to traders from abroad at an honest price, or export it in sea ventures to the distant, foreign countries of Portugal and the Indies. This liquor is so beneficial that when you drink it certain very corrupt humours in the body are restored to a sound state. Therefore wherever this beer comes it is never unwelcome, but is bought at once as a most effective medicine, and in northern areas deservedly wins the prize of preference over all the rest." Prussian beer was in demand in Sweden and other places, and in 1416, the number of brewers in Danzig was 376. Ibid., bk. 13, ch. 27 (2:643).

[35] Vitruvius, *De Architectura*, Frank Granger, trans. 2 vols. (Cambridge, Mass.: Harvard University Press, 1931, 1934), II.3.

civilization. Recounting the excitement of Aristippus, Melanchthon declared, "If only these traces of men which Aristippus saw there on the shore were even more numerous in the schools. For these arts have been lying abandoned and neglected for many centuries already."[36]

Rheticus's Platonic-Melanchthonian "Praise" extolled a Prussia that mirrored Rhodes. Rheticus testified that he had not entered a home yet in Prussia "without immediately seeing geometrical diagrams at the very threshold or finding geometry present in their minds. Hence nearly all of them, being men of good will, bestow upon the students of these arts every possible benefit and service, since true knowledge and learning are never separated from goodness and kindness."[37] Indeed Rheticus's patronage in Danzig and in Prussia came as a realization of Melanchthon's wishes that rulers support the endeavors of mathematicians.[38]

Rheticus continued with platonic praise of Danzig's eminent citizens. By extolling Johannes von Werden as a *philosopher-ruler*, Rheticus reasoned that if "all kings, princes, prelates, and other dignitaries of the realms had souls chosen from the vessel of harmonious souls" to which von Werden belonged, "then these excellent studies and those which are chiefly to be pursued for their own sake would doubtless achieve a worthy station."[39] This manifesto for fostering mathematical studies held von Werden up

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[36] Melanchthon, "Preface to *Geometry*," 100.

[37] Rheticus, *Narratio prima*, 191.

[38] For Melanchthon's plea of support from rulers for mathematical subjects, see Melanchthon, "On astronomy and geography," 114.

[39] Rheticus, *Narratio prima*, 196.

as the standard by which others should rule. Danzig, in other words, was the Republic that Plato had envisioned with von Werden at its head.

Franz Rhode and the Printing of the *Narratio prima*

Concerning the writing and publishing of the *Narratio prima*, Burmeister contends that based on the quality of the printing, Rheticus did not care much about its appearance; all that mattered was a quick publishing of Copernicus's ideas.[40] In this same vein, Barker and Goldstein add that rapid publication derived from Rheticus's desire to protect the reputation of his new-found mentor Copernicus in the eyes of the Duke of Prussia. However, the analyses of Burmeister, Barker and Goldstein assume that Rheticus had more control over the speed of printing of the *Narratio prima* than he actually did.[41] It is the printing history of Franz Rhode (d. 1559), the printer of the *Narratio prima* in Danzig, that offers explanations to the physical appearance of the book and to its speedy production.

An immigrant to German-speaking lands, Rhode came from Flanders in 1525 to study at the University of Wittenberg. In 1528, Rhode decided to take his Reformation education to Marburg, where he began printing, coming into the machinery of the

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[40] Burmeister, *Rhetikus*, 1:46.

[41] Burmeister does show some skepticism towards the claim on the title page of the *Narratio prima* that Rheticus himself oversaw the printing of the book at least as far as the proofreading is concerned. He notes that in the list of errata at the end of the *Narratio prima*, the geographer Heinrich Zell is named as the corrector. But Burmeister still allows a role in the printing process for Rheticus, who possibly received proof sheets back in Frauenberg during the process of the printing of the book. See Burmeister, *Rhetikus*, 1.46-47.

previous printer there, Johann Loersfeld (fl. 1525-1528). The first project he began in Marburg was the printing of Luther's translation of the *New Testament* and by the end of his first year in Marburg, Rhode had printed seven books.[42] Rhode also continued his studies in Marburg where he matriculated in 1530 and was esteemed a good Latin poet from his writing of epigrams, versifying translations of scripture, translating the Gospel of Nicodemus and possibly composing hymns. A. v. Dommer, the bibliographer of Rhode's publications in Marburg, esteemed Rhode's print jobs for the most part average compared to others of the time, although some of his productions could be counted among the best as well, based on the appearance of engravings in each book, the quality of the type Rhode used and the number of errors found in each Rhode production.[43]

Rhode emphasized the works of the religious reformers with which he would have been acquainted from his Wittenberg days. Of the over 55 works that Rhode printed from 1528-1536 in Marburg, a quarter of them were by Martin Luther himself; and among the others were works by Philip Melanchthon, Andreas Osiander and the poet Eobanus Hessus. Rhode reprinted an important Luther catechism, the original of which was printed in Wittenberg with no copies of the original now remaining. Among his printings in Marburg, there were no astrological practica, prognostications, calendars or mathematical treatises- only theological tracts and reports of state business. Nonetheless,

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[42] For the list of books Rhode printed in Marburg, see A. v. Dommer, *Die Aeltesten Drucke aus Marburg in Hessen, 1527-1566* (Marburg, 1892), nos. 10-64.

[43] For the Marburg phase of Rhode's printing career, see Dommer, *Die Aeltesten Drucke aus Marburg*, 5-10. The Danzig historian Gotthilf Löschin also reported that Rhode was a talented poet. See Gotthilf Löschin, *Geschichte Danzigs von der ältesten Zeit bis zur neuesten Zeit*, 2 vols. (Danzig: F.W. Ewert, 1823), 1:288.

the works that Rhode did print were intended for quick release and distribution. He was not involved in elaborate productions that required ornate engravings or type and he limited his printings to works in Latin or German (with exceptions of one work in English and one in Dutch).[44]

Before Rhode arrived in Danzig, he spent the winter of 1536-1537 in Hamburg, a city which had difficulties retaining printers. The last printer in Hamburg left the city in 1532 and after Rhode's stay, no one printed there for another decade. Rhode struggled to retain living quarters in Hamburg, straining to pay rent and being discouraged by the prospect of living in a room in the old Mary Magdalene cloister of Hamburg. Although his stay in Hamburg was short and, to him, unpleasant, Rhode still managed to print eight works of religious devotion and an almanac of Johannes Carion (1499-1537/8), tutor of mathematics and astrology at the court of Joachim I, Elector of Brandenburg (1484-1535) in Berlin.[45] Rhode then found his way to Danzig in the spring of 1537 where his condition would change for the better. Although there is evidence of a few early printings in Danzig in the late fifteenth century, no one had established himself as a regular printer in Danzig or in Prussia before Rhode arrived.[46]

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[44] Dommer, *Die Aeltesten Drucke aus Marburg*, nos. 10-64.

[45] Concerning Rhode's printings and stay in Hamburg, see Werner Kayser and Claus Dehn, *Bibliographie der Hamburger Drucke des 16. Jahrhunderts* (Hamburg: Dr. Ernst Hauswedell & Co., 1968), 8 and nos. 87, 240, 556-8, 560-61; and Lajos Borda, "Ein unbekannter Hamburger Druck. Der Almanach von Johannes Carion (1537)," *Gutenberg-Jahrbuch* (2004): 183-186.

[46] Between 1492-1499, Jacob Karweysse of Malbork and Konrad Baumgart of Danzig produced at least six incunabula. See Jan Kordel, "Scientific Session Devoted to the Quincentenary of Printing in Poland" *Libri Gedanenses* VIII (1974): 277-286. Baumgart was a "wandering bookbinder and typographer" who published the *Ars minor*

Rhode had only been in Danzig a couple of years before he took on the job of printing Rheticus's *Narratio prima*. That there were few figures or numbers in the *Narratio Prima* made it easier for Rhode to print quickly the mathematical work, a genre with which he was not as familiar as the religious tracts of Luther and others he had printed in Marburg and Hamburg with the exception of Carion's almanac that he printed in Hamburg in 1537. By February 1540, the first proof sheets were done and the printing was completed by March of 1540.[47]

As the process of publishing the *Narratio prima* was underway, Rheticus continued working in Prussia. While still in Danzig, he experimented with the magnetic needle of the compass and measured the magnetic declination in the city. He also visited with sailors in the ports of Danzig in order to dispel (or at least uncover the reasons behind) a myth he had heard from pilots that they had no need of instruments or maps while at sea during their voyages to England and Portugal. The final report of his experiments with the magnetic needle and of his conversations with the Baltic sailors he

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(1498) of Donat, a book titled *Agenda* (1499) and two other books in Danzig. See Zbigniew Nowak, "The production of books in Gdańsk to the close of XVIII century" and "In search of the origins of Gdańk's printing" *Libri Gedanenses* XV/XVI (1997-1998): 9-40, *30*; 145-156. Gotthilf Löschin argues that the oldest printshop in Königsberg did not arrive until 1542. See Löschin, *Geschichte Danzigs*, 1:288.

[47] Andreas Aurifaber to Philip Melanchthon, 14 February 1540. *NCG*, VI/1:286-287. Andreas Aurifaber (1512-1559) – rector of the St. Mary's school in Danzig – sent Melanchthon both greetings from Rheticus and three proof sheets of the *Narratio prima*. Born in Breslau, Aurifaber had studied theology in Wittenberg and landed the post in Danzig upon Melanchthon's recommendation in 1540. This letter to Melanchthon was one of the first and only letters Aurifaber wrote in Danzig, for by the next year he was already on his way to Elbing to become the Rector of the Gymnasium there, replacing Wilhelm Gnapheus who had accepted a professorship in Königsberg. For more on Aurifaber and Gnapheus, see Götz von Selle, *Geschichte der Albertus-Universität zu Königsberg in Preussen* (Königsberg: Kanter-Verlag, 1944), 23, 27.

met was printed in his *Chorographia* of 1541, which he dedicated to the Duke of Prussia, Albrecht of Königsberg.[48] It was this book that targeted the duke solely for patronage and the duke did not offer Rheticus any outward signs of his favor until after this book was published.[49]

Still living on the success of *Narratio prima* and his *Chorographia*, upon his return to Wittenberg in the fall of 1541, Rheticus not only retained his chair as a professor of Mathematics, but he was also promoted as the school Deacon (Dean) for the school year 1541-1542. This promotion effectively made Rheticus a senior member of the faculty at Wittenberg, a highlight in his life.[50] In one of his first lectures he gave to the students of Wittenberg that school year, he reiterated the lessons he had taught in the

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[48] Burmeister, *Rhetickus*, 1:52-53. Rheticus's initial measurements of magnetic declination in Danzig constitute the beginnings of such measurements that eventually resulted in the world's longest curve of declination changes. Peter Crüger followed up Rheticus's measurements in the first two decades of the seventeenth century and then Crüger's student Johannes Hevelius went on to make measurements in the middle of the seventeenth century and recognized definite variation in the measurements from the time of Rheticus through Crüger to his own time. See Andrzej Januszajtis, "Peter Krüger (1580-1639): Gdańsk Scientist, Professor of the Academic Gymnasium" *Task Quarterly* 1 (1997): 127-130, *129*. Accessed on the internet at http://www.pg.gda.pl/januszajtis/1997/n1/1997-1.jpg on 11 December 2003.

[49] Barker and Goldstein come to the same chronology of patronage, even though they argue that something was in the works with the Duke as early as the printing of the *Narratio prima*. See Barker and Goldstein, "Patronage and *De Revolutionibus*," 356. Although I do not agree with Barker and Goldstein that the *Narratio prima* was meant specifically as a plea for patronage from the Duke, it did not hurt that Franz Rhode was primarily a well-known printer of Lutheran religious works before his arrival in Danzig. The addition of his name as the printer, a salient feature on the pages of the *Narratio prima*, would help Rheticus in his later quest to develop a patronage relationship with the Lutheran Duke of Prussia.

[50] Burmeister, *Rhetikus*, 1.67. "Die Wahl zum Dekan bedeutete für den 27jährigen Rhetikus,…, daß er in den Rang der übrigen Professoren erhoben wurde, was ein weiterer Höhepunkt in seinem Leben war."

"Praise of Prussia" at the of the *Narratio prima*. If his students would take care to study the arts and sciences, then they would more easily achieve peace and avoid wars and contention.[51] He offered the same lesson again in his promotion speech given on February 9, 1542 in which he relayed his interest in defending the study of astronomy for its own sake. Continuing his Platonic rhetoric of raising better rulers through the study of mathematical subjects, Rheticus noted in his speech that even the Holy Roman Emperor Charles V spent his free hours studying astronomy.[52]

The stories of Rheticus's writing of the *Narratio prima* and Rhode's printing of it are cases in point of the interest and support in the city for astronomical work. Rheticus praised Danzig's characteristics that made her "eminent for the wisdom and dignity of her Senate, as well as for the wealth and splendor and reputation in her renascent literature."[53] In addition to the patronage that Rheticus received for his praise of Danzig, the Senate also noticed and rewarded the efforts of Franz Rhode, who in Danzig had widened the repertoire of book genres he printed. The *Narratio prima* with its accompanying "Praise of Prussia" was one of his first jobs, which he started in 1539 and which found its first readers in 1540. A year later, Rhode included in his list of print jobs "Morosophus" a comedy by Wilhelm Gnapheus about a fumbling astrologer who makes benign predictions.[54] Having proved his worth, Rhode became the official city printer

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[51] Ibid., 3.44.

[52] Ibid., 1.69.

[53] Translation mine. See the Rosen translation in Rheticus, *Narratio prima*, 190; see also Prowe, I/2:450.

with privileges to publish reports from the city council and later the speeches, disputations and other works flowing from the Gymnasium. For Rhode's services, the city paid him a yearly stipend of 10 Marks starting in 1545.[55] Although Rhode complained that his work brought him little income, he nevertheless remained in Danzig until his death in 1559.[56] When Rheticus and others sought patronage from the city, they were not seeking something in vain. The city Senate was a powerful patron that offered support to printers and scholars.[57]

Wilhelm Misocacus

Connected to the support that the Danzig Senate offered Rheticus and Rhode was the patronage it offered to practitioners of the science of the stars during the sixteenth century. In 1554, for example, the Senate offered a mathematician 16 ½ marks for an

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[54] Burmeister, 1.63-64. Several authors have characterized Gnapheus's play as a comedy that made fun of Copernicus and his "heliocentric concept." See, for example, Jerzy Szperkowicz, *Nicolaus Copernicus, 1473-1973* (Warsaw: Polish Scientific Publishers, 1972), 73; and Götz von Selle, *Geschichte der Albertus-Universität zu Königsberg in Preussen* (Königsberg: Kanter-Verlag, 1944), 23.

[55] Foltz, *Danziger Stadthaushalts*, 160.

[56] Löschin, *Geschichte Danzigs*, 1:289. Löschin also argued that Rhode was to Danzig what both Manutiuses were to Venice, both Stephanuses were to Paris and what Froben and Quorin were for Basel. (1:288) In a similar vein, Marian Biskup maintained that due to Rhode's consistent work, Danzig "became the leading centre of printing [in Prussia] in the first half of the 16th century." See Marian Biskup, "Royal Prussia in the Times of Copernicus" in *Poland: The Land of Copernicus*, Bogdan Suchodolski, ed. (Wrocław, Warszawa, Kraków, Gdańsk: Ossolineum, The Polish Academy of Sciences Press, 1973): 41-53, *52*.

[57] Bogucka, "Economic Prosperity or Recession and Cultural Patronage: The Case of Gdansk in the 16th-18th Centuries," article twelve in Bogucka, *Gdańsk/Danzig and its Polish Context*.

almanac he produced.[58] Maria Bogucka has found that in the private letters and journals of Danzig citizens during the sixteenth and seventeenth centuries, "politics occupied much of the space," but that second only to politics, Danzigers were interested, not surprisingly, in the weather.[59] Residents of the city saw severe weather occurrences as punishments from God for the sins of mankind and they hoped that through repentance such occurrences would either not take place or would be much milder. Weather prediction, however, rested in the hands of prognosticators, who would issue annual prognostications that included weather forecasts based upon the positions of heavenly bodies throughout the year. Prognosticators also often included predictions of events like war, famine and floods that could take place after appearances of eclipses, conjunctions and planets passing through constellations in the sky overhead. Just because the Danzig Senate found value in supporting prognosticators did not mean that prognosticators did not have their detractors in the city. Nobleman Mikolaj Rej (1505-1569) commented on the regretful use of astrology in astronomical studies. "Of what use will it be to a person to learn astronomy, that is, to be able to [discover] impending things, and not to be able to use and recognize those he has in front of his eyes?"[60] Yet despite such attitudes, prognosticators in the city still found support for their practices.

Wilhelm Misocacus was one of the first to issue prognostications regularly in Danzig, offering his first prognostication in the city for the year 1571. He found himself

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[58] Foltz, *Danziger Stadthaushalts*, 160. Foltz also reports that in 1553, the Senate gave money to an astronomer named "Johannes."

[59] Maria Bogucka, "Mentalität der Bürger von Gdańsk im XVI.-XVII. Jh," 71, article fifteen in Bogucka, *Gdańsk/Danzig and its Polish Context*.

[60] Bogucka, "Social Structures and Custom in Early Modern Poland," 107

in Danzig in 1568 as a refugee having fled his home in the Low Countries due to the outbreak of the Eighty Years War (1568-1648) that eventually resulted in the separation of the Netherlands from the rule of Spain.[61] There were many Dutch and Flemish refugees in the city during the 1570s and 1580s who brought reformed ideas with them that spread throughout the city.[62] Misocacus affirmed in his prognostication printed in 1580 that he was also among the reformed in Danzig by pledging his allegiance to William of Orange-Nassau, the defender of Protestants, especially Calvinists, in the Netherlands.[63] Misocacus also identified himself in print as a medical practitioner and astronomer, and in the full title to his prognostications, Misocacus wrote that he practiced what he did "to the honor of the praiseworthy royal city Danzig." Each of his prognostications also began with extended dedications to the city fathers; and although they may not have necessarily agreed with Misocacus's assertions, the Danzig Senate offered him a yearly stipend of 50 Marks starting in 1572.[64]

His appearance as a prognosticator belonging to the Reformed Calvinists was quite rare in Europe at the time. As Robin Bruce Barnes convincingly argues, Reformed prognosticators living in Calvinist strongholds in the Netherlands and in France did not

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[61] Löschin, *Geschichte Danzigs*, 1:285.

[62] See Michael G. Müller, *Zweite Reformation und städtische Autonomie im Königlichen Preußen: Danzig, Elbing und Thorn in der Epoche der Konfessionalisierung (1557-1660)* (Berlin: Akademie Verlag, 1997), 253.

[63] Volker Leppin, *Antichrist und Jüngster Tag: Das Profil apokalyptischer Flugschriftenpublizistik im deutschen Luthertum 1548-1619* (Gütersloh: Gütersloher Verlagshaus, 1999), 46, n.5.

[64] See the entry for Misocacus in *Altpreußische Biographie*, ed. Christian Krollman (Königsberg: 1936, 1941).

resort to the prophetical type of prognostications that Misocacus issued in Danzig.[65] While he may have been a faithful follower of Calvin, Misocacus did not hold fast to Calvin's *Warning against Judiciary Astrology* (1549) and was free to offer more speculative and wide-ranging prognostications in Danzig, which although it had strong Calvinist personalities was not a Calvinist city.

The most controversial of Misocacus's prophecies came in his prognostication for the year 1583.[66] In that year, the planets Saturn and Jupiter would align in a great conjunction portending for Misocacus events that would mirror happenings in the time of Charles the Great. The effects of the conjunction would be so powerful that they would last twenty years.[67] Upon the appearance of the eclipse, the Roman Church would fall

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[65] Robin Bruce Barnes, "Astrology and the Confessions in the Empire, c. 1550-1620" in *Confessionalization in Europe, 1555-1700: Essays in Honor and Memory of Bodo Nischan*, John M. Headley, Hans J. Hillerbrand and Anthony J. Papalas, eds. (Aldershot, England; Burlington, Vt.: Ashgate, 2004): 131-153, *134-137*.

[66] On this prognostication, see Karl Schottenloher, "Untergang des Hauses Habsburg, von Wilhelm Misocacus aus den Gestirnen für das Jahr 1583 vorhergesagt: Eine verkappte politische Flugschrift" *Gutenberg Jahrbuch* (1951): 127-133.

[67] Misocacus had a history of extending the length of effects resulting from heavenly happenings. Upon the appearance of the new star of 1572, for example, he asserted that "As many months as it burned, so many years will its effects with its harmful workings turn." By his reckoning the new star was visible 7 months, so there were 7 years of effects that flowed from its appearance. Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1577* (Danzig: Jacob Rhode, 1576), Biv^{r}. For his prognostication for 1578, Misocacus made the happy announcement that the curses from the new star of 1572 would end in 1579 "with great peace. In addition, there will be no [harmful] effects from a few eclipses, nor from the marvelous star, nor from a few conjunctions. Rather, everywhere should be inclined to great peace; and God should be praised for it." Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1578* (Danzig: Jacob Rhode, 1576), Aiv^{v}.

into greater disorder, corruption, pride and tyranny. The pope and his cardinals would be persecuted from within and without. In worldly affairs, the Turks would overrun Austria pushing the Habsburgs out of power. While resting many of his claims on readings of biblical prophecies, Misocacus's prophecy concerning the Turks was connected to his readings of Johannes Lichtenberger, who earlier prophesied that the Turks would overrun Germany and turn the cathedral in Cologne into a horse stable. Misocacus likewise warned his Polish readers in 1577 of the imminent onslaught of the Turks into their land.[68] Needless to say, according to these prophecies, both the Church and the Holy Roman Empire would need a savior. Following the language and prophecies made in the book of Daniel,[69] Misocacus claimed that God would raise a king from the north who would bring order to both the fallen church and the suffering empire, reform them through humility, rescue them from tyranny, as well as restore discipline and proper studies. But this would not come without a cost. The "king from the north" would necessarily use force and Europe would suffer from war.

Misocacus's 1583 prophecy initially received negative attention. Catholic Johann Rasch (fl. 1577-1590) wrote in his *Gegenpractic, A judgment against several issued prophecies, prognostications and writings, particularly those of Misocacus* (1584) that "Gicuscacus" as he called him, projected only the wishes of his heart through his prognostication and that neither the end of the world nor the fall of the Habsburgs were

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[68] Misocacus, *Prognosticvm,1577*, Aiii^{v} – Aiv^{r}.

[69] Misocacus had earlier used the prophecy in Daniel 2 to declare that the fourth monarchy spoken of by Daniel was the Roman monarchy and that once it became weak and fell, one could expect the Last Judgement. He believed the Roman Empire to be weak, weaker than it ever was before and ready to fall. Misocacus, *Prognosticvm,1577*, Aii^{r} - Aii^{v}.

imminent.[70] As negative was the name-calling by a defender of the Habsburgs and of the strength of Austria, Johannes Nas, who labeled Misocacus "the foolish weathertaster Wilhelm Misteat, Mendicus or Medicucus at Danzig," and further ridiculed Misocacus with names like "Mistrac," "Mistcack [dungheap]" and "loose star-cuckoo."[71]

In his own defense Misocacus wrote a lengthy prognostication for 1584 in which he presented himself in the entourage of Old Testament prophets, a tactic he had used before.[72] He couched his own words in the words of the prophets Isaiah and Jeremiah among others in order to testify that his pronouncements were not just those of a medical practitioner or prognosticator, but rather those of God and that he was simply a

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[70] On Rasch's *Gegenpractic*, see Schottenloher, "Untergang des Hauses Habsburg," 132, Robin Bruce Barnes, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation* (Stanford, California: Stanford University Press, 1988), 161, and Barnes, "Astrology and the Confessions," 133. In "Astrology and the Confessions," Barnes adds "According to Rasch the heretics were guilty not only of illegitimately combining the art with spiritual prophecy; they had also managed to sow vast confusion among the common folk through their almanacs and other vernacular works."

[71] From Schottenloher, "Untergang des Hauses Habsburg," 132.

[72] Leppin, *Antichrist und Jüngster Tag*, 141, 181. On Misocacus's astrological beliefs, Maria Bogucka notes that "many scholars and physicians, such as Bartholomew Wagner, Severin Goebel and Willem Misocacus, agreed that astral influences moulded the state of a person's physical condition." Bogucka also claims that the gap between learned medicine and popular natural magic for Misocacus and others "was not very wide." See Maria Bogucka, "Health care and poor relief in Danzig (Gdansk): The sixteenth- and first half of the seventeenth century," in *Health Care and Poor Relief in Protestant Europe, 1500-1700*, Ole Peter Grell and Andrew Cunningham, eds. (London and New York: Routledge, 1997): 204-219, *214*, republished as article thirteen in Bogucka, *Gdańsk/Danzig and its Polish Context*.

mouthpiece.[73] This was one way to bolster his authority as a prognosticator. Misocacus had earlier asserted that one should not speak against astrologers for even the greatest of the Old Testament prophets practiced the art of astrology, "as Josephus, Eusebius, Dicearschus, Theodorus and other Greek masters say that Abraham and Moses were astrologers."[74] In one of his final prognostications and in connection with the claim that many earthly rulers practiced astrology, Misocacus claimed high disciplinary status for astrology, which "is a part of the most superb, useful and necessary teachings, which one calls *Physicam* that no one without sophistry can contradict."[75] Astrology for Misocacus was a legitimate practice to be taken seriously.

After his prophecy of 1583, Misocacus did not back down from making bold predictions. Following the tradition of those who looked to 1588 as a year of wonder, a year that would play an integral role in the end of time, he joined prognosticators who repeated a verse reportedly from Regiomontanus:

> One thousand five hundred eighty eight
>
> That is the year that I await
>
> If the world does not then suffer its fate
>
> There will still be wonders marvelous and great[76]

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[73] Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1584* (Danzig: Jacob Rhode, 1583), Aiii^{r} - Aiii^{v}.

[74] Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1579* (Danzig: Jacob Rhode, 1578), Aiii^{r}.

[75] Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1594* (Danzig: Jacob Rhode, 1593), Aiii^{r}

In the years following 1588, Misocacus continued to affirm that Regiomontanus's prophecy was true. According to Misocacus, both the chronology of the end times and the condition of the world matched his world of 1588. He offered a lengthy discussion of the seven ages of the world, which should end in the year 2000 according to a literalist reading, but instead he followed the words of Christ concerning the time for the Last Judgment in Matthew 24:22 "And except those days should be shortened, there should no flesh be saved: but for the elect's sake those days shall be shortened." Misocacus accordingly reasoned, "the days will be shortened because of our sins. Consequently, God will not endure this evil world much longer."[77] In response to those "several Epicureans [who] crudely and shamelessly mock"[78] Regiomontanus's prophecy, Misocacus asked "Is it not a great noteworthy wonder that in the year 1588 so many thousands of people died from the plague and were taken from this world?" Rhetorically, he again asked if it was not a wonder that the King of Spain sent such a large Armada that was then destroyed sparing the Queen of England and her people.[79]

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[76] As quoted and translated from Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1588* (Danzig: Jacob Rhode, 1587), Aiii^{v}. On the tradition of this little rhyme, see Barnes, *Prophecy and Gnosis*, 163.

[77] Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1589* (Danzig: Jacob Rhode, 1588), Aiv^{v}. On the wider context and reception of the prophecy for 1588, see Barnes, *Prophecy and Gnosis*, 163-168.

[78] Wilhelm Misocacus, *Prognosticvm, Oder Practica auffs Jar nach der Geburt unsers HERRN und Seligmachers Jesu Christi, 1590* (Danzig: Jacob Rhode, 1589), Aiii^{r}.

[79] Ibid., Aiii^{v}. Curicke does not report 1588 in his list of noteworthy years when the plague hit Danzig hard. See Curicke, *Historische Beschreibung*, 271.

Misocacus issued prognostications until his death in 1595 and was continually supported by the Danzig Senate. His prophecies, however, did not die with him. In 1631 at the height of the Thirty Years War, his prophecy about a "king from the north" who would save both Christendom and the Empire was understood by some in Danzig to predict Gustavus Adolphus's entrance to the war. The prophecy was published again as if thereby vindicating the veracity of Misocacus's prophecy.[80] Misocacus's prophecies nevertheless remained controversial. Peter Crüger, a later Danzig prognosticator, argued that Misocacus was confused and misread the prophecy of Daniel. According to Crüger, theologians agreed that Daniel more likely referred to a figure that was bent on destroying the Church and could even be equated with the Anti-Christ, not a lion from the north that would save the Church and Europe.[81] Whether or not they agreed with Misocacus, the Danzig Senate during the sixteenth century showed their collective interest in what he had to say by continually supporting him financially.

Bartholomew Keckermann and the Danzig Gymnasium

In 1558, a decade before Misocacus arrived in the city and in the year before the death of printer Franz Rhode, Danzig witnessed the founding of a Gymnasium, a school of higher learning that prepared students for university studies. The school met in the former Franciscan monastery connected to the Church of the Holy Trinity in the

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[80] *Extract Der Prophezeyhung auß Doct. Wilhelmi Misocaci, Physici und Astronomi der Königl. Stadt Dantzig. Prognostico, auffs 1583ste Jahr von der grossen Conjunction Saturni und Jovis, in den Himlischen Zeichen der Fischen* (Danzig?, 1631).

[81] Crüger, *Cupediae Astrosophicae*, Ddiv^{v}.

southwestern corner of the city. Danzig had never had an institution of higher learning, but students were nevertheless well-prepared to attend the Gymnasium once it opened. Sons of wealthy burghers for example would have attended one of six elementary schools in Danzig, which found their roots in confessional schools of the fifteenth century.[82] Next to catechism, young students learned reading and writing in German and Latin. In upper classes, students studied classical authors like Cato, Terence, Cicero and humanist authors, including Erasmus. Schools placed emphasis on musical instruction requiring students and teachers to participate in the church choir every Sunday. The schools were mainly for the sons of wealthy citizens, but there were also poor classes established in the school St. Mary's in 1592 and the school St. John in 1616. There were also myriad small private schools in the city devoted to specific instruction in important trade languages such as French and Polish. In these schools, students also learned reading, writing and arithmetic. Students in the trade schools came from the families of tradesmen who did not foresee further instruction for their offspring. Girls also attended the private trade schools. Girls from wealthy families were home-schooled or found themselves in the cloister school of the Bridgettine Sisters. Private schools had anywhere from 10-50 students. By 1663, in the Rechtstadt or New Town, there were 33 private schools with 842 students (120 of whom were girls). Danzigers attended their own Gymnasium but also attended higher institutions of learning in Thorn, Elbing, Cracow, Germany, the Low

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[82] Bogucka, "Mentalität der Bürger von Gdańsk im XVI.-XVII. Jh.," 64-66.

Countries and in Italy. The city also made available stipends for poor students to attend universities.[83] All this is to say that the city fostered learning at all levels.

The Danzig Gymnasium attracted the energies of dedicated mathematicians, increasing opportunities for students of the stars to practice their arts within the city. One of the first professors of mathematics was Professor Matthias Meine (1544-1601), a native of the city who began teaching in the Gymnasium in 1572. He observed the new star of 1572 and the comet of 1577 and wrote tracts about both, as well as offering yearly prognostications. His prognostications and tracts differed in tone and content from those of his fellow prognosticator Wilhelm Misocacus. Like Misocacus, Meine began his tracts with a dedication to the Danzig city fathers and his printer was also Jacob Rhode. Unlike Misocacus, Meine had a more tempered tone and he did not bring into his prognostications eschatological prophecies that related to the Second Coming of Christ or the prophecy of Daniel. He did write that the comet of 1577 was a sign for sinners to repent, but instead of dwelling on possible spiritual connections that could be made to the comet, Meine instead offered a listing of and commentary about the appearances of recent comets.[84] In 1579, Meine accepted the post as the Professor of Mathematics at Königsberg, where he remained.[85] Throughout his life, he stood in contact with the best

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[83] Ibid., 64-66.

[84] Matthias Meine, *Von aller geschlecht der Cometen jeder zeit, wan die erscheine zugebrauchen und von dessen wirckungen der uns zu Dantzigk den 12. Nouembris dieses 1577. Jar erschienen ist* (Danzig: Jacob Rhode, 1578). In his list he included comets seen in: 1456, 1457, 1477, 1500, 1506, 1527, 1531, 1532, 1533 and 1538.

known astronomers of his time including Tycho Brahe and, according to one historian, Meine taught the Copernican system.[86]

Although the Danzig Gymnasium did not offer a university-level education and lost professors like Matthias Meine to university posts, it was able to retain and attract well-known educators. Foremost among the professors who taught in Danzig during the sixteenth and seventeenth centuries was Bartholomew Keckermann (1571/3-1609), a former student who came back to his hometown to teach. At the time Keckermann was a student, the Gymnasium was expanding due to the efforts of the rector Jacob Fabricius (1551-1629), who before coming to Danzig had studied at Lutheran Wittenberg for six years where, ironically, he took to the Calvinist teachings of Christoph Petzel.[87] During the tenure of Fabricius "the defender of Calvinism," the Danzig Gymnasium in effect

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[85] Theodor Hirsch, *Geschichte des academischen Gymnasiums in Danzig* (Danzig: Gedruckt in der Wedelschen Hofbuchdruckerei, 1837), 61. On Meine, see also, Löschin, *Geschichte Danzigs*, 1:285.

[86] von Selle, *Geschichte der Albertus-Universität*, 69-70. According to von Selle's reading of a Königsberg University program from 1595, Meine "explained the merit of the Copernican worldview" to his students. In the tracts that I have been able to research, including his calendar for 1593 and his calendars and prognostications for 1598 and 1600 printed in Königsberg, as well as his 1577 comet pamphlet printed in Danzig, I have only found one reference to Copernicus. Embedded in a brief history of astronomy in his 1577 comet pamphlet, Meine mentions Aristarchus and that Copernicus revived Aristarchus's theory.

[87] After studying in Wittenberg, Fabricius attended the university at Basel where he was promoted as a doctor of theology in 1576. Shortly thereafter, he arrived in Danzig, where in addition to his duties as rector of the Gymnasium, he was also the Professor of Ethics and pastor of the Trinity Church. See Dick Van Stekelenburg, *Michael Albinus 'Dantiscanus' (1610-1653): Eine Fallstudie zum Danziger Literaturbarock* (Amsterdam: Rodopi, 1988), 60-61; and Hirsch, *Geschichte des Gymnasiums in Danzig*, 16-24. Hirsch reported that by 1580, there were 65 students enrolled at the school.

became a Calvinist school.[88] Keckermann entered the Gymnasium in 1586, the same year Fabricius drew fire from citizens in Danzig who were not pleased with Fabricius's appointments of Calvinists to professorships in the Gymnasium. City officials took the matter into consideration and ultimately softened regulations against Calvinists, handing Fabricius and his colleagues a victory in their struggle to establish power within the Gymnasium and elsewhere. The action of the city officials caused greater tension within Danzig to the point that even the young Calvinist Keckermann, who sympathized with Fabricius, was attacked by men armed with daggers and pistols. Keckermann evaded his attackers and slipped into his apartment long enough to change into woman's clothing and then escape out the back door. When things settled down in the city, Keckermann was given some money to take a "vacation."[89]

In many ways, Keckermann followed in Fabricius's footsteps finding his way to Wittenberg, where he first enrolled in 1590. While in Wittenberg, Keckermann

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[88] The Rector of the school was also appointed as the Pastor of the Church of the Holy Trinity that remained connected to the school. See Edmund Cieślak and Czesław Biernat, *History of Gdańsk*. Bożenna Blaim and George M. Hyde, trans. (Gdansk, Poland: Wydawnictwo, 1988), 155. In Fabricius's case this meant that not only would the Gymnasium be a Calvinist institution during his reign, but that the Church of the Holy Trinity would also be a Calvinist Church.

[89] Hirsch, *Geschichte des Gymnasiums in Danzig*, 17-18, 21. Fabricius's educational emphases did not ameliorate the tense religious atmosphere that existed in the city at this time. Throughout his rectorship, Fabricius stressed the study of theology even against the wishes of Keckermann, his most famous pupil, who wanted to limit the teaching of theology. Fabricius made the Gymnasium a theater where religious disputations were played out. During the series of events that resulted in the attempted attack on Keckermann, a prophetess declared in the streets of Danzig's Old Town that she had received a revelatory vision in which she saw the Calvinist Fabricius, his father and other relatives burning in hell.

purchased the Basel second edition of Copernicus's *De revolutionibus*.[90] He then studied in Leipzig for a brief period during 1592 before moving to strictly Calvinist Heidelberg, where he received a master of arts degree on February 27, 1595.[91] Keckermann stayed on at Heidelberg, where he eventually held a professorship in Hebrew. In addition, he recorded (referring to himself in the third person) that in 1597 he repeated "the mathematical course he had formerly run in Wittenberg."[92] It was also during this year that Keckermann penned a poem he composed "In honor of Nicolaus Copernicus of Toruń in Prussia, a miracle of nature and the eternal glory of Prussia," Keckermann used a title that invoked the motto of Tycho Brahe "Suspiciendo Despicio" ("By looking up, I understand below"). In Praise of Copernicus, Keckermann compared him to:

> Ptolemy, Alfonso, Peurbach, and Johannes
>
> Who bears the name Regiomontanus
>
> Rheticus, Schöner, then Leovitius and
>
> Reinhold, still later Peucer and that Tycho-
>
> Those illustrious spirits could conquer the sky,
>
> But they could not surpass that Prussian man.[93]

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[90] Gingerich, *Census of* De revolutionibus, 162-163. Keckermann purchased his copy of *De revolutionibus* in February 1592 for "30 silver pieces equivalent to 6 groschen."

[91] Gottfried Seebaß characterizes the University of Heidelberg "as a bulwark of Reformed theology in the second half of the sixteenth century." See his article on "Heidelberg, University of" in *The Oxford Encyclopedia of the Reformation*, Hans J. Hillerbrand, ed. (New York and Oxford: Oxford University Press, 1996): 2:216-217.

[92] Gingerich, *Census of* De revolutionibus, 163.

According to this short poem, Keckermann held Copernicus in high esteem compared to others who had observed and written about the structure of the heavens. Nevertheless, Keckermann's praise for Copernicus and the resulting references he made to Copernicus in his textbooks did not involve an acceptance of the central tenet of Copernicus's theory, namely that the earth revolves around the sun. Rather, Keckermann adopted the approach of Andreas Osiander, who in his unsigned preface to the 1543 edition of *De revolutionibus* maintained that Copernicus's "hypotheses need not be true nor even probable. On the contrary, if they provide a calculus consistent with the observations, that alone is enough."[94] According to Keckermann, Copernicus's theory was superior for calculating the true distance between the earth and the sun, but in a similar vein to the preface of Copernicus's book, Keckermann wrote that Copernicus's theory of a moving Earth need not be considered real but still useful as a working hypothesis.[95]

In 1602 after writing to the Danzig City Senate about his desire to return to his native city, he was offered a position to teach philosophy in the Danzig Gymnasium, which position he held until his early death in 1609. During the seven years that Keckermann labored in Danzig, he gained a reputation as a great pedagogue by

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[93] Ibid. Keckermann drafted this poem on the flyleaf of his copy of *De revolutionibus*.

[94] From Andreas Osiander's foreword to Nicholas Copernicus, *On the Revolutions*, Edward Rosen, trans. (Baltimore and London: The Johns Hopkins University Press, 1992), xx.

[95] Barbara Bieńkowska, "From Negation to Acceptance (The Reception of the Heliocentric Theory in Polish Schools in the 17th and 18th Centuries)" in *The Reception of Copernicus' Heliocentric Theory*, ed. Jerzy Dobrzycki (Dordrecht, Holland; Boston, Mass.: D. Reidel, 1972): 79-116, *105*.

employing a systematic method of teaching that Howard Hotson calls "methodical Peripateticism" as opposed to textual Peripateticism.[96] In his method, Keckermann taught systems of thought introducing students to one subject at a time (such as geometry, astronomy, optics and geography) through a series of repeating precepts, rules and commentary. The teaching of a system was "the exercise, training or practice of an art which transforms it from an external collection of precepts into an internal, mental habit."[97] His series of lectures later became the substance for many school manuals and textbooks that were used as far away as Harvard, where Adrian Heereboord "recommended Keckermann's work as the best system of Peripatetic natural philosophy," and as late as the Oxford 1660 edition of his *Opera Omnia*, by which the English author John Milton most likely learned his physics and astronomy.[98]

The commentaries on astronomical theory by Georg Peurbach and Regiomontanus aided Keckermann in his system of astronomy, which began with a discussion about the motions of the heavenly spheres that Keckermann held to be material opposing arguments by Scaliger against this position resulting from observations

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[96] Howard Hotson, *Johann Heinrich Alsted, 1588-1638: Between Renaissance, Reformation, and Universal Reform* (Oxford: Clarendon Press, 2000), 31.

[97] Ibid., 32.

[98] On the connection to Harvard see Mary Richard Reif, "Natural Philosophy in some Early Seventeenth Century Scholastic Textbooks," (St. Louis University, PhD diss., 1962), 19-20. See also Samuel Eliot Morison, *Harvard in the Seventeenth Century*, 2 vols. (Cambridge, Mass.: Harvard University Press, 1936), 225. On the use of Keckermann's texts to teach physics at Cambridge, see William Costello, *The Scholastic Curriculum at Early Seventeenth-Century Cambridge* (Cambridge: Harvard University Press, 1958), 83-102.

made of the comet of 1577 that showed it traversed planetary spheres.[99] Keckermann then treated the motions of each of the planetary spheres separately. After working through the planetary spheres, he ended his system of astronomy by discussing time reckoning and the reasons behind the recent change from the Julian to the Gregorian calendar. Apart from his system of astronomy, Keckermann included discussions of phenomena related to astronomy, such as comets and meteors, in his textbooks that concerned physics and other subjects.

The breadth of Keckermann's work is amazing considering how briefly he actually lived to create it. His output probably resulted from his attitude not to be satisfied with leaving questions unanswered and at least attempting a "most probable" explanation to difficult questions. It is safe to say that Keckermann's works were not used for their originality. He believed that tradition should prevail over unsubstantiated claims. By placing knowledge which was "rightly-ordered" before knowledge which may in fact be "true" Keckermann stuck with the wisdom of the ancients over the moderns.[100] For example, although he was open to questioning the reality of solid celestial spheres he could not accept a complete denial "because as yet no astronomical precepts have been established, through which an opinion and hypothesis of this sort can

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[99] On Keckermann and the context of opinions surrounding the issue of solid spheres, see William H. Donahue, "The Solid Planetary Spheres in Post-Copernican Natural Philosophy" in *The Copernican Achievement*, Robert Westman, ed. (Berkeley, Los Angeles and London: University of California Press, 1975), 244-275, especially 255-256.

[100] See Reif, "Scholastic Textbooks," 292, 304.

be taught in the schools."[101] He was waiting for the day when such precepts would be filtered through textbooks such as his own. Because of his attitude, Keckermann was cautious in his references to the work of moderns like Copernicus and Brahe. In the margins of his personal copy of Copernicus's *De Revolutionibus* (Keckermann owned the Basel, 1566 second edition) he could acknowledge and even praise Copernicus and other modern astronomers like Rheticus, Peucer and Brahe. Yet when he taught astronomy and when his teachings were distilled in his textbook *Systema compendiosum*, Keckermann followed a traditional Ptolemaic model with only short references to the works of Copernicus and Brahe.[102]

Theologically, Keckermann held that knowledge of physics was necessary in order to understand the scriptural accounts of creation and of natural things in the Bible such as gems, metals and foods. When it came to miracles, Keckermann wrote, "Properly and accurately speaking, God does not act contrary to nature, but He acts above [*supra*] nature, when He produces miracles."[103] His view of comets also had a theological flavor. Although he took an astrological position when he said that comets portend events on earth such as changes in empires, his causal account of why this is the case became theological. Instead of discussing the natural effects a comet might have on

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[101] Bartholomew Keckermann, *Systema Astronomiae* in *Opera Omnia*, 2 vols. (Geneva: Peter Aubert, 1614), I.1, ch. 11, col. 1883, as translated in Reif, "Natural Philosophy," 280.

[102] On Keckermann's *Systema compendiosum*, see Paul Lawrence Rose's excellent article on Keckermann in the *Dictionary of Scientific Biography*.

[103] "Non agit Deus proprie & accurate loquindo [sic] contra naturam, sed agit supra naturam, cum miracula producis." Keckermann, *Systema Physicum* in *Opera Omnia*, I.1: col. 1369. Translation from Reif, "Natural Philosophy," 158.

events on earth, Keckermann claimed that good angels or bad demons worked with the matter of a comet to produce effects on earth. Comets then acted as signs of God's just rewards and punishments.[104]

Keckermann's work was made possible through the support he had as a teacher in the Gymnasium. Stanisław Salmonowicz argues that the Gymnasium schools in the Prussian cities of Thorn, Elbing and Danzig during the sixteenth and seventeenth centuries were centers where regional and civic identities were shaped. The children of elites studied in the Gymnasium schools and after completing studies the ideal was that they would then spread both their learning as well as the regional and civic identities they imbibed as students. In Danzig, Salmonowicz further argues, Bartholomew Keckermann was a major force in stressing the education of burgers and citizens of the cities. Consequently, his students who later became leading voices in Danzig put into practice the lessons he taught in his systems related to law, history and politics, in addition to learning lessons concerning comets and stars.[105]

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[104] Keckermann, *Systema Physicum* in *Opera Omnia*, I.1: col. 1614. In support of his angels and demons theory, Keckermann cites Bodin's *Theatrum naturae universae* (unspecified edition), p. 177 where Bodin stated that the causes for hurricanes, lightning and earthquakes were not ordinary but from demons. Keckermann also cites Caspar Peucer's *Commentarivs De Praecipivs Divinationvm Generibvs* (unspecified edition), p. 43 in which Peucer argued that it was demon that caused the earthquake at the temple in Delphi. For a summary of Keckermann's theory of comets, see Lynn Thorndike, *A History of Magic and Experimental Science*, 8 vols. (New York: Columbia University Press, 1923-1958), 7:375-379.

[105] Stanisław Salmonowicz, "Die protestantischen akademischen Gymnasien in Thorn, Elbing und Danzig und ihre Bedeutung für die regionale Identität im Königlichen Preußen (16.-18. Jahrhundert)" *Nordost-Archiv* 6 (1997): 515-539.

Conclusion

This chapter has examined examples of civic patronage in Danzig in order to show that there were different patronage arrangements apart from courtly patronage. Among the differences between civic patronage and courtly patronage is that in the former, the reward for services rendered or for work well done was a one-time gift, as in the case of Rheticus. And unlike courtly patronage where courtiers could hope for and achieve healthy stipends, in civic patronage, when yearly stipends were offered, they were often modest (as in the cases of both Rhode and Misocacus) and served more as retainers of extra income than as sole sources of income (especially in the case of the printer Rhode). The city's interest in the work of these individuals could not only enhance its image to its citizens and its neighbors, but also elevate those most vested in supporting the city. As David G. Halsted has argued for a slightly different context during the same period, "investment in culture [by a city] was not a mere luxury but fulfilled an important social function, lending status to the high bourgeoisie."[106] Artisans, merchants, mathematicians, printers and poets all strove to practice their arts and trades, and welcomed the chance to receive support from cities.

Danzig was not unique in its patronage of practitioners of the science of the stars. Civic patronage had been a rival to courtly and ecclesiastical patronage in northern Europe since the end of the fourteenth century.[107] Nuremberg during the sixteenth

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[106] Halsted used the example of Danzig to substantiate this claim. David G. Halsted, *Poetry and Politics in the Silesian Baroque: Neo-Stoicism in the Work of Christophorus Colerus and his Circle* (Wiesbaden : Harrassowitz, 1996), 44.

century, Gerald Strauss contends, "was emphatically an unintellectual society" despite the city's patronage of mathematicians, printers, astronomers and prognosticators.[108] When he lists specific examples of civic patronage in Nuremberg, however, Strauss is more positive about its intellectual achievements. For example, in 1490 the city Council commissioned visitor, explorer and merchant Martin Behaim to construct a globe of the earth, after his travels down the African coast. The result was Behaim's *Erdapfel*, which Strauss describes as "not the first globe ever, but one of the earliest modern ones and certainly the most beautiful…the burgher who approached Behaim's 'earth apple' on its stand in the town hall got from it a much more realistic grasp of the shape of his world and the relationship of its parts."[109] During the sixteenth century, the city Council in Nuremberg also rewarded practitioners of the science of the stars. To Jörg Nöttelein, they awarded 21 gulden (almost the equivalent of a year's wages for an artisan) for one of his annual prognostications.[110] City leaders treated their patronage of Behaim's globe and Nöttelein's prognostication as investments. Geography was important for military and trade and prognostications outlined upcoming astrological events such as eclipses and conjunctions and they speculated on the meaning of such events for agriculture, the weather and politics among other things.

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[107] See Jeffrey Chipps Smith, *The Northern Renaissance* (London, New York: Phaidon Press, 2004), 10.

[108] Gerald Strauss, *Nuremberg in the Sixteenth Century* (New York, London and Sydney: John Wiley & Sons, 1966), 234.

[109] Ibid., 251.

[110] Ibid., 204-206.

This chapter's emphasis on civic patronage briefly helps to show why it was vital for prognosticators to dedicate their pamphlets to cities and to compose poetry in praise of civic authorities and areas.[111] For it was often cities that provided the means of support to prognosticators. Danzig was no exception. While there were multiple systems or logics of patronage, civic patronage operated differently. This is not to say that practitioners could not navigate between forms of patronage. Rheticus is a prime example of someone who spoke to multiple audiences through the *Narratio prima*, where the dedication is directed to an individual mathematician, but the "Praise of Prussia" was directed to a multitude of individuals, above all the city authorities of Danzig, as well as the Duke of Prussia.

This chapter also brings to the fore the preparation that citizens of Danzig had for engaging with the science of the stars. During Keckermann's tenure at the Gymnasium many of the graduates of the school prepared their disputations in natural philosophical topics, above all in astronomy.[112] His legacy can be measured not only by the number of textbooks that resulted from his teachings (Joseph Freedman counts forty)[113] but also by the impact he had on what his students learned and what they did with that learning. As I will discuss in the next two chapters, Keckermann's student and later colleague Peter

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[111] On the variety of recipients of dedications including city councils and bürgermeister, see Karl Schottenloher, *Die Widmungsvorrede im Buch des 16. Jahrhunderts* (Münster: Aschendorffsche Verlagsbuchhandlung, 1953).

[112] Bieńkowska, "From Negation to Acceptance," 85.

[113] See the bibliography to Joseph S. Freedman, "The Career and Writings of Bartholomew Keckermann (d. 1609)" *Proceedings of the American Philosophical Society* 141 (September, 1997): 305-364.

Crüger became a well-respected author of mathematical and astronomical works. The foundation of education that Keckermann laid made it possible to teach a wide variety of subjects through the use of his textbooks, but always with an emphasis on natural philosophical subjects that would shape the character of the Danzig Gymnasium throughout the seventeenth century.

Chapter 2

Between Prophecy and Prognostication: Peter Crüger's Astrological Defense

During the first decades of the seventeenth century, Lutheran orthodoxy began asserting itself in Danzig shaping what practitioners of the science of the stars wrote about. From 1607 until his death in 1639, Lutheran Peter Crüger (b. 1580) taught mathematics and poetry in the Danzig Gymnasium. Among his responsibilities were to issue regular prognostications and calendars for the city, and to be the proof-reader of mathematical manuscripts that were to be published in Danzig.[1] In addition, he wrote school textbooks and presided over several disputations.[2] Throughout his life, Crüger faced decisions he had to make about what he was going to publish, about how to respond to critics of his work and about the debates in which he would participate in print. Ultimately, his position in Lutheran Danzig as a teacher of students in the Gymnasium, as the voice of prognostication for Danzig burgers and as the proof-reader of books to be published in the city shaped and narrowed the field of intellectual battles which he chose to engage.

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[1] See Bieńkowska, "From Negation to Acceptance," 108; and Januszajtis, "Peter Krüger," 127. Januszajtis records that in 1623 Sigismund II the King of Poland gave Crüger the official privilege to carry the title of "calendariographer."

[2] Among these were the disputations of Jacob Gerhard and Bartholomew Schuller both of whom were concerned with the motions of the heavens. Crüger also presided over a disputation with Adrian Stodertus on the subject of magnetism.

The most heated debate in which Crüger was involved was with Paul Nagel (fl. 1606-1621), a self-proclaimed "theologian and astronomer."[3] In 1619, Nagel prophesied in a tract published in Danzig that the millennial reign of Christ would begin in 1624. Nagel's prophecy set off a series of back-and-forth polemics between himself and Crüger over the question of correct methods for prognosticating, a question closely related to questions concerning the limits of prophecy within Lutheran theology. The debate that then ensued between Nagel and Crüger was not an uncommon one during the first third of the seventeenth century. Nagel's prophecy came at a time when Lutheran orthodoxy in German-speaking cities was hardening against prophecies. As Robin Bruce Barnes aptly shows in his book *Prophecy and Gnosis*, around 1618 Lutheran theologians desired to establish the right teaching of the gospel and an earthly social order that connected with the needs of those who struggled for hope and salvation against the terrors of war. Orthodox Lutherans shunned extreme prophetic speculation that deluded humble believers with prophecies that failed, and they also desired to curb the free speculation that individual readings of scripture offered and that had allowed for the rise of false prophets. Nagel's prophecy also came at a time when many in Danzig were becoming wary of figures like Nagel. During the 1610s when the city became an outlet for Rosicrucian writings, there were those concerned about Rosicrucian promises and at least seven preachers in the city were suspected of Rosicrucian views.[4] Nagel's prophecy was therefore an affront to cautious citizens in Danzig.

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[3] Nagel called himself a "theologian and astronomer" in his *Prognosticon Astrologo-Cabalisticum* (1619). See Barnes, *Prophecy and Gnosis*, 178.

Near the end of the debate between Nagel and Crüger, Crüger's friend Johannes Kepler (1571-1630) asked him why he was wasting his time with Nagel. While I have not found any record of Crüger's reply to Kepler, this chapter will argue that Crüger confronted Nagel for several reasons, above all, reasons connected to the intellectual and religious environment in Danzig.

Peter Crüger and Prognosticating in Lutheran Danzig

Calvinists had held powerful positions in Danzig during the last two decades of the sixteenth century and into the seventeenth century as evinced by the appointment of Bartholomew Keckermann. Calvinist Wilhelm Misocacus crafted the prognostications for the city and around the year 1600, many Calvinists filled posts in civic government and in the Gymnasium, but their standing in the community would decline in the first two decades of the seventeenth century. From 1605-1612, seven vacated positions in the city council were filled with Lutherans and by March 11, 1612 a royal edict halted appointments of Calvinists to the Bench and to the City Senate, which subsequently shaped appointments in the Gymnasium as well.[5] As the newly established religious

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[4] Hotson, *Alsted*, 103. The printer Andreas Hünefeld was responsible for publishing many of the Rosicrucian works that appeared in the city.

[5] Cieślak and Biernat, *History of Gdańsk*, 145; Van Stekelenburg, *Albinus*, 62. According to Stekelenburg, the rectorship of the Gymnasium was a life-time appointment that Jacob Fabricius held until his death in 1629. The rector's religious affiliation was also the Gymnasium's as well as that of the Trinity Church, which was closely affiliated with the school. But already in 1622, the Lutheran Andreas Hojer was appointed to be a Deacon at the Trinity Church as well as a professor in the Gymnasium and by the end of the 1620s, the Gymnasium had a new Rector in the person of Lutheran Johannes Botsack and many new Lutheran professors including the influential Johannes Mochinger. Danzig was well on its way to showing a unified Lutheran front. The deathblow to

authority in the city, the Lutherans needed to form a united front- they needed a common identity. Groups like the Calvinists and Rosicrucians served the Lutheran majority as foils against which Lutheran orthodoxy could define itself. The increasing power of Lutherans in Danzig also held consequences for the reception of prophecies and prognostications in the city. As part of their revamping of the Gymnasium and the City Senate, in 1607 city authorities appointed the young Wittenberg graduate Peter Crüger to teach both mathematics and poetry in the Gymnasium and swore him in as the city surveyor.[6]

In addition to his Lutheran leanings, Crüger's background consisted of personal contact with well-respected astronomers and institutions of his time. He was born on October 20, 1580 to Wilhelm Crüger, the Deacon of the Old-Town Church in Königsberg, and to Dorothea, the daughter of Ambrosius Werner Bürgermeister of Drengfurth. His father died when he was three and his mother died when he was 6. His grandfather raised him until he was 12, at which time he was sent back to Königsberg to be educated. Upon his arrival, he was taken into the Duke's choir because of his "pure voice" and also received instruction from the choirmaster Johannes Eccardus. After his voice matured at the age of 17, he studied full-time in Königsberg.[7] When he was

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Calvinism came when Bürgermeister Adrian III. took away the Trinity Church from the Calvinists for good in 1650.

[6] Frederic Berndt served as city surveyor from 1594 until his death on June 3, 1607, when Crüger succeeded him. Of Berndt's detailed maps 20 have survived, of which 7 specifically depict Danzig and its environs. See Maria Pelczar, "Frederic Berndt – A Surveyor of Gdańsk, 16th-17th Century" *Liber Gedanenses* 4/5 (1970-1971): 93-118.

[7] For biographical specifics on Crüger see the sermon given at his funeral by Daniel Dilger, preacher and pastor of St. Mary's in Danzig. Daniel Dilger, *Christliche*

twenty, he made a pilgrimage to Prague where Tycho Brahe and Johannes Kepler had made residence in the same year. By 1603, he became the private tutor for two unnamed young noblemen in Prague. Together, Crüger and his pupils made the journey to Danzig where they studied under Bartholomew Keckermann of the Danzig Gymnasium.[8] Before leaving in 1605 to study at Wittenberg, Crüger engaged in a disputation with Keckermann presiding on the subject of comets and new stars that appeared in 1572, 1577 and 1604.[9]

At Wittenberg, the professor of higher mathematics during the first decade of the seventeenth century was Melchior Jöstel (b. 1559), who did work on trigonometry and on calculating the motion of the moon based on the observations of Tycho Brahe and his assistants.[10] Crüger would likewise later write a treatise on trigonometry, do work on the

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Leich-Predigt: Bey dem Begräbnüß des Ehrenvesten, Achtbaren und hochgelahrten Herrn M. Petri Crügeri, Der Stadt Dantzigk wolbestalten Mathematici. Welcher den 6. Junii dieses 1639. Jahres Gottselig von dieser Welt abgeschieden und den 8. Junij darauff in der Kirchen der H. Dreyfaltigkeit daselbst Christlich und Ehrlich zur Erden bestattet, 19+. See also, Januszajtis, "Peter Krüger," 127-130.

[8] In the matriculation lists for the Danzig Gymnasium, Peter Crüger does not show up nor do his pupils, suggesting that if they did study under Keckermann, they did so privately and not as enrolled students of the Gymnasium. The only students who matriculated in the Gymnasium that came from Prague in the span 1580-1814, were Ernestus à Schliefen in 1647 and Johannes Friedericus Schollyn in 1773. See *Catalogus Discipulorum Gymnasii Gedanensis, 1580-1814*, eds. Zbigniew Nowak and Przemysław Szafran (Warsaw, 1974).

[9] See Bartholomew Keckermann (presiding) and Peter Crüger (responding) *Theoremata exegetica: De Cometis, tam in genere. Quam in specie de tribus* (Danzig: Guilhelm Guilmothan, 1605). Also in Keckermann, *Disputationes philosophiae, praesertim quae in Gymnasio Dantiscano* (Hanau: Apud Guilelmum Antonium, 1606 and 1611).

[10] Walter Friedensburg, *Geschichte der Universität Wittenberg* (Halle: Max Niemeyer, 1917), 513.

motion of the moon and be involved in his own astronomical observations.[11] The similarities in interests between Jöstel and Crüger may indicate that Crüger studied under Jöstel. However, when it came to Crüger's disputation in 1606 on controversial problems in philosophy (*Problemata Philosophica Controversa*), it was the master of logic and disputation Jakob Martini who presided.[12]

After graduation from Wittenberg, Crüger returned to Danzig, where, during his first decade publishing prognostications for the city, he met opposition. In 1610, for example, he published an "Apology or defense of his [Crüger's] Calendar published in 1609, against the impolite Michael Radtzki von Radtkowitz."[13] He was most hurt, however, by David Herlitz (1557-1636), prognosticator and medical practitioner in Stargard, near Stettin in Pomerania. In several books written during the first two decades of the seventeenth century, Herlitz called for a "*Reformation* of *judicial Astrology,* …

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[11] For Crüger's written work on trigonometry and the motion of the moon, see Peter Crüger, *Synopsis trigonometriae* s. *doctrinae triangulorum* (Danzig:Hünefeld, 1612); idem., *Doctrina astronomiae sphaerica* (Danzig: Hünefeld, 1635).

[12] Martini was the professor of logic at Wittenberg starting in 1601 and was a master of the art of disputation. In order to make his method readily accessible in a text to be used in other university classrooms, he wrote his *Institutiones logicae* in 1610. Martini also later criticized Bartholomew Keckermann's *Systema logicae* or *System of Logic* (1606) in two works that were published after Keckermann's death in 1609, his *De communicatione proprii contra Barth. Keckermannum*. (1609) and *Themata decem contra systema logicum Keckermannianum*. (1610).

[13] Peter Crüger, *Apologeticum oder verthedigung Seines auffs 1609 Jahr publicirten Calenders Wieder den unhöfflichen M. Michaelem Hermetem Ratzkt von Radtkowitz* (Dantzig: Andreas Hünefeldt, 1610). Radtkowitz was a churchman in Cracow who published prognostications regularly in Danzig. On prognostications and other astronomical as well as astrological literature printed in Danzig, see Ernst Zinner, *Geschichte und Bibliographie der astronomischen Literatur in Deutschland zur Zeit der Renaissance* (Stuttgart: A. Hiersemann, 1964).

which deals with the weather and the happenings of the year."[14] Crüger attempted to answer Herlitz's call and join him in formulating ways in which astrologers could reform their art. But Crüger's ideas and methods, which closely followed those of Johannes Kepler, who emphasized the powers and effects of the aspects of the planets, were not what Herlitz was seeking. Crüger reported in his *Recompense for the breakfast that David Herlitz prepared for Peter Crüger* that Herlitz (in his prognostication for 1617) offended Crüger "with unfriendly words and horrible names."[15] Above all, Herlitz was not interested in Crüger's aspectual astrology that concentrated on the angular positions of the planets in the zodiacal plane. Instead, Herlitz wanted to develop an astrology that would take into account the possible powers of the stars that stood outside the zodiacal circle.[16] Herlitz and Crüger practiced different forms of astrology.

There was not much to object to when Crüger wrote on the significance of a comet that appeared in the sky at the end of 1618. By this time, despite the opposition he had earlier, Crüger's voice was well established in Danzig and his initial report on the comet titled *Kurtzer Bericht* as well as a later treatise titled *Uranodromus Cometicus* reveal much about his basis for prognosticating. In the *Kurtzer Bericht*, Crüger laid down

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[14] David Herlitz, *Groß Prognosticon vnd Practica des 1610. Jahrs/ nach Christi vnsers Herrn vnd Heylandes Geburt/ auff den Lübischen Meridianum gerichtet* (Stettin: Rhete, 1609), Aiv^{r}. See also Herlitz, *Epistola, oder Sendebrieff, Doctoris Davidis Herlicij* (Alten Stettin: Jochim Rhete, 1608), Biv^{r} – Biv^{v}. The *Epistola, oder Sendebrieff* was a short introduction and summary of a larger book Herlitz intended to publish on the practices of prognostication that he titled *Calendariographiam*, which was to contain a "Reformation of Astrology."

[15] Peter Crüger, *Recompenss Des Frühstücks so D. David Herlicius M. Petro Krügern angefertiget* (Dantzigk: Andreas Hünefeldt, 1617), Aii^{r}.

[16] According to Crüger, Ibid., Bi^{r}.

rules for prognosticating future events based on the appearance of a comet. The rules related the speed of the comet and its position in the heavens to earthly happenings such as the overturning of governments and introduction of disease. If a comet was in Aquarius, for example, then it portended the plague.[17] Incidentally, Crüger's rule spoke to the history of what would happen in Danzig. Crüger observed that the comet of 1618 stayed in Aquarius for fourteen days and Reinhold Curicke later reported that the plague struck Danzig in 1620 killing 11,847 of her inhabitants.[18]

Crüger's rules reflected the rules that others followed. Sara Schechner has summarized the key factors that prognosticators used when discussing the significance of a comet.[19] The motion, speed and position of a comet in the heavens were standard factors to consider when making prognostications based upon the appearance of a comet. Other things one might want to consider would be the color of a comet, its position relative to other planets, the direction of its tail and its shape.

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[17] Peter Crüger, *Kurtzer Bericht Von dem grossen noch zur zeit scheinenden Cometen* (Danzig, 1618), Av^{r}. Written on the 18 of December and published by Hünefeld. Tycho Brahe employed similar rules in his treatise on the comet of 1577 in which he wrote that its initial appearance in Sagittarius would "incite great warfare and bloodshed upon" "the Muscovites and Tartars." See J.R. Christianson, "Tycho Brahe's German Treatise on the Comet of 1577: A Study in Science and Politics" *Isis* 70 (1979): 110-140, *139*.

[18] Curicke, *Beschreibung*, 271. Another rule stated that the potentate will die who governs the land that is governed by the constellation where the comet is seen its first morning. Crüger, *Kurtzer Bericht*, Av^{v}. This rule also shows up in Sara J. Schechner, *Comets, Popular Culture, and the Birth of Modern Cosmology* (Princeton, N.J.: Princeton University Press, 1997), 53.

[19] For her survey of rules regulating cometary divination, see Schechner, *Comets, Popular Culture*, ch. 3.

Crüger reported that in addition to the comet of 1618 seen in December, God sent other signs such as mock suns ("three suns" to be exact) and a halo. He noted that people speculated whether mock suns really meant anything and if so what. That they meant something Crüger wrote "no doubt something great stands at the threshold, God knows what it is." Then he recounted that David Herlitz issued a tract 8 years earlier on parhelia with 46 examples. In short, they signified "in worldly dealings, conspiracies and alliances against high-ranking heads."[20]

Over 120 tracts appeared dealing with the comets of 1618. Crüger read several of these tracts and then wrote a lengthier commentary titled *Uranodromus Cometicus* that dealt with both the physics of the cometary appearances of 1618 and what those appearances portended.[21] Crüger agreed with the weight of contemporary opinions about

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[20] Peter Crüger, *Kurtzer Bericht*, Aiv^{r}.

[21] On the count of tracts produced and the German debates that sprung up as a result of the comets of 1618, see Christian v. Zimmerman, "'Wie man den Cometen [...] soll betrachten': Zwei Predigten des Jahres 1618 aus Riga und Magdeburg im Kontext der Frühneuzeitlichen Kometenliteratur" in *Iliaster: Literatur und Naturkunde in der Frühen Neuzeit. Festgabe für Joachim Telle zum 60. Geburtstag*. Wilhelm Kühlmann and Wolf-Dieter Müller-Jahncke, eds. (Heidelberg: Manutius Verlag, 1999): 321-344, *323*. The tracts on the comets of 1618 that Crüger owned, read and annotated were bound together and the volume now resides at Brigham Young University in the L. Tom Perry Special Collections of the Harold B. Lee Library in Provo, Utah. The bound volume consists of the following: Ambrosius Rhodius, *Cometa Per Bootem* (Apud Paulum Helvvigium Bibliopolam, 1619); Johannes Döling, *Eignedliche,* [sic] *Gründliche, und Volkommene Beschreibung deß Newen selzamen und wunderbarlichen Sterns oder Cometen*. (Greiffswaldt: Hans Witten, 1618); Isaac Habrecht, *Kurze und Gründliche Beschreibung/ Eines Newen ungewohnlichen Sterns/ oder Cometen*. (Straßburg: bey Johann Carolo, 1618); David Herlitz, *Prodromus Und Erster Vortrab/ Oder Kurtze und einfeltige Erklerung/ Des Cometen/ oder Beschwänzten Sterns/ so sich im November des 1618. Jahres hat sehen lassen*. (Danzig: Andreas Hünefeldt, on New Year's Day 1619); David Herlitz, *Kuetzer DISCVRS Vom Cometen/ unnd dreyen Sonnen/ so am ende des 1618. Jahrs erschienen sind* (Alten Stettin: In der Rhetischen Druckerey durch Johan

the position of the comet of 1618 that it was a super-lunar body. His "fundamental proof that the comet soared far above the moon in the heavens above"[22] used one of Aristotle's axioms to make the claim that comets were celestial in nature. In *De Caelo*, Aristotle argued that the further something is away from the earth the longer it will take for its path to pass through the backdrop of the fixed stars. "In one whole month" Crüger observed, "this comet barely passed through a quarter of an entire circle and its daily progress never reached 4 degrees. Whereas the moon ran through 13 degrees every day *motu proprio*. Then it must follow from Aristotle's philosophy that this comet soared much higher than the moon."[23] He even posited that the comet was "twice as high as the moon" and conjectured it "may have its shelter housed between Venus and Mercury."[24]

Crüger also dwelt on the possible astrological meanings of comets, this time juxtaposing his analysis with Aristotelian explanations for the cause of earthly events resulting from the appearance of a comet. For Aristotle, a comet was a burning exhalation in the earth's atmosphere. Accordingly it affected the material balance of the

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Christoff Landtriachtingern, 1619); David Origanus, *Kurtze Beschreibung dess Cometen, so anno Christi vulgaris numerationis 1618, vom 21 Novemb. an biss auff den 15 Decembris ist gesehen worden* (Frankfurt an der Oder?: Nickel Voltz, 1619); Benjamin Ursinus, *Aussführlicher Bericht: Von den Cometen, welcher im Jahr 1618. im Novembr. erscheinen vnd fast biss zu ende dess Decembris is gesehen worden* (Berlin: Martin Guthen, 1619); Johannes Baptist Cysat, *Mathemata astronomica, de loco, motv, magnitvdine, et cavsis cometæ qvi svb finem anni 1618 et initivm anni 1619. in coelo fvlsit* (Ingolstadt: Ex typographeo Ederiano, apud Elisabetham, Angermariam, viduam, 1619).

[22] Peter Crüger, *Uranodromus Cometicus* (Danzig: Andreas Hünefeldt, 1619), 53. Among others who agreed that comets were super-lunar included Döling, *Gründliche, und Volkommene Beschreibung*, chap. 4.

[23] Crüger, *Uranodromus Cometicus*, 53-54.

[24] Ibid., 56, 57.

earth's air, causing storms at one extreme and drought at the other.[25] For Crüger, comets were above the moon and since the atmosphere of air only extends 20 German miles above the earth, well below the orbital distance of the moon, it was not possible for comets to interact in let alone upset the elementary balance of the earth's atmosphere.[26] In addition, according to Crüger comets were made of "celestial matter" not of earthly elements.[27] Cometary matter, which was celestial in nature, did not have any material effect on sublunar matter. Hence, for Crüger the primary purpose of comets was to act as signs and as warnings, not as material or efficient causes. "Because they are heavenly stars of wonder, as sufficient proofs show, and because they do not have adequate natural *efficient cause*, they must mean something else. And the Lord our God would not have exhibited them by chance and without use. For God speaks with man not only through his word, but also often through signs."[28]

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[25] For a summary of Aristotelian cometary theory see Schechner, *Comets, Popular Culture*, 20, 92-93; and Zimmermann, "Zwei Predigten des Jahres 1618," 324.

[26] Crüger, *Uranodromus Cometicus*, 54-55.

[27] See Zimmerman, "Zwei Predigten des Jahres 1618," 324-327, concerning the differing theories about the material substance of comets and where Crüger's analysis fits in the range of opinions. Crüger agreed with others that comets were not earthly elements. In his *Gründliche, und Volkommene Beschreibung*, Johannes Döling opined that the material or substance of comets "was not of elementary but rather heavenly material, out of which other stars and heaven itself in part is made" (Diii^{r}). Döling then went on to cite Tycho's opinion that new stars and comets are generated from the stuff of the Via Lactea or Milky Way. Döling simply referred to the source for Tycho's opinion as Tycho's introduction to the new star of 1572.

[28] Crüger, *Uranodromus Cometicus*, 116. See this same sentiment in Döling, *Gründliche, und Volkommene Beschreibung*, Bi^{r}.

In more ways than one, Crüger followed Girolamo Cardano (1501-1576) in his thinking about comets. Cardano had earlier made the case for the superlunary position of comets due to their slower motions compared to that of the moon and maintained that because of their position, comets could not consist of terrestrial matter.[29] A well-worn controversy by the sixteenth century centered on the question whether comets and planets in certain positions were causes of earthly happenings or whether they were signs of things to come. Although Cardano did allow that there might be some causal influence from comets, he took the stance that comets were signs because of their superlunary positions and their material natures.[30] More than this, Cardano had argued for empirical astrological practices that involved making predictions based on the weight of historical precedent.[31] Rule 133 in book II of his *Astronomical Aphorisms*, for example, states that "For general constitutions one must also observe comets and other things that accompany them."[32] Empirical or inductive practices, then, would involve the recording of past

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[29] Schechner, *Comets, Popular Culture*, 98-99. For the sixteenth-century context on the positioning of comets and the nature of comets, see Peter Barker and Bernard R. Goldstein, "The Role of Comets in the Copernican Revolution" *Studies in History and Philosophy of Science* 19 (1988): 299-319.

[30] Schechner insists that Cardano held comets to be causes of earthly happenings at least to a small degree and Zimmermann characterizes Cardano's theory of cometary influence on earthly events as a theory of indirect causation. This being the case, if Crüger took anything from Cardano concerning the connection between cometary appearances and terrestrial events, then it would have been the idea that comets serve as signs. On Cardano and Crüger, see Zimmermann, "Zwei Predigten des Jahres 1618," 329-331.

[31] On this point, see Anthony Grafton, "The Astrologer as Empiricist" Chapter 11 in *Cardano's Cosmos: The Worlds and Works of a Renaissance Astrologer* (London and Cambridge, Mass.: Harvard University Press, 1999).

appearances of comets and the listing of earthly events that occurred possibly due to the appearance of comets. One could then make predictions about possible earthly happenings that will take place when a new comet appears based upon what has happened in the past. There were a host of astrological practitioners during the seventeenth century who followed Cardano's lead in establishing inductive practices when attempting to find astrological meaning for heavenly events. Like his list of 46 historical examples for what parhelia portended, David Herlitz remarked that in 1604 and 1607 he had accounted for "innumerable many examples found in the histories, all of which testify that no comet appears after which not all kinds of distress, misfortune and misery follow."[33] Similarly, although he thought comets could not act as natural or efficient causes for political or religious events on earth, Kepler was still convinced by the historical record that human misery followed comets.[34] Anthony Grafton argues that Cardano's "remained the model for an empirical, critical astrology until deep in the century after his death."[35]

In the tradition of Cardano, Herlitz and Kepler, Crüger gleaned from historical sources possible events that past comets could have signified in order to make predictions

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[32] Grafton, *Cardano's Cosmos*, 93. For Cardano's opinion on the causes of comets see Grafton, *Cardano's Cosmos*, 115.

[33] Herlitz, *Prodromus Und Erster Vortrab*, Aii^{r}.

[34] Schechner, *Comets, Popular Culture*, 101; Kepler, *Ausführlicher Bericht*, Bi^{r}, in *GW*, 4:62.

[35] Grafton, *Cardano's Cosmos*, 200. Sara Schechner Genuth has shown from the works of the late-seventeenth century prognosticators John Edwards and Increase Mather that "historical induction was a common tool of the prognosticator." See, Schechner, *Comets, Popular Culture*, 65.

upon the appearance of the comet of 1618. Among others, he combed through Herodotus, Plutarch, Thucydides, Aristotle, Pliny, Seneca, Lucan, Virgil and Josephus. According to Pliny, for example, a comet appeared in the year of Alexander the Great's birth and several centuries later, comets were seen in the same year Octavian overtook the reign of Egypt from Anthony and Cleopatra. Comets not only portended the birth of great leaders or change in earthly governments, but also wars, plagues and the deaths of many. The most harmful comet must have been the comet of 1347, which preceded the black plague that raged through Europe. Nevertheless good things as well could come from the appearance of comets such as "great upheavals in spiritual matters."[36] To Crüger, it was fortunate that Luther's reforms came after the advent of the comet of 1516. Somehow comets heralded many of the major events from world history and Crüger stood as a witness to the signal role that historical comets played in those events.[37]

Finally, after discussing cometary theory in general and listing his research of what events comets preceded, Crüger talked of the significance of the comet of 1618 and what it meant for his readers. Like pastor Hermann Samson of Riga, Crüger used the occasion to give a sermon of repentance.[38] "God gives us such warning signs out of

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[36] Crüger, *Uranodromus Cometicus*, 117.

[37] Of the nine ancient comets that Crüger listed in Chapter 18 of *Uranodromus Cometicus*, Alexander the Great's is number iv and Octavian's is number ix. Crüger remarked that there were plenty of modern comets to discuss but that he would only give a sampling. Of his list of eighteen modern comets, the black plague comet is number vi and Luther's is number xiii.

[38] Riga is now the capital of the Baltic state Latvia. On Samson, see Zimmermann, "Zwei Predigten des Jahres 1618," 341. According to Zimmermann,

fatherly love. If we were to ask of him through our prayers that he change his will and if God then changes his intention because of several pious prayers, should we then live a secure life until the same sign [appears] another time?"[39] Instead of living complacently, Crüger admonished his readers to take the sign of a comet as a warning to repent and change:

> When a comet appears, everyone runs to the astrologer with questions about what he thinks about comets and what they may mean. But no one has yet to ask if and how one can escape the meaning or how one should understand such counsel from God. For when a comet disappears from eyesight, or disappears from any of the senses, they believe that it does not entail any more danger...
>
> The rainbow appears also because of natural causes and God uses it still as a sign of grace. And at all times Christian philosophers therefore hold that as the rainbow is a sign of grace so also is the comet a sign of anger.[40]

According to Luther's invitation, they would also need to watch and pray continually, for "When a comet appears and there is fire in the air, how it happens is not necessary and urgent for you to know. It is enough that you recognize God's wrath and better yourself."[41]

Crüger ended his *Uranodromus Cometicus* with advice on how to escape the wrath of God that accompanies sin through repentance.

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calling people to repentance upon the appearance of a comet was a tradition hearkening back to the writings of Paracelsus.

[39] Crüger, *Uranodromus Cometicus*, 116.

[40] Ibid., 137.

[41] Ibid., 138. Luther considered comets as signs and furthered the tradition of using the appearance of a comet as an impetus to preach repentance. See Schechner, *Comets, Popular Culture*, 46-48. This tradition was strong in the seventeenth century as well. See Döling, *Gründliche, und Volkommene Beschreibung*, Aiv^{r}.

> How should one escape the just mentioned rightful wrath of God? Answer: With true repentance, as we have heard, and with the bettering of our lives. For this is why God has given us such an example and beyond that he has set visible comets in heaven not that we look at them only as signs of wrath, but also as a signs of grace and fatherly warning. … In the same way a father shows compassion to his children, the Lord also shows compassion to those who fear him (Psalms 103).[42] He is not guilty however by warning us with such signs (as I have said on page 124)[43] rather he has given us, His children, an early warning as a cause to know that his wrath will soon come.[44]

Crüger based his astrology on rules and historical precedent. Through his prognostications and his tracts on the comet of 1618, he engaged in conversation with other practicing prognosticators who sought to reform astrology, as David Herlitz put it. Starting with the ground work of Aristotelian philosophy, Ptolemaic astronomy and

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[42] "Like as a father pitieth his children, so the Lord pitieth them that fear him…. But the mercy of the Lord is from everlasting to everlasting upon them that fear him, and his righteousness unto children's children." (Psalm 103:13, 17).

[43] On page 124, Crüger addresses the question of whether or not comets are necessarily evil. He says that for most people earthquakes, pestilence, flood, etc. are unlucky "but for others, such examples serve as a warning" and as an impetus to better their lives.

[44] Ibid., 139. It is clear that Crüger was well-versed in scripture. Directly after this passage, Crüger paraphrased Hosea 11:8-9 and in the margins of his text around page 140, Crüger cited several scriptures, which for him proved the mercy of God and His willingness to give His children a chance. Among these passages were several Psalms (7, 86, 103, 145), Ezekiel 33 ("As I live, saith the Lord God, I have no pleasure in the death of the wicked; but that the wicked turn from his way and live: turn ye, turn ye from your evil ways; for why will ye die, O house of Israel?" Ezekiel 33:11) and Jeremiah 31 ("….for they shall all know me, from the least of them unto the greatest of them, saith the Lord: for I will forgive their iniquity, and I will remember their sin no more." Jeremiah 31:34). Crüger also summarized the stories of Nineva (Jonas 3) and Sodom and Gomorra (Genesis 18) as evidence of the Lord's willingness to be merciful. The Lord's compassion and mercy was sufficient for the penitent to acknowledge through song. Crüger admonished the repentant to "sing and say: It is the goodness of the Lord that we are not completely abandoned- his mercy still has no end."

astrology, Crüger sifted out what he figured were the kernels of sound principles while adding the rules and theories of Cardano, Tycho, Kepler and others. And although he was not afraid to import religious significance to the appearance of the comet of 1618, he kept it to the earthly realm of human betterment and repentance.

The Challenge of Paul Nagel's Prophecy

Paul Nagel based his astrology on principles that differed greatly from Crüger's. In one of his first writings, Nagel showed himself to be more interested in the signs of the heavens as fulfillment of biblical prophecies rather than as symbols of temporal events like war, plague, famine and the need for individual repentance. In Nagel's estimation, the new star of 1604 for example "was a sign of great punishment, of the Last Judgment, and of deliverance."[45] When Rosicrucian tracts began appearing in manuscript form during the 1610s, Nagel embraced their mystical teachings.[46] The comet of 1618 spurred Nagel to prepare a prognostication for publication in Danzig that would outline events to take place in the next five years and that would contain his bold prediction that the

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[45] Barnes, *Prophecy and Gnosis*, 178.

[46] He knew of Adam Haslmayr's "astronomical Alphabet" through which one could relay secret messages; he owned an early manuscript copy of the Fama Fraternitas (ca. 1613) which furthered the claim that the cycles of conjunctions of Jupiter and Saturn recently signified the end of the world. See Susanna Åkerman, "The Rosicrucians and Great Conjunctions" in *Continental Millenarians: Protestants, Catholics, Heretics*, John Christian Laursen and Richard H. Popkin, eds. (Dordrecht, Boston, London: Kluwer Academic Publishers, 2001), 1-8, *3*. He had also read and appreciated a Rosicrucian manuscript of Aegidius Gutman's *Offenbarung Göttlicher Majestät* at the house of the Prince of Anhalt, three years before its publication in 1619. See Carlos Gilly, *Adam Haslmayr: Der erste Verkünder der Manifeste der Rosenkreuzer* (Amsterdam: In de Pelikaan, 1994), 96, 101, 132.

Second Coming of Christ and final age of the world would commence in 1624. Crüger summarized Nagel's prediction in his own prognostication for the year 1620. According to Crüger's summary, Nagel wrote that an eclipse would take place in 1619 that would be much like the eclipse at the time of Christ's death, which lasted three hours. Crüger further summarized Nagel. "In 1619 and 1620, there will be a spiritual eclipse and dreadful persecution of the Church of Christ for three years into the year 1624."[47] Then Christ will reign 1000 years before Satan is unleashed, after which the Last Judgment will come. Nagel's looking forward to Christ's Second Coming and Last Judgment was not what bothered Crüger. It was the method by which he made his prediction.

Nagel opted for the year 1624 using methods involving cabalastic reckonings, scriptural interpretation and astrological calculations of the major conjunctions of Jupiter and Saturn. Nagel used one method to come to the approximate date of 1620 by reasoning that "in Solomon's temple stood two pillars, each 18 elen high and 12 elen in circumference." The number 18 (from the height of the pillars) splits into 6.6.6., which is the number of the beast in Revelation 13:18. The number 12 (from the circumference of the pillars) squared equals 144. 666 + 144 = 810, and 810 doubled equals 1620. When Nagel used conjunctions of Jupiter and Saturn as a method of calculation, he was drawing upon a long tradition of using these conjunctions in astrological predictions. According to Nagel, 1617 happened to be the year of a major conjunction, namely the seventh and final conjunction to take place since the beginning of the world. This conjunction preceded the number eight, which according to Nagel was the number of Christ. Through

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[47] Peter Crüger, *Cupediae Astrosophicae Crügerianae* (Breslaw: Georg Baumann, 1631), 1620: IX, Miv^{v}.

these and similar calculations, Nagel ascertained the year 1624, to be the year of the beginning of Christ's reign on earth.

Crüger's initial criticism of Nagel's prognostication was brief. He criticized Nagel for not talking more specifically about the year's eclipses. Concerning Nagel's cabalistic reckonings, Crüger would argue that although the art of Cabala did not necessarily fall within the discipline of philosophy that did not preclude a practitioner of Cabala to be both a Cabalist and a competent astrologer.[48] However, Nagel was no good Cabalist according to Crüger. He called Nagel's method of numerology "Abracadabra of three kinds: the first [kind] being Pseudocabala of numbers and figures."[49] Nagel's fishing for numbers and twisting them into the desired result of the approximate year 1620 for the Second Coming of Christ was for Crüger simply laughable. Finally, Crüger contended that Nagel seemed to be more concerned with establishing "his new religion in these lands" than making any valuable prognostications for the coming year. Nagel's religious mission was obvious to Crüger and could "be seen throughout his entire prognostication [for 1619]."[50]

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[48] Ibid., 1622: III. "While it [Cabala] does have its own foundations, namely the Hebrew letter, it is still not a philosophical art but rather a theological art: and it therefore has nothing to do with the art of the stars. Apart from this, a good Cabalist could well be at the same time a good astronomer and astrologer, just as a good theologian can also be at the same time a good philosopher."

[49] Ibid., 1620: IX, Miv^{v}.

[50] Ibid., 1620: IX, Miv^{r}.

By 1620, Nagel, the rector of a school in Torgau, was on the defensive.[51] Among his several tracts reaffirming his radical prognostication, Nagel offered a full defense in his *Complement to astronomy*.[52] To justify his silence about conjunctions and eclipses, for example, Nagel claimed that for this tract he had researched what astrologers had said of conjunctions and aspects in the previous 20-50 years and did not find them to say anything of worth. He specifically looked at Cyprian Leovitz and found that usually the contrary or opposite of what Leovitz predicted to have happened.[53] Nevertheless, in his *Complement*, he listed the solar eclipse that would take place in 1621, the eclipses in 1622 which would "be much greater" and 21 conjunctions in the year 1624, all of which allegedly heralded the end of time.[54]

In further defense of the irregular nature of his prognostications, Nagel emphasized that his interests were not those of "gentile astrologers." Above all, he studied the "greatest and most important" changes in the world from its beginning to its end, changes that would need to take place in fulfillment of biblical prophecies concerning the end of the world.[55] His was an "astronomy of grace" that relied more on

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[51] In his *Prodromus Astronomiae Apocalypticae* (Danzig: Martin Rhode, 1620), for example, Nagel claimed that in his day, the day of Tycho and Kepler, the heavens were known as they had never been known before. Accordingly he, Nagel, could legitimately assert the third age would begin in 1624 and would end 42 years later in 1666. See a summary of *Prodromus* in Leppin, *Antichrist und Jüngster Tag*, 75.

[52] Paul Nagel, *Complementum Astronomiae und Aussführliche Erklerung des fünfjährigen Prognostici 1619. zu Hall gedruckt* (Halle: Christoph Bizmarcks?, 1620).

[53] Ibid., Aiv^{v}.

[54] Ibid., Civ^{v}, Fi^{r}.

revelation than on reckoning. Taking the book of nature metaphor to the extreme, Nagel read it in the way he read the Bible, for "the starry heaven is nothing other than a book in which the stars are letters."[56] He claimed that through his astronomy of grace one could measure the true size and distances of the ten heavenly spheres and have a perfect knowledge of the nature and significance of stars and comets, not just the superficial knowledge that one was left with from the astrology of the gentiles.[57]

Before Crüger engaged with Nagel in a more extended criticism, others weighed in on Nagel's prediction. Among those who attacked Nagel's prediction was Philipp Arnoldi, a theologian of Tilsit (today Sovetsk, Russia) in east Prussia near Königsberg.[58] Arnoldi was a defender of strict Lutheran doctrine against all other systems of doctrine including Calvinism and was the author of *Antinagelius: Namely, foundational proof that there should not be hope for a tertium Seculum or an earthly third age after this condition of the world*.[59] In *Antinagelius*, Arnoldi maintained that Nagel's prediction could not be considered religious prophecy by orthodox Lutherans.

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[55] Ibid., Aiv^{v}-Bi^{r}.

[56] Ibid., Fiii^{r}.

[57] Ibid., Bi^{r}, Biii^{r}.

[58] German Lutherans Johann Wolther and Georg Rost also wrote against Nagel. In addition to the Lutheran affronts on Nagel, a Jesuit author attacked him arguing his condensed timeline for the end of the world was a fantasy incompatible with lived experience. See Åkerman, "The Rosicrucians and Great Conjunctions" 4. Nagel upheld his claims in his *Cursus Quinquenali Mundi oder Wundergeheime Offenbarung* (Halle, 1620).

[59] The original full title of Arnoldi's book is: *Antinagelius: Das ist, Gründlicher Beweiß, daß nach dieser Welt Zustandt nicht ein tertium Seculum oder dritte jrrdische Zeit, in welcher die Heiligen allein mit Christo dem Herrn nach allhie gantzer tausendt*

Arnoldi was aware that by writing against Nagel, he would also play a part in the further propagation of Nagel's ideas, but he wanted to make it clear that Nagel's version of prophecy crossed the boundary of acceptable methods for revelation. Arnoldi listed seven ways in which legitimate revelation came through man as outlined in the holy scriptures. "The first revelation was written in the creation of the heavens and the earth and in that God wrote the law in the heart of man." Other revelations came through the mouth of God (as in the cases of Adam, Eve and Moses), angels as intermediaries, prophets and apostles as spokesmen for God and through the person of Jesus Christ.[60] Above all else, Arnoldi claimed that any new revelation or prophecy must be based on scripture.

As an example of how Nagel erred in his method of prophecy, Arnoldi quoted from Nagel's prognostication for the year 1620. According to Arnoldi, Nagel reported that "a heavenly messenger was sent to me in the form (gestalt) of *Mercury*, who gave me a mirror in my hand…a mirror that was not made by the hands of men. And behold, I saw in the mirror Adam and Eve naked and under the tree of life, many little naked beautiful children and snow white lion cubs."[61] Arnoldi countered, "My dear Christian, where is even the thought of such a messenger named *Mercury* in the Holy Scriptures?

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apocalyptischer Jahre, in gorssen Frewden herrschen solten, zu hoffensey zu behauptung seines Schwarnis, dass Anno 1624 noch ein guldenes Seculum auff Erden solte angeben. Aus dem propheten Daniel, der geheimen Offenbarung Johannis und des himmels Constellation irdichter, entgegengesezt und dem gemeinen Mann zur Nachricht Einfältig gestellen (Königsberg in Preussen: Segebade, 1621).

[60] Ibid., Aii^{r}.

[61] Ibid., Aiv^{v}. Arnoldi quotes this from Paul Nagel's *Calendar* for 1620, ch. 3, Ciii^{v}.

Nowhere."[62] He inquired further, "Where in the scriptures is such a mirror mentioned? It could not have been the Urim and Thummim for that came to an end a long time ago."[63] The conclusion was that Nagel's use of a physical object, namely a mirror, and the appearance of *Mercury* as means of revelation were not based in scriptural precedent.[64]

Although Arnoldi's *Antinagelius* was largely a theological critique, it also revealed his views on astrology and the possible effects of the stars on earthly affairs. Arnoldi repeated the passage at the beginning of Genesis arguing that the lights (the sun and the moon) spoken of were created as timekeeping devices. However, "what their effects may be in Nature can be seen through daily experience." Yet Arnoldi did not believe that the stars could tell us anything about the changes in regiments, the changes in the churches, persecution or war. In these affairs, the stars had "neither force nor

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[62] Ibid., Bi^{r}.

[63] Ibid., Bi^{v}. The Urim and Thummim were revelatory objects placed within the breastplate of a priest officiating in the ancient Israelite temple. For an overview of early modern interpretations of what the Urim and Thummim were, see Cornelius Van Dam, *The Urim and Thummim: A Means of Revelation in Ancient Israel* (Winona Lake, Indiana: Eisenbrauns, 1997), 9-38. According to Barnes, Johann Faulhaber in his *Himlische gehaime Magia Oder Newe Cabalistische Kunst, und Wunderrechnung, Vom Gog und Magog* (Nuremberg, 1613) also concentrated on the fact that the Urim and Thummim were lost as a means of revelation through objects. See Barnes, *Prophecy and Gnosis*, 199.

[64] The issue of basing prophecy on scriptural precedence was of prime importance to Arnoldi. According to Arnoldi, Nagel predicted in his *Prognosticon Astrologicon Harmonicum* (1620) that there would be a new star in either July or August of 1623. This new star would be a sign for the coming of the lion from the tribe of Judah. Arnoldi asked rhetorically "But my Nagel, where does it state something in the Apocalypse (Revelation) or somewhere else in the scriptures either explicitly or mystically (*Mystice*) that in the year 1623 in July or August a new star will appear?" See Arnoldi, *Antinagelius*, 6-7, quote from page 7.

power."[65] Arnoldi also complained (as did Peter Crüger) that Nagel did not concern himself with the typical topics of a prognosticator. He specifically protested that Nagel did not deal with the weather as was typical for a prognosticator.[66]

In sum, *Antinagelius* pointed out the theological shortcomings, according to Arnoldi, of Nagel's professed predictions. As with Crüger, Arnoldi did not object to Nagel's interest in Christ's Second Coming and the last judgment. Concerning the signs of the times as contained in Matthew 24, Arnoldi said that it "is known that the general time for Judgment is at hand, for all the signs that the Lord foretold have been fulfilled and if perhaps there are any still left over, they can be fulfilled in short time."[67] It was Nagel's method of prophecy that concerned Arnoldi. Nagel's claim of revelation from Mercury, his cabalistic reckonings and his dismissal of scriptural precedent for revelation left his predictions suspect.

Despite the heavy criticism Nagel drew from Arnoldi and Crüger, he still defended his predictions with increasing conviction in his *Prognostication for the year 1622*. However, Nagel showed he was not ignorant of the predicaments of prognosticators. Common astronomers he wrote, predict all sorts of terrible things according to the appearances of aspects and conjunctions. But he reasoned that if the simple appearance of an aspect or conjunction were the sole cause of wars and contentions "then in all years of the world the same things must have always come to

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[65] Arnoldi, *Antinagelius*, 5. For the earlier quote, the original German reads "…was aber ihre Wirckungen sein *in Naturalibus* giebet die tägliche erfahrung."

[66] Ibid., 8.

[67] Ibid., 19.

pass, because in every year the same aspects and conjunctions appear."[68] Since this was not the case, then astrologers should take into account other factors like the nativities of each soldier in a battle.[69]

Nagel continued to maintain that the knowledge gained in astronomical studies by the "light of nature" could never be as perfect as is the truth gained through the "light of grace." For although one could measure with some degree of accuracy the path of a comet or the position of a new star, Nagel cried that "it is not possible for an astronomer who reasons through the light of nature to interpret such wonders of heaven correctly and to understand them. That is why I can plead with Crüger and others of his kind that they interpret me correctly." Nagel could see that it was difficult for Crüger to interpret him correctly because knowledge gained through the "light of grace" was "truly buried" for Crüger.[70] Crüger's acceptance of traditional practices of astrological prediction based on calculations of aspects and conjunctions kept him from Nagel's knowledge by the "light of grace." When making his calculations and predictions, Nagel followed a standard reference from the Old Testament apocryphal book the *Wisdom of Solomon* that referred to God's ordering "all things in measure and number and weight" (*Wisdom* 11:20). Accordingly, Nagel did not rely on the observations of Tycho, but created a secret new

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[68] Paul Nagel, *M. Pauli Nagelii Deutzsche Astrologische Practica, oder Prognosticum Auff des Jahr 1622. Aus dem Liechte Göttlicher und Natürlicher Weißheit hergenommen, und Nicht weniger den Preußischen als anderen Landen zum Besten ... in offenen Druck gegeben* (Leipzig: durch Andream Oßwald, In verlegung Johann Krausen Buchhändlers in Danzig, 1621), Ci^{v}.

[69] Ibid., Cii^{r}.

[70] Ibid., Aiii^{v}.

method of calculation to which only Nagel and his kind were privy in order to determine the measure, number and weight of the stars.[71]

It did not matter how carefully Crüger prepared his instruments or that he was willing to pay more than 600 gulden to construct his instruments according to Nagel. What mattered was the ability to measure the size of the planetary spheres, which could only be done successfully through Nagel's new methods.[72] Even Tycho with his great instruments was as much in the dark as Crüger, because of his lack of knowledge through the "light of grace."[73]

According to Nagel, if one takes into account the correct distances of the heavenly spheres then one would be able to make predictions up to seven years in advance, and the predictions would include more than just common events like war and bloodshed. So although "Master Crüger" could do a fairly good job of saying something about aspects and conjunctions and their astrological effects, he could not know the distances of the heavenly spheres correctly and therefore could not predict greater events associated with the end of the world. "How can you measure what you cannot see? And what kind of instrument will you use?" Nagel asked Crüger. "My *Instrumenta* reach higher than any other up to the waters above, and beyond where we point out still greater *Conjunctions*, and *Aspects*."[74] Nagel claimed his "instruments" were the geometrical shapes of the

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[71] Ibid., Aiii^{v} – Aiv^{r}.

[72] Ibid., Aiv^{v}.

[73] Ibid., Div^{r}.

[74] Ibid., Cii^{v}.

circle, quadrangle and triangle.[75] How to utilize the shapes remained a secret, for Nagel's astronomy was an astronomy of grace- if you have it you will know it. It was not something to be publicized (that will happen at the Second Coming). "Our astronomy" Nagel pronounced "is nothing other than revelation."[76]

Common astronomers, according to Nagel, rather unknowingly used the signs and conventions of the heathens. To escape this trap, Nagel resorted to scriptural history. He noted that even Crüger must have been aware that "astronomy did not originate from the heathens but rather from the Patriarchs."[77] Thus, it was in the myth of biblical astronomers that the adept astronomer or initiate in the astronomy of grace would find his lineage and true inspiration. Nagel willed a return to the time of Solomon who came to know the whole of nature through the Spirit of God and His light.[78] His final plea in his *Prognostication for the year 1622*, was to the learned "that they not malign what they do not understand."[79]

It was then Crüger's turn to reply at length to Nagel's prognostications. With Philipp Arnoldi, he formed a united front against Nagel. Arnoldi acknowledged Crüger's

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[75] Ibid., Eiii^{r}.

[76] Ibid., Ei^{v}.

[77] Ibid., Diii^{r}. Crüger indeed would have agreed with Nagel on the point that the science of the stars originated with the patriarchs. In section one of his prognostication for 1623 (see *Cupediae Astrosophicae* for this section), Crüger asked whether the ancient patriarchs practiced astrology. His answer came from a summary of chapters 3 and 4 of Josephus's *Antiquities of the Jews* which relates the activities of Adam, Enoch and Abraham as concerns the science of the stars.

[78] Nagel, *Prognosticum Auff des Jahr 1622*, Eii^{v}.

[79] Ibid., Eiv^{r}.

initial criticisms of Nagel, claiming that at the time of his writing *Antinagelius*, he had only seen one other treatment of Nagel's prognostication, namely that of Crüger "who nevertheless leaves the examination and refutation of theology to the discretion of theologians."[80] Agreeing with Arnoldi to leave theological matters to him and concentrating instead on the problems of "Astronomy, Geometry and Arithmetic"[81] in Nagel's predictions, Crüger responded specifically to Nagel's prognostication for the year 1622 in an open letter *To the respectable and learned Herr Paul Nagel, well-known Cabalapocalyptic Theologastronomer in Meissen*.[82] And a year later he wrote another reply to Nagel.[83] In addition to his earlier criticism of Nagel's cabalistic reckonings, Crüger outlined four major criticisms of Nagel. First, Crüger censured Nagel's simplistic suggestion that the astronomer only use the shapes of the circle, square and triangle as geometrical "instruments" and stated that it was beneath even common "idiots, cabinet-

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[80] Ibid., Bi^{r}. There were at least two other works written against Nagel before Arnoldi's work was printed. They were Georg Rost, *Prognosticon Theologicon Oder Theologische Weissagung, Vom Jüngsten Tage…* (Rostock, 1620) and Justus Groscurdt, *Bacchationum Nagelianarum Prima: Das ist, Ein sonderlicher und zwar Erster FastnachtsAffzug des newen Schwermers, der sich nennet Paulum Nagelium…* (n.p., 1620).

[81] Peter Crüger, *Rescriptum Auff M. Pauli Nagelli Buch Dessen Titel Astronomiae Nagelianae Fundamentum verum &principia nova zu endlicher abfertigung dieses vermeinten Astronomi Cabalistici & Apocalyptici gestellet* (Dantzigk: Andreas Hünefeldt, 1622), 1. Hereafter cited as *Rescriptum*.

[82] Peter Crüger, *An den Achtbaren und wolgelahrten Herren M. Paulium Nagelium Weitberühmten Theologastronomum Cabalapocalypticum in Meissen/ Ein Sendbrieff M. Petri Crügeri, der Stadt Danzigk Mathematici*. (Danzig: Andreas Hünefeldt, 1621). Dated at the end as having been written on 20 December (new style), 1621. Hereafter cited as *Sendbrieff*.

[83] His *Rescriptum* cited above.

makers, coopers, carpenters, masons, and others like them" who know that there are more useful figures in the world than just the ones that Nagel mentioned.[84]

Second, Nagel fallaciously used the book of *Revelation* in the *New Testament* as an astronomical text. Nagel started off well by basing his calculations on the numbers of Tycho, and relying on the principles and instruments of Ptolemy, Copernicus and Tycho. "However" Crüger writes to Nagel "at the beginning of the hastiest chapter, you put in place explicitly for your new astronomy completely different principles and rudiments, namely, the Apocalypse or the Revelation of John and a correct understanding of it."[85] Whether or not *Revelation* could be used as a book of astronomy, Crüger acknowledged lack of judgment, but stated that Nagel had no grounds to make his claim that it was. It would be like saying with an Alchemist "that the entire art of Alchemy was hidden in the 37th chapter of the prophet Ezechiel."[86]

Third, Crüger criticized Nagel for his "phantasies" of perfect astronomy. Crüger used a scriptural passage from the apostle Paul in order to get his philosophical point across that human knowledge is imperfect. From chapter 13 of Paul's first epistle to the Corinthians, Crüger paraphrases "that in this life nothing is perfect, rather all our knowledge is only in parts, which will not end in this life, as you hope, but in the next."[87]

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[84] Crüger, *Sendbrieff*, Aii^{v}.

[85] Ibid., Ai^{v}-Aii^{r}.

[86] Crüger, *Rescriptum*, 5.

[87] Crüger, *Sendbrieff*, Aii^{r} - Aii^{v}. Crüger paraphrases the following verses: "...whether there be knowledge, it shall vanish way. For we know in part, and we

For Crüger, the imperfection of human knowledge meant that the sciences could never be perfect in this life. And although there was no guarantee that perfect knowledge existed in the afterlife, if the hope for perfect knowledge in the next life was not in vain, then, according to Crüger, "At the beginning of eternal life, we will have already attained the perfect state [*habitum*] of all the arts."[88]

Also of philosophical importance was Crüger's resorting to his senses when it came to the observations and measurement of heavenly bodies. At the end of his questioning Nagel's accuracy of predictions, Crüger asked rhetorically, "How should we believe your prophecies of great and immense wonders and believe something of the certainty of your Cabala, when we recognize that you would talk us into believing something other than what we see with our own eyes."[89] With bitter sarcasm, Crüger elicited "notice from Torgau, Leipzig and Halle whether something like another moon may shine there than [the one] here in Prussia. But even the same one shines in all those places."[90]

The most important issue for Crüger, however, was Nagel's dismissal of the astronomical practices advocated by Tycho Brahe. According to Crüger, Nagel had rightly made use of Tycho's numbers to make his prognostications, but had confusedly disregarded Tycho when it came to calculating the sizes of the planets. As his example

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prophesy in part. But when that which is perfect is come, then that which is in part shall be done away" (1 Corinthians 13:8-10).

[88] Crüger, *Rescriptum*, 3.

[89] Crüger, *Sendbrieff*, Aviii, r.

[90] Ibid., Avii^{v}.

of how Nagel erred, Crüger relayed the calculation of the earth's circumference by Johannes Kepler and Willebrord Snell based upon Tycho's observations and contrasted it with Nagel's calculation. According to Kepler and Snell, the earth's diameter was 5400 German miles, but according to Nagel the circumference was 5614 German miles. "He [Nagel] calculated the number of miles around the circumference of the earth according to the number of years he figured that the world should stand. It is a peculiar connection."[91] Crüger could not endure such a capricious mathematical practice of accepting Tycho in one instance and claiming superiority over him the next, especially since Nagel did not provide any new observations upon which he could base his own calculations of the sizes of the planets. Therefore, he had no right to dismiss Tycho's.[92]

In 1623, Crüger wrote Johannes Kepler asking him about his reactions to Nagel's treatment of Tycho. Kepler replied stating that he had read some of Nagel's works "but not the one he had written against Tycho."[93] A year earlier, Philipp Müller (1585-1659), the professor of mathematics in Leipzig during the time Nagel prognosticated there, earlier explained to Kepler the nature of Crüger and Nagel's contention. In a letter he wrote to Kepler on August 3, 1622, Müller related how Nagel came from being a medical

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[91] Crüger, *Rescriptum*, 23.

[92] Crüger, *Sendbrieff*, Aiv^{v}.

[93] Kepler to Crüger, 15 July 1623, in Johannes Kepler, *Johannes Kepler in seinen Briefen*, Max Caspar and Walther von Dyck, eds. and trans., 2 vols. (München and Berlin: R. Oldenbourg, 1930), II:198.

practitioner to his teaching position in mathematics, a subject about which he did not understand much according to Müller.[94]

Nevertheless, by February of the 1624, the year that Nagel's prophecy should have been fulfilled, Kepler took Crüger's reprimands of Nagel seriously and reported that he had studied Nagel carefully.[95] He castigated Crüger for his behavior in his engagements with Nagel's thesis and stated that Crüger had embroiled himself in a messy battle "where the innumerable sayings of your unworthy opponent fly everywhere in disjointed fashion like the atoms of Democritus."[96] In Kepler's opinion, the debate with Nagel was not worthy of someone of Crüger's stature and learning.

Conclusion

So why did Crüger spend so much energy engaging Nagel? He issued prognostications from the same place that Nagel published and therefore had a continued vested interest in Nagel's predictions. In his criticism of Nagel, Crüger fashioned an identity for Danzigers and Prussians which represented all of them, even the common "idiot," as being at least capable enough to understand that one could not practice astronomy in the way Nagel did. Crüger warned Nagel in his *Open Letter* that if he did

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[94] See Johannes Kepler, *Gesammelte Werke*, Max Caspar and Walther von Dyck, eds. (München: C.H. Beck, 1937-), xviii.96-100. Hereafter cited as *GW*.

[95] Crüger had written Kepler earlier on 15/25 September 1623 relating the publications that went back and forth between Nagel and himself. Ibid., xviii.497.

[96] "wo die Aussprüche Eures hohlen Gegners ebenso zahlreich und zusammenhangslos umherfliegen wie die Atome Demokrits," Kepler to Crüger, 28 February 1624, in Ibid., xviii.160-169; also in *Kepler in seinen Briefen*, II:204.

not reply with "mathematical demonstrations" then Nagel's already frail reputation among the Prussians would be lost,[97] as indeed it was, especially since his prophecy failed- there was no Second Coming in 1624.

Even if such an event had taken place in 1624, Nagel would not have been able to enjoy it, for he had died a heretic to Lutheran orthodoxy in 1621. At his death, it was forbidden to bury him in the churchyard and because no one else wanted to bury his body, a group of women decided to do so. However, the body was soon dug up again and the women who buried it were thrown into prison for four weeks.[98] Nagel nevertheless had his followers after his death. According to Crüger's prognostication for 1628, Nagel's followers still believed that the Swedish attack on Prussia near the beginning of the Thirty Years' War fulfilled Nagel's prediction that the midnight lion would appear to usher in the millennial reign of Christ. Crüger argued that not only was Nagel mistaken about his prediction, Nagel's followers were misinterpreting Nagel's words. For they believed that Nagel predicted that the lion would come from the north. According to Crüger, Nagel never predicted specifically whence the lion was to come. Nagel "should have said finally where his midnight lion, of which he preached so much, was located. He explained that he meant thereby not an earthly potentate but rather a lion

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[97] Crüger, *Sendbrieff*, Aiv^{r}.

[98] It was not unusual to treat the bodies of deceased heretics and labeled atheists in such fashion. In Danzig, for example, to be an atheist was forbidden. The city passed a law stating that if anyone died without belonging to a Church, then the burial would take place "without sermon and ceremony." See Maria Bogucka, "Mentalität der Bürger von Gdańsk im XVI.-XVII. Jh," 68, n.12. On Nagel's standing in the Lutheran Church, his death and burial, see the article by G. Frank in the *Allgemeine Deutsche Biographie*. Frank reports that Nagel was considered a threat to orthodox theology and that in 1619 he was invited to stand before the theological Faculty in Wittenberg.

from the tribe of Judah."[99] Crüger's message was that the "lion from the tribe of Judah" spoken of in Revelation 5:5 should not be confused with Gustavus Adolphus. Crüger quoted both from Nagel's *Astronomiæ Nagelianæ fundamentum* and from Nagel's prognostication for the year 1623, to prove that Nagel did not give any more specific details about the nature of the lion who was to come other than that the lion was the same individual as the first of the four horsemen of the apocalypse who would come riding a white horse (Revelation 6:2).

In the end, Nagel's predictions fell outside the bounds of Peter Crüger's astrology and ran against the Lutheran theology of Philipp Arnoldi that denied modern prophecy. A distinction and separation between the realm of astrology and the realms of prophecy and theology had existed in medieval theology long before the Lutheran Reformation.[100] Both Arnoldi and Crüger agreed that such a separation existed when they agreed to leave to each other the responsibility to critique Nagel from the standpoint of their own expertise. Crüger examined Nagel's claims to astrological prediction on the one hand and Arnoldi examined Nagel's claims to religious prophecy on the other. According to Crüger and Arnoldi, Nagel's prediction was neither religious prophecy nor astrological prognostication.

Crüger did not ignore Nagel, because Nagel represented the type of predicter who posed a threat to prognosticators like Crüger who wanted to defend their art through

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[99] Crüger, *Cupediae Astrosophicae*, 1628: IX, Ddiv^{r}.

[100] Laura Ackermann Smoller, *History, Prophecy and the Stars: The Christian Astrology of Pierre d'Ailly, 1350-1420* (Princeton, N.J.: Princeton University Press, 1994), 127-129.

reform and moderate claims. In other words, figures like Nagel, who made apocalyptic predictive claims based on heavenly happenings, gave a bad name to all astrologers, even those like Crüger, who practiced a temperate art. Nagel differed from Crüger in that he disregarded entirely previous systems of astrological calculation from Ptolemy to Kepler. He was completely skeptical of past precedent when it came to the combined knowledge gleaned from astrological speculations of past astrologers. He claimed to practice a privileged astrology that relied on spiritual "instruments" that could not be tested by earthly instruments. And he claimed to be able to reach a perfect knowledge of the heavens without any regard to the observations of Tycho. Crüger viewed him as a threat.

Referring to Nagel in the context of German practices of prophecy and prognostication, Robin Bruce Barnes writes that around 1620, the time for "the use of astrology for apocalyptic investigation had reached its peak, and the most eager proponents of astrological prediction were thrown on the defensive, as orthodox theologians set about to exclude them from the realm of legitimate prophecy. … In writers like Nagel, the combination of astrology and theology was accompanied by outright heresy."[101] The debate with Crüger adds to Barnes' analysis of German prophecy and prognostication.[102] Although Crüger still believed in some forms of astrological prediction, he joined with orthodox Lutherans to speak out against mixing astrology with unfounded apocalyptic investigation. In other words, the type of astrology

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[101] Barnes, *Prophecy and Gnosis*, 180.

[102] Barnes emphasizes the situation in Germany which could be contrasted to the state of prophecy and prognostication in England, where apocalyptic astrology continued especially during the Interregnum years (1640s-1660s).

Crüger practiced differed in kind from the type of astrology that Nagel advocated. Crüger's position in Lutheran-leaning Danzig shaped the stance he took against Nagel.

Chapter 3

The Vanity of Human Knowledge: Andreas Gryphius's Heavenly Writings

Chapters 1 and 2 touched on how the Danzig Gymnasium shaped and supported the work of Bartholomew Keckermann and Peter Crüger. To the credit of gymnasiums, such as Danzig, and in contrast to universities, Joseph Freedman has shown that since professors like Keckermann still had to meet the demands of teaching several disciplines, they wrote encyclopedic texts in the attempt to bring all knowledge under the roof of one method, system or order.[1] In Peter Crüger's case, chapter 2 displayed how the Gymnasium in its later Lutheran iteration fostered an atmosphere of religious orthodoxy and helped shaped some of Crüger's choices in his scholarship. This chapter will look at the experience of a student, Andreas Gryphius (1616-1664) in the Gymnasium. Specifically, the argument is that what Gryphius learned from Crüger between the years 1634 and 1636 shaped his later writings.

Underlying much of Gryphius's writing is a skeptical view towards human knowledge and achievements. "All is vanity" Gryphius wrote:

You see / everywhere you look, only vanity on earth.

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[1] Keckermann taught and wrote systematic textbooks on most every subject taught in the Gymnasium from family life to astronomy and metaphysics. Keckermann's methods and textbooks made it easier for Gymnasium teachers to handle a wide variety of subjects. On the breadth of Keckermann's output, see Freedman, "Keckermann" 305-364. Freedman also notes that as late as 1688 "the entire scope of philosophical disciplines appears to have been taught at both Danzig and Soest; at Danzig this seems to have been done by a single teacher." See Joseph S. Freedman, "Encyclopedic Philosophical Writings in Central Europe during the High and Late Renaissance, (ca. 1500-1700)" *Archiv für Begriffsgeschichte* 37 (1994): 212-256, *236*.

What one builds up today / another tears down tomorrow;

Where cities now stand / will become a meadow

Upon which a shepherd's child will play with the flocks.

. . . . . .

The fame of mighty deeds must fade like a dream.

Shall then fragile man / survive the test of time?

Alas, what is all this we consider precious

But horrible nothingness / shadows, dust and wind.

Like a meadow flower, which one never finds again.

Still, no one desires to contemplate that which is eternal.[2]

Readers of Gryphius's work have seen tension and outright inconsistency in his writings, especially his skepticism about human knowledge and activity on the one hand and his positive praise for individuals as well as his expressed enthusiasm for scientific thought on the other. For the most part, readers and critics of Gryphius's works have sifted through classical, medieval and early modern texts to find Gryphius's possible sources in order to explain the tensions in his writing.[3] Wilhelm Kühlmann, for example,

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[2] I have translated Gryphius's poetry without his rhyming schemes in order to relay more literal readings. The poem is from Andreas Gryphius, *Sonnete* (Leiden, 1643), Aiii^{r}; as printed in Andreas Gryphius, *Gesamtausgabe der deutschsprachigen Werke*, Marian Szyrocki and Hugh Powell, eds., 8 vols. (Tübingen: Max Niemeyer Verlag, 1963-1972), I, 33-34. Hereafter cited as *GdW*. The poem was first printed in slightly different form in Gryphius, *Sonnete* (Polnischen Lissa: Wigandum Funck. o. J., 1637), 14-15 in *GdW*: I, 13. For an alternate translation, see Andreas Gryphius, "All is Vanity," trans. George C. Schoolfield, *The German Quarterly* 24 (1951): 22.

[3] One example is Will Hasty, "The Order of Chaos: On *Vanitas* in the Work of Andreas Gryphius," *Daphnis: Zeitschrift für Mittlere Deutsche Literatur* 18 (1989): 145-157. Hasty specifically attempts to resolve the tension in Gryphius's poetry by placing

examined the Copernicus poems of Caspar Barlaeus as sources for Gryphius's own poem of praise for Copernicus.[4] More recently, Von Jochen Schmidt musters the writings of Seneca, Augustine, Lactantius, Johann Arndt, and Francis Bacon among others as sources for Gryphius's thought.[5] Chapter 3 takes an alternative approach similar to that of new historicists who place "high cultural texts" that have become canonized in the circles of literary theorists (such as Gryphius's poetry) next to forgotten texts that may not even be considered literary by established convention in literary theory (such as Crüger's prognostications and writings).[6] The purpose of such an approach is to discover "hidden links" with a larger "life-world" that only forgotten or unliterary texts could flesh out.[7] Accordingly, the way to tap into Gryphius's world would be to survey his immediate

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Gryphius's philosophy concerning the vanity of human knowledge in a broad context of "Lutheran theology and Baroque normative poetics."

[4] Wilhelm Kühlmann, "Neuzeitliche Wissenschaft in der Lyrik des 17. Jahrhunderts: Die Kopernikus-Gedichte des Andreas Gryphius und Caspar Barlaeus im Argumentationszusammenhang des frühbarocken Modernismus," *Jahrbuch der Deutschen Schillergesellschaft* 23 (1979): 124-153.

[5] Von Jochen Schmidt, "Die Opposition von contemplation and curiositas: Ein unbekanntes Denkmuster, seine Tradition und seine poetische Gestaltung durch Andreas Gryphius im Sonett *An die Sternen*," *Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 77 (2003): 61-76.

[6] Erika and Michael Metzger trace the history of readings of Andreas Gryphius's work and its elevation as high cultural text. They state that starting at the time after Gryphius's departure from Danzig and the publication of his first selections of poems and poetry, many have considered him one of the greatest German writers of the baroque period. See Metzger and Metzger, *Reading Andreas Gryphius: Critical Trends 1664-1993* (Columbia, S.C.: Camden House, 1994).

[7] See the "Introduction" to Catherine Gallagher and Stephen Greenblatt, *Practicing New Historicism* (Chicago and London: The University of Chicago Press, 2000).

surroundings – not just the texts with which he may have been familiar. As a result of taking such an approach, this chapter will argue that Gryphius took from Peter Crüger a skeptical stance towards human knowledge as well as his attitudes towards the science of the stars and his interest in bringing astronomical and astrological content into his literary works.

Of course limiting this chapter to an investigation of Peter Crüger can only provide a sketch of the "life-world" that Gryphius would have met specifically in Danzig and not the other worlds he faced during his time in the Low Countries and elsewhere. Nevertheless, Gryphius himself recognized the intellectual (as well as social and cultural) indebtedness he owed to Crüger's position in his life, when he lauded Crüger in his 1637 compilation of sonnets.

To the eminent master of all erudition and virtue, Peter

Crüger, Mathematician of Danzig, in all cities celebrated.

With his restored Epitaph accommodated

Now accept in return / what you have entrusted me /

(Your home of faithful kindness / A guiding principle to you at all times /

Making you in the face of the very sun a sun yourself /)

This is / what one beholds here and there / on many graves /

Your wisdom / which is not terrified of the end and death /

Your honor / which fame spreads to every place /

Your virtue / which the sting of death threatens in vain /

And your friendliness finds here no ready grave /

To them no gravestone is set, because over them the wheel

Of fortune and death has no command /

And yet if my mind may surely become so very wrong /

That I dare open the grave for them /

In which ingratitude sits / to which forgetfulness calls /

So must I be buried alive with earth.[8]

Gryphius's expressed indebtedness to Crüger for his kindness, friendliness, honor and wisdom justifies making Crüger a primary source for the ideas, sensibilities and mentalities that Gryphius might have drawn from when thinking, praising, lamenting and writing.[9]

Poets and Poetry in Danzig

Early seventeenth-century Danzig was a place that fostered the writing and printing of poetry. One of Crüger's friends in the intellectual world of northern Europe was the poet Martin Opitz, who lived in the city at the end of his life. In the front matter of Crüger's *Cupediae Astrosophicae Crügerianae* (1631), Opitz offered a Latin poem in praise of Crüger and his book. Optiz's reputation became firmly established in Danzig in 1634 when Andreas Hünefeld reprinted his *Buch von der Deutschen Poeterey* or *Book*

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[8] Andreas Gryphius, *Sonnete* (Lissa, 1637), 29-31 in *GdW*: I, 13.

[9] Others have often noted Crüger's relationship to Gryphius and the possibility that he shaped the young poet's thought, but as far as I know there has been no extensive treatment relating the two. An example of one author's opinion is as follows: "In Danzig the young man [Gryphius] undoubtedly found himself as a poet. Under the influence of such teachers as Peter Crüger, mathematician, astronomer as well as professor of poetry, and Johann Mochinger, professor of rhetoric, both of whom were in close contact with Marin Opitz, Gryphius most probably began writing a series of German poems, which will include some of his best-known sonnets." From Blake Lee Spahr, *Andreas Gryphius: A Modern Perspective* (Columbia, S.C.: Camden House, 1993), 10.

concerning German Poetry, originally published in Breslau a decade earlier. Hünefeld's printing of Opitz's book in Danzig was significant to the city's poets. For it introduced Opitz's ideas for reforming German poetry that drew upon the example of sixteenth-century French poets who sought to pen poetry in their own language based upon the rules for Latin poetry. In a way it was an imitation of classic Latin authors through the vernacular.

Peter Crüger took seriously his position as both a professor of mathematics and of poetry in the Danzig Gymnasium. The educational reforms of Bartholomew Keckermann at the beginning of the seventeenth century made it easier for one professor to handle a broad array of disciplines at the gymnasium level. With respect to poetry, Peter Crüger practiced what he taught and was often called upon to write epigrams for different occasions. On one such occasion, he celebrated in verse the special event of the marriage between Kasper Zierenberg and Barbara Rudiger in 1625. As a young professor in 1608, Crüger himself had married Elisabeth Reutorff and knew both the happiness and sorrow that marriage could bring. After seventeen years of marriage, Elizabeth died in 1625, possibly due to the plague that struck Danzig in 1624 killing more than 10,000 in the city.[10] The 45 year-old widower Crüger then married the younger Ursula Remus, a

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[10] Curicke, *Beschreibung*, 271. In his prognostication for 1625, Crüger addressed the question whether the influence of the stars was strong enough to cause the plague. The question was timely, because by his own account Crüger was writing his answer on February 8, 1624 in the same year the plague struck. Crüger's answer to the question of the connection between stellar influence and the plague was that there were multiple causes for the plague that could include foul and poisoned air, contagion and poor diet. For their part, the stars were not necessarily causes for the plague, but they could amplify the effects and conditions that caused the plague, worsening it. Crüger followed Johannes Kepler (and cites Kepler's *Tertius Interveniens* section 139), arguing that stellar

woman young enough to give birth to an additional five children with Crüger. It was in that same year of 1625, possibly during the period of time after Elizabeth's death and before Crüger's marriage to the youthful Ursula, that he wielded his poetical talents in celebration of the marriage between Zierenberg, an older widower like himself, and Rudiger, a younger second bride. Despite the tragedies of the plague suffered the previous year and the death of his own wife, Crüger could still laugh in his poem "A Joke and a Serious Matter" that "Providence has an eye on the lucky tribe of the widowers, who before, as everyone could see, had to tread the land as bachelors. God has decided today to give every one of them a wife they had dreamt of."[11] At the end of his poem, Crüger warned young suitors to beware of old widowers and to act quickly on their love for the beautiful maidens of Danzig lest the widowers snatch them away from under their noses. In his heart, Crüger must have been hurting still from the loss of Elizabeth, but showed optimistic courage in the face of death.[12]

Among the many poets who lived in Danzig was Andreas Gryphius, a student of Crüger. Born in 1616 the son of a Lutheran Archdeacon in Glogau, Gryphius lost his father at an early age and was forced to flee his home due to the ravages of the Thirty

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influence came through the aspects of the planets. In the end, Crüger prayed: "God grant that my worry [over severe plague] be mistaken." See Crüger, *Cupediae Astrosophicae*, 1625: IV, Xii^{r} - Xiv^{r}.

[11] Peter Crüger, "Schertz und Ernst" (Danzig, 1625), as quoted in Januszajtis, "Peter Krüger," 129-130.

[12] Steven Ozment makes the argument that there was more love within families and between married couples in early modern Europe than histories of the period generally portray. He also notes that it was a general trend for widowers with married children to remarry quickly. See Steven Ozment, *Flesh and Spirit: Private Life in Early Modern Germany* (New York: Penguin, 2001), especially the "Introduction."

Years War. He arrived in Danzig in June 1634 to study at the Danzig Gymnasium and was initially taken into the house of the newly appointed Lutheran Rector Johannes Botsack.[13] During the two short years that he lived in Danzig, Gryphius published his first books and built a strong friendship with Peter Crüger.[14] In an early epigram "To the splendid philosopher and mathematician Peter Crüger concerning the death of his child in the year 1638," Gryphius mourned in general the deaths that raged across Germany due to the Thirty Years War and lamented that Danzig, a city not seriously harmed by war, was still losing her youth.

> O Danzig! Does the wrath completely consuming Germany /
>
> Wish to be so terrible to you as well? Does He / who judges all
>
> With the flame of His lightning / which breaks throne and crown /
>
> Wish to destroy you dreadfully / as fiercely as He destroys us?
>
> Is there no one who with seriousness defends against the great zeal?
>
> Who withstands His blows? Death no longer spares anyone.
>
> It follows the trumpeting of blood and plucks out of this light /
>
> The children / whom God surely burdens with no guilt!
>
> The children: God's delight / how bad is our situation /

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[13] Baltzer Sigmund von Stosch, *Last- und Ehren- auch Daher immerbleibende Danck- und Denck-Seule, Bey vollbrachter Leich-Bestattung Des Weiland Wol-Edlen, Groß-Achtbarn und hochgelehrten Herrn Andreae Gryphii* (Leipzig: Gedruckt bey Christian Scholvien, 1683), 28. Gryphius took residence in Botsack's household until August 23, 1634. He then took up the post as a tutor in the household of Polish Admiral Alexander von Seton, a Scottish Catholic. See Eberhard Mannack, *Andreas Gryphius* (Stuttgart: J.B. Metzlersche Verlagsbuchhandlung, 1968), 6.

[14] In the two German sonnets that Gryphius wrote to Crüger, he thanked Crüger for those things that he had entrusted Gryphius, including his "home a true kindness."

When these bulwarks are gone / when that select crowd dies

They alone have the power to wage war on the Almighty!

If it strikes you first, Herr Crüger,[15] well, in truth

This child / this pale child / who now lies on the bier /

This one would / if he stood, triumph alone.[16]

Gryphius's expressed concern for the Crügers unveils, at least partially, the feelings he had for his teacher and his teacher's family. It was during his time under Crüger's tutelage that Gryphius began drafting and composing some of his most famous poems and sonnets.

Gryphius published his first volume of poetry in 1637, the year after he left Danzig. Eventually, he found his way to the University of Leiden, where during the early 1640s, he offered lectures on various subjects including astronomy, geography and mathematics. Karl Guthke points out that during this time, Gryphius "wrote a thesis 'de igne non elemento' (that fire is not an element), which caused offense in orthodox circles, evidently because it cast doubt on the traditional view that the Earth beneath the moon's trajectory was surrounded by a sphere of fire."[17] Among his poems, epigrams and

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[15] For the spelling of "Crüger" within the poem, Gryphius employed the unusual spelling "Kriger" perhaps making a pun on Crüger's name with an alternative spelling of the word "warrior" (Krieger) in German.

[16] Gryphius, *Teutsche Reim-Gedichte* (Frankfurt am Main: Johann Hüttnern, 1650), 188; *GdW*: I, 84-85. The death of Crüger's children was fairly common during his lifetime. He was outlived by only two of his ten children from his two marriages. See Januszajtis, "Peter Krüger," 128.

[17] Karl Guthke, *The Last Frontier: Imagining Other Worlds, from the Copernican Revolution to Modern Science Fiction*, Helen Atkins, trans. (Ithaca, N.Y.: Cornell University Press, 1990), 125.

sonnets are several with natural philosophical themes including poems on astral influences and on the ordering of the planets. He also wrote an epigram on the study of chiromancy or the art of palm reading, which for Gryphius "was a means of discerning the will and ways of God."[18] In his plays, he talked of astrologers, calendar making, eschatology (the study of the end of time), magnetic cures, the significance of comets and the wretched practices of demonology of which even the noble minds of Girolamo Cardano and Tycho Brahe were not immune.[19]

After his stay in Leiden, Gryphius toured Europe visiting among others Hugo Grotius and Athanasius Kircher. By the end of the 1640s, Gryphius was ready to settle down. He married Rosina Deutschländer in 1649 and in 1650, after entertaining offers from several universities for his services, Gryphius decided instead to accept a position as a statesman in Glogau, where he served as the syndic for the local landed nobility and acted as the mediator between Protestants and Catholics as well as the mediator between the nobility and others. He held this position until his death on July 16, 1664 after a fatal heart attack.

Although Gryphius's life was filled with concerns far removed from poetry and literature, he found the time to compose verses and write plays. In his writings, Gryphius expressed ideas and employed metaphors that he learned as a student in Danzig. In what

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[18] Hugh Powell, *Trammels of Tradition: Aspects of German Life and Culture in the Seventeenth Century and Their Impact on the Contemporary Literature* (Tübingen: Max Niemeyer Verlag, 1988), 117.

[19] Gryphius talks of Cardano and Tycho in his tragedy *Cardenio und Celinde*. See *Deutscher Gedichte* (Breslau: Johann Lischkens, 1657), Aiii^{r}; *GdW*: V, 100. See also Powell, *Trammels of Tradition*, 56.

follows, I have read Gryphius's works in the light of what he may have taken from Peter Crüger. By doing so, this chapter argues that the apparent contradictions and inconsistencies of Gryphius's writings dissipate in the light of Gryphius's attitudes towards knowledge that resemble the attitudes of Peter Crüger.

Gryphius's Heavenly Poetry and Literature

Gryphius's poetry and plays often contained references to the sun, moon and stars and employed astronomical knowledge. In his poetry, Gryphius followed the rules that Opitz had outlined in his *Buch von der Deutschen Poeterey*, which incidentally was published in Danzig first in 1634, the same year Gryphius arrived in the city to study at the Gymnasium. Opitz's rules for German poetry, in turn, followed the rules of the French Pléiade, seven poets who led the movement to write classically-imitative French poetry during the sixteenth century. While often writing about love and similar sentimental subjects, the Pléiade were also known for composing heavenly poetry using the stars as metaphors and writing of their magnificence. One of the best known of these French poets was Joachim Du Bellay (c.1522-1560), who used the images of the sun and the stars to express in words a woman's beauty. "When Sun darts forth his rays, the stars commence/ To fade, no longer free to gleam; resigned,/ Beauty herself must stand, dull and outshined,/ When your celestial body ventures hence."[20] Isabelle Pantin contends that although the Pléiade and their contemporaries strove to fuse heaven and earth, they failed to bridge the worlds of technical astronomical thought and descriptive poetry due

[20] Joachim Du Bellay, "Pour mettre en vous sa plus grande beauté," *L'Olive*, lxvi, as translated in *Lyrics of the French Renaissance: Marot, Du Bellay, Ronsard*, Norman R. Shapiro, trans. (New Haven and London: Yale University Press, 2002), 177.

to their efforts to confine themselves to the strictures of Latin etiquette in poetry, which would not allow for technical or "specialist" language. So although Amadis Jamyn (1538-1592), friend to Pléiade leader Pierre de Ronsard (1524-1585), observed in 1572 that "the most divine poet is he who most divinely represents to the mind all mortal things, the mysteries of heaven and the beautiful sciences as one sees them constructed in his verse with such erudition,"[21] the French poets shied from expressing learned ideas of the stars in their heavenly poetry.

Like the French poets who came before him, Gryphius steered from learned knowledge of the stars in his poem "An die Sternen" or "To the Stars," in which alluded to the more common knowledge of scripture. In the second stanza of "To the Stars," for example, he reflected the Psalmist's statement that it is the Lord who "telleth the number of the stars; he calleth them all by *their* names" (Psalms 147:4):[22]

To the Stars

You lights, which I cannot see enough of on earth /

You torches, which adorn constantly the open firmament

With your flames / and burn without ceasing;

You flowers, which decorate the fields of the great heavens

You watchmen / who, when God wished to construct the world,

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[21] From Isabelle Pantin, *La Poésie du Ciel en France: Dans la Seconde Moitié du Seizième Siècle* (Genève: Librairie Droz S.A., 1995), 194, as translated in Yasmin Haskell, "All the Heavens, Truthfully Represented, it Can Enclose with its Verses" *Studies in the History and Philosophy of Science* 28 (1997): 681-697, *688, n. 25*.

[22] Von Jochen Schmidt has also recognized the allusion to the Psalms in Gryphius's poem. See Schmidt, "Die Opposition von contemplation und curiositas," 65.

Named His word wisdom itself with the proper name

Which only God can truly measure / which God alone truly knows

(We blind mortals! How can we wish to trust ourselves!)

You guarantors of my desire / on how many beautiful nights (54)

Have I kept watch / in which I observed you?

Rulers of our time / when will it actually happen

That I / who cannot forget you here below /

Shall, free of other cares, see you /

Whose love inflames my heart and spirits / somewhat closer.[23]

In these verses, Gryphius offered the topos that human knowledge was deficient compared to the perfect knowledge of God. There is not much that would have been difficult for a non-Latinist audience to understand. The opposite was more likely the case. The references to biblical knowledge probably made the poem even more appealing to Lutheran parishioners, whether or not they recognized Gryphius's disparagement of human knowledge.

When it came to his prose literature, however, Gryphius did not fear employing language, methods and concepts from then-current investigations into the science of the stars. The Pléiade member Pontus de Tyard likewise had earlier made abundant reference to astronomical theory in his *L'Univers* (1557) citing ancients such as Cicero, Plato and Plutarch as well as moderns like Copernicus, whom de Tyard labeled the

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[23] Andreas Gryphius, *Sonnete* (Leiden, 1643), Ci^{r}; as printed in *GdW*: I, 53-54. For a more poetical translation of this poem, see George C. Schoolfield, *The German Lyric of the Baroque in English Translation* (Chapel Hill, N.C.: The University of North Carolina Press, 1961), 149.

"prince of astronomy."[24] Nevertheless, Gryphius's prose writings differ from those of de Tyard and his associates in that he deftly used the recent and contemporary knowledge of the moderns Galileo Galilei, Christoph Scheiner, Johannes Hevelius and others to make his rhetorical points.

In one of his funeral sermons, for example, Gryphius expressed the kind of heavenly life the deceased (one Sigmund Müller, a military man) deserved.[25] Gryphius related the souls of men to the stars in heaven. "No one is unaware of the many different opinions teachers have brought forward concerning the nature of the stars, their forms and qualities" which despite their differences, they teach "that the stars are heavenly beings."[26] Likewise, Gryphius contended, despite the disputations over the nature of the soul, all are agreed that it is not an earthly being but a heavenly one.

Next, just as astronomers graded stars according to their brightness, Gryphius sermonized that one could similarly grade souls. In the heavens there were thousands of stars that were classified according to their differing brightness. "The feasts of Heaven are full of shining torches and their amount is considered innumerable, despite Pliny's opinion that there may not be found more than 1600." Gryphius noted that the Hebrews

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[24] On de Tyard, see the "Introduction" to *The Universe of Pontus de Tyard: A Critical Edition of* L'Univers, John C. Lapp, ed. (Ithaca, N.Y.: Cornell University Press, 1950). Quote from page xliii.

[25] Gryphius gave this sermon on October 31, 1649. For the dates of the sermons and biographical information of the individuals for whom Gryphius gave his funeral sermons, see Maria Fürstenwald, *Andreas Gryphius, Dissertationes Funebres: Studien zur Didaktik der Leichabdankungen* (Bonn: Bouvier, 1967).

[26] Andreas Gryphius, "Schlesiens Stern in der Nacht" in *Dissertationes Funebres, oder, Leich Abdankungen, bey unterschiedlichen hoch- und ansehnlichen Leich-Begängnüssen gehalten* (Leipzig: Christian Scholvien, 1683), 67-98, *72-73*.

believed there were 12000 heavenly bodies, that the cabalists came to the number 29000; Wilhelm Schickard, the famed inventor of the first calculating machine and a correspondent of Kepler, argued for millions. In Ptolemy's register there were 1022 "and we add to that 1700 and others forty," but "in truth no one will be able to count the stars" because of the field of stars that are opened up to the eye by the newly invented telescope. "Freely must one confess here with Galileo" that one can find thousands of stars which were never before seen by the naked eye.[27] Among the thousands of stars are only a few of the first grade, meaning those that shine the brightest. Gryphius's final message was clear, like the stars, the souls of the dead are innumerable and are likewise graded in glory. And individuals like Sigmund Müller belonged to the first grade of stars.[28]

This did not mean that Herr Müller or anyone else for that matter was perfect. Furthering his analogy between the stars and the deceased's character, Gryphius noted in the form of a common topos that despite Müller's goodness he was not perfect just as heavenly bodies are not perfect. For example, although the friendly Müller was a clear,

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[27] This is obviously a reference to Galileo's observation of thousands of stars in the Milky Way and in other areas of the heavens, as they were resolved through the lenses of his telescope. See Galileo Galilei, *Sidereus Nuncius*, Albert Van Helden, trans. (Chicago and London: The University of Chicago Press, 1989), 59-64.

[28] Gryphius, "Schlesiens Stern," 75-76. Gryphius added that as one comes closer to the sun of life his glory will increase until it outshines all other stars. See Gryphius, "Schlesiens Stern," 95. It should be noted here that Gryphius's analogy relating the differing magnitudes of the stars to the differing glories of individual lives was not unique. In his funeral sermon for Peter Crüger a decade earlier, Daniel Dilger made the same analogy. The difference, however, is that Dilger made no mention of Pliny, Schickard or Ptolemy, let alone Galileo and his telescope. See Dilger, *Christliche Leich-Predigt*, 17-18.

lovely, victorious shining star, he was, like any other star, subject to eclipses.[29] He was also like the sun which had spots or like the moon whose great deformities were easy to see with a telescope. Gryphius also brought in scripture quoting from Job 25, which declared that if the stars are not pure how much more so the case is for man. Then resting upon the authority of Christoph Scheiner and Johannes Hevelius, Gryphius added the optimistic outlook that "although the sun is full of dark and black colors and the moon and other planets are full of valleys and mountains," these are rather superficial features of a heavenly body as well as an earthly body and do not reflect the inner glory that the body gives off.[30]

In his sermon for Andreas Müller, Gryphius also dared to bring in the controversial astronomical idea of a greatly expanded universe, possibly an infinite universe. He raised the idea in order to expound further on Müller's character. According to appearances Gryphius argued, the heavenly lights do not stand in a circle round the earth; rather they rise past each other and find their worth according to their positions in the heavens just as the hierarchy of Thrones, Chariots, Dignities, Exaltations, Delights- the gradations of heaven and of angels according to the medieval view.[31] In

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[29] Gryphius, "Schlesiens Stern," 86-88. Gryphius further points out the imperfection by discussing the appearance and disappearance of some stars, referring of course to super novas and variable stars seen during the sixteenth and seventeenth centuries. Gryphius noted that in addition to stars rising and setting, there are some stars which disappear altogether and others that appeared and burned as bright as the sun. See Gryphius, "Schlesiens Stern," 94.

[30] Ibid., 93. Gryphius specifically cites Scheiner's *Rosa Ursina* and Hevelius's *Selenographia* to make this point.

[31] The order according to pseudo-Dionysius was Seraphim, Cherubim, Thrones in the first grade, Dominations, Virtues, Powers in the second grade and Principalities,

this hierarchy of heavenly places, Müller's soul belonged to the most noble of stars.[32] By arguing that the stars are not equidistant from the center of the universe, Gryphius both touched upon a concern of his teacher Peter Crüger and went beyond Crüger's opinion that the stars indeed remained fixed in a common-radius sphere.[33] Crüger's concern was with Copernicus and the implications of his theory that would make the universe extremely large. In the next section, I will discuss Crüger's readings of Copernicus as background to what he might have taught in his mathematics classes during the years that Gryphius attended the Gymnasium in Danzig.

Crüger's Readings of Copernicus

Crüger's annotated copy of the Basel (1566) second edition of Copernicus's *De revolutionibus* survives today in the Russian State Library in Moscow. The binding of the heavily annotated book carries on its spine the label *The Revolutions of the Heavenly Spheres of Copernicus with the MS [manuscript] notes of Peter Crüger, 1600*. If Crüger obtained this copy of *De revolutionibus* in 1600, then it is most likely that he first began reading it in Prague where at the same time he began moving in Tycho's circles. Indeed Crüger's first annotation in his copy of Copernicus's work shows his indebtedness to

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Archangels, Angels in the third and lowest grade. This ordering was based on scriptural precedence found in Ephesians 1:21 and Colossians 1:16

[32] Gryphius, "Schlesiens Stern," 81.

[33] From one of his early prognostications we learn that Crüger believed that the stars were roughly equidistant from the earth subscribing to the idea of a sphere of fixed stars. He came to the conclusion that the stars were equidistant from the earth and that the differences in their brightness was due to the fact that "in truth one star is larger than another." See Crüger, *Cupediae Astrosophicae*, 1624: II, Ti^{r}.

Tycho. Parallel to Copernicus's outline of his system near the beginning of the book, Crüger drew in the margins Tycho's system along with the annotated question "What if this is so? [Quid si sic?]"[34] Crüger also owned a copy of the third edition of *De revolutionibus* printed in 1617. Crüger made annotations in this book as well. In the front matter, one can find Crüger's transcription of the 1616 instructions from the Holy Index to censor parts of Copernicus's book.[35]

Next to Crüger's annotated copies of Copernicus's work that provide evidence for his immediate reactions to Copernicus's theory, stand Crüger's writings and teachings where he expressed his opinions concerning Copernicus. In the disputation of Jacob Gerhard over which Crüger presided, there is evidence that Crüger taught Copernicus in such a way that encouraged students to seek alternatives to Ptolemy, Copernicus and others. In his disputation, Gerhard presented a novel system of the world in which the Earth remained immobile around its axis while it revolved around the sun.[36] In one

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[34] Details about Crüger's annotations taken from Gingerich, *Census of* De revolutionibus, 190-191, no. II.181. Gingerich notes that the question "Quid si sic?" also shows up in the frontispiece to Kepler's *Tabulae Rudolphinae* (Ulm, 1627), a book to which Crüger makes several references throughout his annotations in his copy of *De revolutionibus*.

[35] Crüger copied the Index instructions over into his 1617 copy of *De revolutionibus* in 1625. He also wrote "biographical notes from [Copernicus's?] Frauenburg epitaph and from Tiedemann Giese's letters to G.J. Rheticus." See Stanisław Cynarski, *Reception of the Copernican Theory in Poland in the Seventeenth and Eighteenth Centuries*, Elżbieta Tabakowska, trans. (Cracow: Jagellonian University, 1973), 26; and Robert S. Westman, "Two Cultures or One? A Second Look at Kuhn's *The Copernican Revolution*" *Isis* 85 (1994): 79-115, *107*. Both Cynarski and Westman rely on T. Przypkowski, "Notatki astronomiczne Piotra Crügera, nauczyciela Jana Heweliusza, na egzemplarzu 'De revolutionibus' Mikołaja Kopernika," *Sprawozdan Polskiej Akademii Umiej* 50 (1949): 607-609.

sense, Gerhard attempted to hold onto the Aristotelian conception of the universe in which a body may only have one single natural motion, either up and down for earthly bodies and only circular motion for heavenly bodies. That is why he rejected the daily motion of the earth on its axis. Nevertheless, Gerhard assigned a motion to the earth that would account for the annual motion of the stars. His earth was a heavenly body that revolved around the sun but did not spin on its axis, abiding by the Aristotelian maxim of only one natural circular motion for heavenly bodies.[37]

Crüger increasingly wrote about his own reactions to Copernicus and his followers upon the publication of Johannes Kepler's *Epitome of Copernican Astronomy* (1618-1621). Crüger found in Kepler's *Epitome* new challenges to an acceptance of the Copernican theory. Upon reading Kepler's defense of Copernicus based on new physical reasons Crüger wrote that it was "pleasing, but quite obscure…. This being the case, not a few may be enticed by [Kepler's] speculations to his celestial physics and to Copernican astronomy; but many also will be deterred, especially when they have seen the publication of that other work [Christian Severin Longomontanus's *Astronomia Danica* (1622)] which reforms all of astronomy according to the Tychonic hypotheses [and observations]."[38] It was not easy for Crüger to understand let alone accept Kepler's

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[36] This disputation was *De hypothetico systemate coeli disputatio publica ordinaria…/ Praeside Petro Crügero… Respondente Jacobo Gerhardi*. (Danzig: Hünefeld, 1615).

[37] Bieńkowska, "From Negation to Acceptance," 106. More work should be done with Gerhard's disputation both to verify Bieńkowska's summary and to set it in the context of similar disputations and theses published from other German schools.

[38] Crüger to Philipp Müller, I July 1622, G*W* xviii, nr. 933, as translated in Westman, "Two Cultures or One?" 107, n. 89. Kepler's proofs both in defense of the

claims concerning ellipses and the Copernican theory. Referring again to the *Epitome of Copernican Astronomy*, Crüger relayed to Philip Müller that "The Poet says that to read a thing ten times is pleasing. But this work I do not yet understand after reading it a hundred times. The author seems, as usual, to obscure the matter deliberately…. These theories are based upon uncertain foundations and mere guesswork."[39]

It was not until after the *Rudolphine Tables* were printed in 1627, that Crüger came closer to accepting Copernicus and his theory. In tandem with his reading of the *Rudolphine Tables*, Crüger made annotations in his 1566 edition of *De revolutionibus* next to sections where the numbers in the *Rudolphine Tables* could help clarify Copernicus's numbers. In addition, Crüger wrote in 1629 that he was finally able to understand Kepler's theory of Mars as it was presented in the *Epitome of Copernican Astronomy*. "This *Epitome* which previously I had read so many times and so little understood and so many times thrown aside, I now take up again and study with rather more success seeing that it was intended for use with the tables and is itself clarified by them." Crüger continued that along with understanding came acceptance of Kepler's theories. "I am no longer repelled by the elliptical form of the planetary orbits; Keppler's proofs, in his *Commentaries on Mars* have persuaded me."[40]

Copernican theory and of his theory of elliptical orbits for the planets initially met only a small reception. For example, John Russell has found that Crüger was one of only nine individuals before 1630 familiar with Kepler's theory of ellipses. John L. Russell, "Kepler's laws of planetary motion: 1609-1666" *The British Journal for the History of Science* 2 (1964): 1-24, *6-9*. See also Wilbur Applebaum, "Keplerian Astronomy after Kepler" *History of Science* 34 (December 1996): 451-504, *456*.

[39] Crüger to Philipp Müller, 1622, in *Nova Kepleriana 4* 31 (1927): 107, as translated in Russell, "Kepler's laws," 8.

Kepler's proofs, however, were not enough to convert Crüger to the Copernican theory. In line with contemporary reactions to Copernicus, Crüger objected most to Copernicus's claim that the distance between Saturn and the fixed stars must be immense in order to account for the lack of any perceptible stellar parallax that would result if the earth were indeed revolving around a fixed point at or near the sun. Tycho Brahe, for one, narrowed the distance between Saturn and the stars to 1,700 earth radii, which shrunk the size of the universe by one third from the Ptolemaic measure making it so that even a star of the first magnitude would still only be half the size of the sun.[41]

In his prognostication for 1631, Crüger relayed Kepler's calculation for the size of the universe in answer to the question whether or not Copernicus's theory should be believed and if so, what it would do to our view of the universe. Kepler's calculation for the diameter of the sphere of fixed stars was 60,000,000 earth diameters.[42] Crüger expressed his doubt whether this number could be believed calculating that if the sphere of the fixed stars were really that big, it would mean that the stars would be "3,048, 625 times as large as the sun….For this reason, I do not understand how the Pythagorean or

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[40] Crüger to Philipp Müller, 1629, in *Nova Kepleriana 4* 31 (1927): 108, as translated in Westman, "Two Cultures or One?" 106. See also Russell's translation in Russell, "Kepler's laws," 8.

[41] Albert Van Helden, *Measuring the Universe: Cosmic Dimensions from Aristarchus to Halley* (Chicago and London: University of Chicago Press, 1985), 41-50.

[42] According to Crüger, this calculation came from Kepler's *Epitome astronomiae Copernicanae* (1618-1621), p. 492. See Johannes Kepler, *Epitome of Copernican Astronomy*, Charles Glenn Wallis, trans. (Amherst, New York: Prometheus Books, 1995), V: p. 43.

the Copernican *Systema Mundi* [could] exist and at the same time the sun with her [comparatively small] size should exceed all other stars"[43]

In the *Epitome of Copernican Astronomy*, Kepler defended his calculation for the size of the universe and claimed that his calculation would not affect the size of the stars. Kepler held that stars simply appeared as points of light when seen through a telescope. Accordingly, he believed that the fixed stars lie within a sphere whose thickness (or thinness) was 1/6000 solar radii, which was the equivalent of 2 German miles or 9 English miles! The stars would necessarily be very small indeed according to this calculation.[44]

Crüger recognized Kepler's explanation, but accepted instead the testimony of Galileo who reported in his *Sidereus Nuncius* that even when the twinkling rays of the stars are stripped away by the telescope, the sizes of their bodies still differentiate themselves and appear larger than they do to the naked eye. For example, the size of a star of fifth or sixth magnitude through the telescope appears the same as that of first magnitude by the naked eye. Through the telescope, Crüger reported that Galileo and others had seen six further magnitudes of stars that one could not see with natural eyes.[45] So, as far as the differing sizes of stars were concerned, Crüger accepted the observations of Galileo over Kepler's reports, agreeing with Galileo that stars were more than just points of light in the sky. However, when assessing the validity of what Copernicus's

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[43] Crüger, *Cupediae Astrosophicae*, 1631: IV, Jji^{r}.

[44] Van Helden, *Measuring the Universe*, 88; Kepler, *Epitome*, Wallis, trans., 886.

[45] Crüger's summary of Galileo follows the *Sidereus Nuncius* closely. See Galileo, *Sidereus Nuncius*, Helden, trans., 58-59.

claims would do to the size of the universe and to the sizes of the stars, Crüger took into account Kepler's geometrical proof for the distance between the earth and the sphere of the fixed stars, taking as fact that there was indeed a sphere of fixed stars.[46] Accordingly, even the smallest of stars that could be discerned through one of Galileo's telescopes would still be nine times as large as the sun if one accepted the Copernican value for the size of the universe that Kepler gave in the *Epitome*. Crüger expressed his continued hesitation over accepting the Copernican system, which the contradictory findings of Kepler and Galileo made hard to believe. "I cannot understand it. If someone does understand it, he is requested to teach me."[47]

Crüger's skepticism here with the Copernican system did not result from doubts about the mobility of the earth, but rather with doubts about the size of the universe and the resulting "unbelievable free space" between Saturn and the nearest star that would be a over thousand times larger than the distance between the sun and Saturn. Crüger asked, "To what end would God the Creator" allow for such space? Until this issue was

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[46] Crüger's main authority on this issue was neither Kepler nor Copernicus; it was scripture. See Crüger, *Cupediae Astrosophicae*, 1624: II, Ti^{r}.

[47] Ibid. Barbara Bieńkowska uncharacteristically misrepresents Crüger's Copernicanism based on her reading of Crüger's prognostication for 1631, arguing that according to Crüger, Galileo confirmed the Copernican hypothesis (Bieńkowska, "From Negation to Acceptance," 107). According to my reading, however, Galileo's observations only made Copernicus's claims about the size of the universe more unbelievable to Crüger. Stanisław Cynarski mistakenly follows Bieńkowska writing that Crüger's prognostication of 1631 "clearly proves him to be an adherent of heliocentrism" and that Crüger considered Galileo's observations to be "proof of the validity of the Copernican theory" (Cynarksi, *Reception of the Copernican Theory in Poland*, 26).

resolved, Crüger would not accept fully Copernicus's theory about the system of the universe.[48]

Despite his personal reservations about the implications of Copernicus's theories, Crüger still taught Copernicus's theory to his disciples. Among his students who embraced Copernicus to one degree or another were Johannes Hevelius, Andreas Gryphius and Benjamin Engelcke, a son of a leading patrician family in Danzig.[49] Engelcke, like Hevelius before him, even sought a visit with Galileo and in 1632 he received from Galileo a copy of his *Dialogue* in Italian. Engelcke was then the mediator who brought Galileo's *Dialogue* to Matthew Bernegger in Vienna, where he convinced Bernegger to translate the book into Latin.[50]

Skepticism and Gryphius's Praise for Copernicus

Peter Crüger's student Andreas Gryphius also expressed great admiration for Copernicus and his work. His poem honoring the memory of Copernicus survives as one piece of evidence for the position of Crüger's students and their opinions about

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[48] Crüger, *Cupediae Astrosophicae*, 1631: IV, Jji^{r}.

[49] Piotr Rypson, "Seventeenth-century Visual Poetry from Danzig" *Gutenberg-Jahrbuch* 66 (1991): 269-304. Pages 292-293 list the "Engelke" family as being one of the leading families of the city. Born on October 16, 1610 to Benjamin and Elisabetta Siefert, young Benjamin attended the universities of Leipzig, Jena and Altdorf, where he studied jurisprudence. In his travels, he also visited the universities of Padua and Pisa, as well as meeting with Galileo. In 1646, Engelcke was appointed to the Bench in the Danzig New Town and he became a City Senator in 1662. In 1667 he acted as the royal Burgrave for the city. Engelcke died on April 24, 1680. On Engelcke, see the biographical index in Galileo Galilei, *Opere*, Antonio Favaro, ed. 20 vols. (Florence: Barbera, 1890-1909), 20:436, and see Curicke, *Beschreibung*, 100, 114.

[50] Bieńkowska, "From Negation to Acceptance," 107-108.

Copernicus and his theory. It also survives as evidence of a shift from the French heavenly poetry of the sixteenth century that bypassed contemporary discussions about the nature of the heavens in favor of an astral aesthetic to the German poetry of the mid-seventeenth century that, although largely following French ideals, was not afraid to touch on contemporary controversial issues, which an acceptance of Copernicus's theory still was.

On the Image of Nicolaus Copernicus

You thrice wise spirit / you more than great man
To whom neither the night of time / nor blind illusion
Nor bitter envy, have bound the senses:
The senses which found the course of the swift earth
By refuting ancient dreams and conceit
And by showing us correctly what lives and what moves.
Behold now your glory blossom / for as if on a wagon
The wheel on which we circle, must carry [us] around the sun.
If this, which is earthly, pass with time;
Your praise should stand unmoved within the heavens.[51]

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[51] Andreas Gryphius, *Epigrammata* (Leyden, 1643), Aii^{r} in *GdW*: II, 152. In his discussion of the sonnets of Gryphius, Wolfram Mauser considered the placement of each sonnet within a collection as being just as important as the content of the sonnets. For Gryphius's poem on Copernicus, Mauser saw it as being placed in a special spot in both editions of the *Epigrammata*. In the first one (1643), it is the seventh sonnet- "the number 7, among other things, refers to the Holy Ghost" Mauser added. In the second edition (1663), it held a "special place" as the second piece in the second book coming after the poem "Uber wahre Beständigkeit" ("On True Constancy"). See Wolfram Mauser, *Dichtung, Religion und Gesellschaft im 17. Jahrhundert: Die <Sonnete> des*

Regarding this poem, the Gryphius scholar Hugh Powell took a quote from one of Gryphius's funeral sermons in order to show an inconsistency between Gryphius's praise of Copernicus on the one hand and his opinion of the uselessness of philosophical searches on the other. "In our day," Gryphius preached in his funeral sermon, "one investigates a great deal, whether or not the Sun is mobile, whether she is in truth a fiery body, or whether she simply possesses a warming power, whether she is fluid or solid, whether she is larger or smaller than God's Earth and a host of pretentious, unnecessary questions causing his own corruption and that of many others."[52] Powell used Gryphius's poem of praise for Copernicus on the one hand and his statement concerning the pointless searches for things like the immobility of the sun on the other to argue that "There *is* an inconsistency in Gryph[ius]'s attitude, but it is neither unique nor inexplicable."[53] Although Powell was right to argue that Gryphius's stance concerning Copernicus was neither unique nor inexplicable, he misunderstood it as inconsistent.

By separating what Gryphius penned about Copernicus the person on the one hand and what he opined concerning Copernicus's theory on the other, I argue that Gryphius could praise Copernicus while at the same time casting doubt on his theory without being inconsistent. In the last few lines of "On the Image of Nicolaus Copernicus," Gryphius remarked that even though Copernicus's fame would stand

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Andreas Gryphius (München: Wilhelm Fink Verlag, 1976), 51. Powell quotes this passage in German in Hugh Powell, "Andreas Gryphius and the 'New Philosophy'" *German Life & Letters* 5 (1951/52): 274-277, *275*.

[52] Gryphius, "Winter-Tag Menschlichen Lebens" in *Dissertationes funebres*, 196-257, *236-7*.

[53] Powell, "Andreas Gryphius and the 'New Philosophy'," 275.

unmoved like heaven itself, his theory "which is earthly" may "pass with time." Gryphius's praise for Copernicus did not cancel out his skepticism towards astronomical theories, which could "pass with time" making way for new theories. It is interesting to note here that such an attitude was not uncommon. In his *Apology for Raymond Sebond*, the French Pyrrhonian skeptic Michel de Montaigne also wrote of Copernicus's achievement in making an earth-moving system just as plausible a model as the Ptolemaic sun-moving system. But a model may have been all that an earth-moving or sun-moving system could claim to be, "For all we know, in a thousand years' time another opinion will overthrow them both."[54] Gryphius's sentiment also parallels that of Pontus de Tyard, who was proud of mankind's achievements whether or not they withstood the test of time.[55]

Gryphius adopted a skeptical attitude towards human knowledge similar to that of Peter Crüger. For Gryphius and Crüger, knowledge of nature was imperfect.[56] As discussed in chapter 2, Peter Crüger expressed his skepticism towards the abilities of

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[54] Michel de Montaigne, *The Essays of Michel de Montaigne*, M.A. Screech, ed. (New York: Penguin, 1991), 642.

[55] *Universe of Pontus de Tyard*, xlv-xlvi.

[56] In his analysis of Gryphius's writings, Hans-Jürgen Schings came to the same conclusions about Gryphius's statements concerning the vanity of human knowledge, but without attempting to make any connections between Gryphius's skepticism and that of Peter Crüger. One of Schings's targets was the assertion made by Herbert Schöffler that Gryphius was "the first Lutheran Cartesian" (see Herbert Schöffler, *Deutsches Geistesleben zwischen Reformation und Aufklärung: Von Martin Optiz zu Christian Wolff* (Frankfurt am Main: V. Klostermann, 1956): 132-137). Schings convincingly showed that although Gryphius may have had some exposure to Descartes' works, their philosophies were widely divergent. See Hans-Jürgen Schings, *Die Patristische und Stoische Tradition bei Andreas Gryphius: Untersuchungen zu den Dissertationes funebres und Trauerspielen* (Köln and Graz: Böhlau Verlag, 1966), 54-75.

humans to gain perfect knowledge in his opposition to Paul Nagel's claims that he could achieve a perfect astronomy through revelation. Crüger specifically quoted Paul's letter to the Corinthians, a favorite text of Pyrrhonian skeptics.[57] According to Richard Popkin, the Pyrrhonian style of skepticism held "that there was insufficient and inadequate evidence to determine if any knowledge was possible, and hence that one ought to suspend judgment on all questions concerning knowledge."[58] Yet the passage that Crüger took from Paul suggests rather that he adopted Ciceronian or Academic skepticism. Academic skeptics went further, in one sense, in their criticisms of human knowledge than the Pyrrhonists by arguing that humans cannot achieve any certain knowledge. At best, mankind can only come to probable knowledge in this life.[59] Those who followed the Academics in the sixteenth and seventeenth century often held that human attempts at knowledge of the world were attempts in vain curiosity.[60] Crüger paraphrased the apostle Paul (1 Corinthians 13:8-10), who contrasted the constancy of charity with the imperfection of knowledge: "...whether there be knowledge, it shall vanish way. For we know in part, and we prophesy in part. But when that which is

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[57] Richard H. Popkin, *The History of Scepticism: From Savonarola to Bayle* (Oxford: Oxford University Press, 2003), 49.

[58] Ibid., xvii.

[59] Ibid., xviii.

[60] Heiko A. Oberman, "Reformation and Revolution: Copernicus' Discovery in an Era of Change" in *The Nature of Scientific Discovery: A Symposium Commemorating the 500th Anniversary of the Birth of Nicolaus Copernicus*, ed. Owen Gingerich (Washington, D.C.: Smithsonian Institution Press, 1975): 134-169, *139-140*; Fernand Hallyn, *The Poetic Structure of the World: Copernicus and Kepler*, trans. Donald M. Leslie (New York: Zone Books, 1990), 47.

perfect is come, then that which is in part shall be done away." Crüger quoted or paraphrased this passage in several of writings and included it in his last prognostication for 1639. In his funeral sermon for Crüger, Daniel Dilger recognized Crüger's consistent skepticism about knowledge and his hope for complete knowledge in the afterlife by relaying Crüger's quotations of Paul.[61]

Gryphius adopted the Academic skepticism that Crüger emphasized. As already discussed, he explicitly expressed his opinion that all is in vain including human knowledge. Along with his pronouncements on the "pretentious, unnecessary questions" regarding the motion of the heavens that he expressed in "Winter-Tag," Gryphius listed several reasons in another funeral sermon expressing his view of the futility of human searches for knowledge. First of all, the increased appearances of novelties due to observations made on voyages to the New World and those made of new stars, comets and planets through the telescope outweighed the combined abilities of philosophers and mathematicians to observe and explain them all. "How dismayed are the perceptive doctors about so many new treasures and wonders of nature which are discovered through daily astute investigations and also to explain all incomprehensible things, how imperfect they are."[62] The imperfection of human knowledge also resulted from the difficulty of the subjects mathematicians pursued, making such searches vain. "Earlier

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[61] See Dilger, *Christliche Leich-Predigt*, 21-22. Dilger relayed Crüger's paraphrase of Paul in his prognostication for 1639: "That in this life, all our knowledge may only be in parts, and here, we can attain no perfection."

[62] Gryphius, "Uberdrusz Menschlicher Dinge" in *Dissertationes Funebres*, 257-304, *280*.

Rheticus was impatient as he investigated in vain the motion of Mars,[63] and Riccioli argues extensively, how much astronomy still lacks today."[64] Mathematics was not the only subject that struggled. According to Gryphius, theologians had not achieved syncretism,[65] political philosophers were still trying to work out a general monarchy, one could still not square the circle using geometry, mechanists were still concerned with finding perpetual motion, and chymists still strove to find the philosopher's stone. These examples served to show "how often great science is married to poor judgment and reasoning."[66] "In short," Gryphius wrote, "it remains that the only Wiseman [God] laughs at human wisdom."[67] As summarized by Fernand Hallyn the position of Academic skeptics created an ironic relationship between God and man: "astronomy becomes a lesson in humility. To signify the fundamental infirmity of the human mind, God makes heaven appear monstrous and places its real beauty beyond man's grasp."[68] Gryphius's skepticism followed Crüger's, establishing a rift between the ways of

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[63] The printed postil to Gryphius's sermon reads: "Kepler, praefat. In motum Martis. Praefat. Almagest. Artic. 7," referring to Kepler's *Astronomia nova* and Riccioli's *Almagestum novum*.

[64] Gryphius, "Uberdrusz Menschlicher Dinge," 279-280.

[65] The first definition in the *OED* for the word syncretism shows that it was a word used in the seventeenth century to describe the "Attempted union or reconciliation of diverse or opposite tenets or practices, esp. in philosophy or religion; *spec.* the system or principles of a school founded in the 17th century by George Calixtus, who aimed at harmonizing the sects of Protestants and ultimately all Christian bodies."

[66] Gryphius, "Uberdrusz Menschlicher Dinge," 281.

[67] Ibid., 280. This might be a paraphrase from Pliny, H. 4. 34. cap. 8

[68] Hallyn, *Poetic Structure of the World*, 47.

mankind and the ways of God. Gryphius, Crüger and other Lutherans (including Luther himself) deployed Academic skepticism to encourage hope in the afterlife when souls stripped of human incapacities could commune with God.

The evidence Hugh Powell employs in classing Gryphius among those who lived in "divided and distinguished worlds" during the seventeenth century is not limited to the seeming contradiction in Gryphius's thought concerning Copernicus. Powell also argues, anachronistically, that Gryphius "delighted in scientific experiment conducted on modern lines, but *at the same time* lectured on chiromancy and practised astrology."[69] While Powell admits, again anachronistically, that Gryphius's "interest in astrology and kindred subjects" was not "peculiar in a scholar and scientist of his time," Powell still perpetuates the historiographical commonplace that seventeenth-century Europe was divided intellectually and that it stood at the cusp between two epochs which could be readily seen by contemporaries.

In counterargument to Powell's picture, Gryphius neither lived in a divided world nor was "modern" astronomy yet an antithesis to astrology during the seventeenth century. Both enjoyed the status of being "sciences." In the table accompanying *Leviathan* IX.3, for example, Hobbes classified both astronomy and astrology as sciences.[70] Hobbes's classification was not unique. Peter Crüger and his correspondent Johannes Kepler both strove to reform astrological practice while standing critical of

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[69] Powell, "Andreas Gryphius and the 'New Philosophy'," 276.

[70] Thomas Hobbes, *Leviathan* (London: Printed for Andrew Crooke, 1651), on table between pages 40 and 41.

those practices that benefited in their eyes only charlatans and deceivers. Gryphius encountered Kepler's and Crüger's style of astrological thinking while in Danzig.

Keplerian Astrology in Danzig

A discussion of the astrology of Johannes Kepler is vital to understanding the astrologies of Gryphius and Crüger. Kepler stands as a major figure in the history of astrology. He reformed astrological theory by emphasizing the importance of the aspects of the planets (their positions relative to one another in the zodiac).[71] Kepler argued that the aspects of the planets resonated with the souls of the earth and of mankind to create emotions and character. As we will see, Crüger early on agreed with Kepler's physical scheme for astrology that involved the effects of the aspects.

In *De Fundamentis Astrologiae Certioribus* (1602), Kepler defended astrology by placing several of the claims of astrology on a physical foundation. His defense of astrology came in response to a tradition of astrological criticism that followed Giovannni Pico della Mirandola's *Disputationes adversus Astrologiam divinatricem* (Bologna, 1495).[72] In defense of astrology, Kepler followed the order of argumentation found in Ptolemy's *Tetrabiblos*, the foundational text for theoretical astrology.

Where Ptolemy began the *Tetrabiblos* with an apology for the limits of astrology, Kepler already recognized those limits and he began his work going beyond further

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[71] Fritz Krafft, "*Tertius Interveniens*: Johannes Keplers Bemühungen um eine Reform der Astrologie" in *Die okkulten Wissenschaften in der Renaissance*, August Buck, ed. (Wiesbaden: Otto Harrassowitz, 1992), 197-225, *205, 221-222*.

[72] Robert S. Westman, "Kepler's Early Physical-Astrological Problematic" *Journal for the History of Astronomy* 32 (2001): 227-236.

criticism of astrological theory to a defense of the gems picked out of the mire of astrology. Like Ptolemy, Kepler was largely concerned with the powers of the sun, moon and the planets. He noted that one could rely on the physical power of the sun's warmth and that one could be sure that the moon affects terrestrial affairs such as the swelling of bodily humours when the moon waxes. But he admitted that "Natural philosophers have not yet completely understood the reason for this Sympathy."[73] Despite his inability to identify completely the physical causes behind the affects of the moon on the earth, Kepler wrote at length about what he saw as the third point of astrology which could be defended- the causes behind the powers of the planets.

Kepler argued that the planets affect terrestrial affairs only through the light that comes from the sun being reflected off a planet or the light that comes from a planet itself. Accordingly, what affects us "is not matter or actual body," it is light. The amount of light that comes from the sun and that is then reflected off a planet determines the "humidification" power of the planet. In Ptolemy's terms, this is the drying or moistening power. For Kepler, light emanating from the planet itself determined its "quality of warming."[74] Again, in Ptolemaic terms this is the heating or cooling power. Kepler assigned powers to the planets according to their apparent colors. This gave the powers of the planets a physical cause, because by knowing the color of a planet, we can

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[73] Johannes Kepler, *De Fundamentis Astrologiae Certioribus*, translated by J.V. Field as *On Giving Astrology Sounder Foundations* in J.V. Field, "A Lutheran Astrologer: Johannes Kepler" *Archive for History of Exact Sciences* 31 (1984): 190-272, quote from p. 235. Unless otherwise noted, all translations and page numbers come from Field's translation. A better translation of the title would be *On the more certain foundations of astrology*.

[74] Ibid., 238.

know whether or not a planet reflects more light than it emits and we can know something about the surface of a planet by its color.

The fourth tenet of astrology which Kepler defends in *De Fundamentis* is the effect which the astrological aspects have on earthly affairs. Unlike the physical causes Kepler found for the powers of the planets, he related the power of aspects over earthly affairs to the power of the soul over the body. Just as a tree is affected by its geometrically-minded soul to make sure that there are five seeds in each piece of its fruit, the soul of the earth is affected by the aspects of the planets and acts accordingly by "engendering metals, keeping the Earth warm, and sweating out vapours to beget rivers, rains and other meteorological phenomena."[75]

Peter Crüger agreed with Kepler's aspectual astrology and he also agreed with Kepler's formulation that the geometrical configurations of the aspects resonated with the soul at the time of birth, thereby imprinting on the soul a certain temperament. Crüger and Kepler concurred, however, that it was virtually impossible to determine an individual's temperament because of the difficulties inherent in calculating exactly the time of the conception of a child, as well as the precise time of a baby's birth due to faulty and unreliable clocks. In his prognostications Crüger asked how astrology could predict accurate nativities, when it could not predict something easy like the weather. He answered that the weather was predicated upon terrestrial causes whereas a person's temperament and inclination are impressed upon him by the heavens at birth (which influence cannot be interrupted by air). But as Crüger emphasized, this can only happen

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[75] Ibid., 252.

"when the hour and minute of the Nativity is precise and correct, which one can have barely one or two times out of 100 Examples."[76]

So, even though Crüger and Kepler agreed that the stars had some influence on the fashioning of the soul at birth, Crüger voiced strong criticism against the practice of drawing up nativities. Not that it wasn't possible, but that it was probably more of a waste of time, since it would only work in an extreme minority of cases.[77] Beyond this, Crüger and Kepler adamantly argued for the free will of man despite man's soul being given a temperament at birth. After birth, man was free to choose what he wanted to make of himself. While not neglecting the role of man's surroundings, Kepler numbered three of the most important causal factors behind the outcome of the life course of man: namely God's will, "the diagram of a person's natural soul, according to the constellation which was present at the time of birth and the mind and temperament which fashions itself after the same image or character"[78] and "the sovereignty of men, the principal

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[76] Crüger, *Cupediae Astrosophicae*, 1617: XI, Eiii^{v}. Only once in a hundred times were vulgar astrologers correct according to Kepler. See Powell, *Trammels of Tradition*, 107.

[77] Several times in his prognostications, Crüger affirmed that it was possible to give accurate nativities. Crüger followed Aristotle, who said in Book 4 of his *Physics* that 'things above agree with things below.' Crüger questioned however, how a solar eclipse could affect cattle and birds if these animals knew nothing at all about astrology. He answered that the heavens do in fact affect things below. These affects are not just fictions, which astrologers make up for profit or gain. See Crüger, *Cupediae Astrosophicae*, 1620: I.

[78] For contemporary literary conceptions of fashioning, see Stephen Greenblatt, *Renaissance Self-Fashioning from More to Shakespeare* (Chicago and London: University of Chicago Press, 1980).

faculty of the soul, which is free and stays free!"[79] The mind preceded the soul in every way, which in turn preceded the outcome of behavior and of the physical appearance of every individual. But God's will and mind preceded everything else. In *Tertius Interveniens* (1610), Kepler asserted that "all of nature in this world below and the nature of every person in particular, namely the inferior faculties of the soul, was formed by God in the first creation."[80]

Crüger followed Kepler also arguing for man's free will. He addressed the question whether or not stars were evil and what effects if any they had on man. In his answer, he argued that the stars themselves were not evil. It is true however that they work "according to the condition of the recipient." He continued that "the effects of some stars are often harmful, not because of the stars but because of man's fallen nature."[81] Above all, the responsibility for correct behavior and action was placed on the shoulders of mankind. Each individual was responsible for his own actions, displacing the tendency to blame the stars and to use the stars as scapegoats in place of personal accountability.

The attitudes of Kepler and Crüger should suffice to show that in the seventeenth century, there were varying systems of astrology and varying degrees to which one held to one system or another. In other words, astrological practices and astrological thought

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[79] Johannes Kepler, *Tertius Interveniens: Das ist Warnung an D. Philippum Feselium und etliche mehr Philosophos, Medicos und Theologos: daß sie den Verwerffung der Astrologiae nicht das Kindt mit dem Bad außschütten* (Franckfurt am Mayn: Tampach, 1610) in *GW* iv, 231, sec. 104.

[80] Ibid., iv: 203.

[81] Crüger, *Cupediae Astrosophicae*, 1617: X, Eiii^{r}.

consisted of heterodox positions. Even to say that Andreas Gryphius lived in conflicted worlds because he "delighted in scientific experiment conducted on modern lines, but *at the same time* lectured on chiromancy and practised astrology," one would still need to establish *which* astrology Gryphius practiced.[82]

Through his poetry and plays, Gryphius largely expressed conviction in the system of astrology that Kepler and Crüger proposed. In a private poem he never published, Gryphius spoke "Of his Birthday" and the possible influence heavenly bodies may have had on him at birth. In line with Kepler's confidence that there was something to the effects of the sun's warmth and light (tenets one and three in his defense), Gryphius began his poem:

> The noble sun now calls upon the balancing scales of Astraea /
>
> And appoints hours equally to day and to night /
>
> She allots me the time / which brought me into the light /
>
> When she had reached the ninth [celestial] portion with golden rays.
>
> O eternally-lit Sun! You who paints the heavens /
>
> And decorates the earth; at whom my soul smiles
>
> . . . . . .
>
> Help me apportion exactly and well my time /
>
> And justice, oh help! Help me that I never fail /
>
> That I may live beside you as you tender judgment.[83]

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[82] Quoting again from Powell, "Andreas Gryphius and the 'New Philosophy'," 276.

Like Kepler and Crüger, Gryphius also held to the possible influences that the light of the stars may have had on the souls of men. "When the heavenly lights attain comfortable places in heaven, they do not remain idle. Rather, they give off power of themselves and cause in the world wonderful ends and motions."[84] Finally, like Kepler, Gryphius knew of the possible relationship between the moon and the sun, but also like Kepler was not sure what to make of the relationship. In his comedy *Horribilicribrifax*, Gryphius ambiguously places in the mouth of Cyrilia popular belief about the moon's effects:

> There comes the moon.
>
> Please be merciful to me you new light,
>
> For the fever and also the gout[85]

Gryphius also followed Crüger in the way he dealt with the effects comets may have had on the actions of mankind. In his funeral sermon for Sigmund Müller, he noted that there was a connection between comets and actions of men, but that it had more to do with the light of heavenly bodies than the actual existence of comets. Because the tail of a comet

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[83] Andreas Gryphius, "Ueber seinen Geburts-Tag" in *GdW*: I, 105. In his analysis of this sonnet, Gerhard Lemke argues that Gryphius never published it during his lifetime possibly because it was an astrological analysis of his birth. See Gerhard H. Lemke, *Sonne, Mond und Sterne in der deutschen Literatur seit dem Mittelalter: Ein Bildkomplex im Spannungsfeld gesellschaftlichen Wandels* (Bern, Frankfurt am Main, Las Vegas: Peter Lang, 1981), 112. Gryphius however sometimes assessed the lives of those for whom he gave funeral orations by analyzing character traits according to possible astral influences.

[84] Gryphius, "Schlesiens Stern," *Dissertationes Funebres*, 82.

[85] As quoted in Lemke, *Sonne, Mond und Sterne*, 42.

blocks out the light of stars, the balance of light issuing both from the comet and from the light of stars would shift towards the comet's favor and would affect souls accordingly.[86]

Gryphius however was not in complete agreement with his master's opinions. Crüger was skeptical of Cardano's claims, for example, that the stars and constellations that had power over Rome made that city destined to rule the entire earth.[87] Gryphius was still convinced, on the other hand, of the great influence that the signs of the zodiac had over the earth. His statement that no one is unaware that a land's sign exercises great influence over it ran against the grain of Crüger's astrology.[88]

Conclusion

As a student in the Danzig Gymnasium, Gryphius learned principles of poetry, astronomy and astrology from Peter Crüger. Keckermannian reforms were still in place in the Danzig Gymnasium when Gryphius attended as he learned both poetry and mathematics from Crüger. Because of his background and education in mathematical subjects as well as in poetry, Gryphius had offers in 1650 to be a professor of mathematics at universities in Heidelberg, Frankfurt an der Oder, and Uppsala. He declined the offers.[89]

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[86] Gryphius, "Schlesiens Stern," *Dissertationes Funebres*, 83.

[87] See Crüger, *Cupediae Astrosophicae*, Gii^{v} – Giii^{v}.

[88] Gryphius, "Schlesiens Stern," *Dissertationes Funebres*, 84.

[89] Mauser, *Die <Sonnete> des Andreas Gryphius*, 109. According to Mauser, Gryphius's decision to decline the offers to teach was connected to the tragedies of the Thirty Years War that wasted German lands more than any other area of Europe that suffered from wars of religion.

This chapter has viewed Peter Crüger as a primary source for the ideas, theories and attitudes that Gryphius gathered in the short time he resided in Danzig during his formative years. It has also offered an explanation for the outwardly perplexing contradiction between Gryphius's praise of Copernicus and his belief in the vanity of human knowledge. The explanation is rooted in Peter Crüger's own attitudes towards Copernicus and his insistence that human knowledge is imperfect. While this chapter does not deny that Gryphius could have built his skepticism from other sources, it does privilege Crüger's Academic skepticism.

Finally, the problem of knowledge and its limits or its limitlessness plays into the problem of the next chapter that pushes the boundaries of what could be known in the seventeenth century. Investigations into what could be known about the planets, their number, the possibility of life on other planets and the size of the universe further changed the view of the Earth as the center of the universe. The locus for chapter 4, however, shifts away from the Gymnasium to the houses of merchants and immigrants in Danzig. Like chapter 3, chapter 4 concentrates on the experiences of visitors and guests in Danzig, especially the life of Abraham von Franckenberg.

Chapter 4

Private Patronage in Danzig and the Idea of a Plurality of Worlds: Abraham von Franckenberg's *Oculus Sidereus* (1644)

Patronage came in varying forms in the sixteenth and seventeenth century. This chapter will disucss Abraham von Franckenberg, a displaced nobleman from Silesia, who sought patronage from merchants in Danzig during the 1640s. In a strange reversal of patronage relationships, the nobleman von Franckenberg desired support from rich merchants not to increase his social status nor to associate himself with any one individual, but for financial freedom from daily labors which would free him and make it possible for him to continue writing without the distractions of earning his own keep.

While in Danzig, von Franckenberg completed and published *Oculus Sidereus* (1644), a text containg his ideas concerning the plurality of worlds. From the thought of Giordano Bruno and the observations of Galileo grew increasing speculation in the seventeenth century about life on other worlds (especially life on the moon) and possible implications of such life for Christian theology.[1] This chapter engages with two recent appraisals of the "plurality of worlds" idea in the seventeenth century and offers an alternative appraisal employing von Franckenberg's *Oculus Sidereus*. The first appraisal is from Karl Guthke who argues that for the German-speaking area of Europe there was a "tendency to ignore the new worlds" that "remained the norm in German literature and

[1] The standard history concerning the "plurality of worlds" idea in the seventeenth century is Steven J. Dick, *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant* (Cambridge: Cambridge University Press, 1982).

philosophy right up to the early eighteenth century."[2] While there may have been a trend to ignore the idea of a plurality of worlds in German literature and philosophy, the existence of Franckenberg's *Oculus Sidereus*, a German text with a Latin title, provides a strong counterexample to Guthke's general claim.[3] In this chapter, I will attempt a reconsideration of Guthke's claim by examing the intellectual and social conditions in Danzig that help explain the creation and publication of Franckenberg's text in the city and its reception there and elsewhere. In order to delineate further the conditions of Danzig, this chapter also compares and contrasts Franckenberg's work about the plurality of worlds with the discussion of the same idea in England by the divine John Wilkins at

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[2] Karl Guthke, *The Last Frontier: Imagining Other Worlds, from the Copernican Revolution to Modern Science Fiction*, Helen Atkins, trans. (Ithaca, N.Y.: Cornell University Press, 1990), 113.

[3] On Franckenberg's *Oculus Sidereus* see Saverio Ricci, "Un Commento Secentesco al *De Immenso* di Bruno: *Oculus Sidereus* di Abraham von Franckenberg" *Nouvelles de la Republique des Lettres* (1985): 49-65; Siegfried Wollgast, *Philosophie in Deutschland zwischen Reformation und Aufklärung, 1550-1650* (Berlin: Akademie-Verlag, 1988), 788-791; and Susanna Åkerman, *Rose Cross over the Baltic: The Spread of Rosicrucianism in Northern Europe* (Leiden: Brill, 1998), 228-236. Ricci's analysis of *Oculus Sidereus* is the most comprehensive in setting the book within the context of the reception of Giordano Bruno's ideas during the seventeenth century. According to Åkerman, one of Franckenberg's goals in writing *Oculus Sidereus* was to show that the Copernican theory came as a result "of biblical views." Giordano Bruno takes his role in Franckenberg's text as the defender of "an unbounded, uncentered universe unfolding uniformly in all dimensions" (229). Franckenberg's commentary on Bruno's text *De immenso* also specifically discusses "Bruno's [anti-Aristotelian] view that 'the center of gravity is in each and every body'" (231). In addition to references to the idea of plurality of worlds as found in the works of Michael Maestlin, Reymarus Ursus, Johannes Kepler, Christoph Scheiner, Tommaso Campanella and René Descartes, Franckenberg used Menasseh ben Israel's *De Creatione Problemata* (Amsterdam, 1638) to show that the idea of a plurality of worlds was in harmony with the views of the Hebrews. Siegfried Wollgast further elevates Franckenberg as an apostle of Bruno's teachings. He notes that appended to *Oculus Sidereus* is a catalog of Bruno's works, only half of which had been published according to Franckenberg. But that is as far as Wollgast goes with his report of Franckenberg's commentaries on Bruno.

about the same time. Second, in a recent article, Ingrid Rowland makes the claim that Athanasius Kircher derived inspiration for his *Iter Exstaticum* or *Ecstatic Journey* directly from Giordano Bruno. This chapter suggests shortly that Kircher could have taken his inspiration directly from Franckenberg's text which contained a detailed summary of Bruno's poem *De Immenso et Innumerabilibus*.[4]

Abraham von Franckenberg (1593-1652)

Who was Abraham von Franckenberg and what is in his book *Oculus Sidereus*? Born in the castle Ludwigsdorf near Oels in Silesia, Franckenberg studied at the Gymnasium in Brieg (today Brzeg, Poland) where he first met lifetime friends Cyprian Kinner (d. 1649) and Samuel Hartlib (c.1600-1662), both of whom are discussed in more detail later in this chapter.[5] From 1612 to 1617, Franckenberg studied at the universities of Leipzig, Wittenberg and Jena.[6] Although well-versed in eloquence and in theology, Franckenberg was not at peace with his faith. In 1617 after attending jubilee celebrations

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[4] There is much that connects Franckenberg to Kircher including their correspondence, in which Franckenberg labeled Kircher a "mystic." See the letter from Franckenberg to Kircher, 14 June 1646, in Abraham von Franckenberg, *Briefwechsel*, Joachim Telle, ed. (Stuttgart-Bad Cannstatt: frommann-holzboog, 1995), 193, 194. Hereafter cited as *AvFB*. For translations, I have relied heavily on Telle's German translations of some of Franckenberg's letters that were originally written in Latin. In each citation I give both the location of the Latin passage (if the letter was originally written in Latin) and the German passage

[5] For biographical information on Franckenberg, see, Joachim Telle, "Abraham von Franckenberg" in *Literatur Lexikon: Autoren und Werke deutscher Sprache*, Walther Killy, ed. (Gütersloh/München: Bertelsmann Lexikon Verlag, 1989): 471-472; and Jeffrey L. Sammons, Angelus Silesius (New York: Twayne Publishers, 1967), 22.

[6] Von Franckenberg shows up in the matriculation lists of Wittenberg on May 1612 as "Abrahamus a Franckenbergk in Ludwigsdorff." See *Album Academiae Vitebergensis*, 127.

in Strasburg and Basel of the hundredth anniversary of Luther's initial criticisms of the Church, Franckenberg experienced a spiritual conversion that transformed his pursuit of knowledge. By his own account, Franckenberg contemplated his struggle with contending faiths on a "quiet Sabbath" day. He reported that he could not eat or sleep because of the worry he had to find true religion. After much prayer and supplication, he reported a vision in which he claimed for himself a true theology given him by the light of glory, grace and nature- a light brighter than all other lights.[7] After this experience, he transferred his inheritance to his brother and took on the journey of a truth-seeker.

During the next several years, Franckenberg associated himself with the shoemaker and religious thinker Jacob Böhme (1575-1624) and his followers. On Christmas day, 1622, Franckenberg found himself sitting around the table with luminary figures such as Böhme and his friend Theodor von Tschech, participating in a discussion concerning the "union of philosophy and theology, so that they do not contradict any more."[8] In the following years, Franckenberg enjoyed a close association with Böhme and would eventually write his biography.[9] In the 1620s and 1630s, Franckenberg busied

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[7] Franckenberg to N.N., 21/22 December 1649, *AvFB*: 244. Another letter written to N.N. probably around the same time also recounts his enlightenment. See Franckenberg to N.N., date unknown, *AvFB*: 301.

[8] Will-Erich Peuckert, *Das Rosenkreutz*, 2nd ed (Berlin: Erich Schmidt Verlag, 1973), 246.

[9] In 1624, Böhme's death year, Franckenberg urged him to compile some of the thoughts they had discussed and the result was Böhme's last publication during his lifetime- the *Tafel der drei Prinzipien* or *Tablet of 3 Principles* (1624). During the two decades after Böhme's death, Franckenberg was involved with the translation of Böhme's texts into Latin and with the publication of Böhme's works to which he added his biographical work of Böhme.

himself with his writings, many of which he left unpublished.[10] His *Raphael oder Arzt-Engel* (1638, pub. 1676) was a spiritual treatise on medicine in the tradition of Paracelsian alchemical thought. Following a disciple of Paracelsus, Jan Baptista van Helmont (1577-1644), Franckenberg felt assured that the angel Raphael would give knowledge necessary to both medicine and spiritual matters.[11]

Not surprisingly, by the 1640s, Franckenberg's interests had shifted to include an interest in celestial objects next to his fascination with the more earthy subjects of alchemy and medicine. Like others before him, including Peter Crüger and Paul Nagel, Franckenberg looked to motions of heavenly bodies as signs for future earthly events. For example, in 1637, he foretold the imminent arrival of the Second Coming of Christ due to "great and innumerable miracles and signs" seen in the heavens. From events in the past, Franckenberg considered the new star of 1572 as perhaps a sign that portended Jacob Böhme's birth.[12] It was around this time that he also drafted the manuscript of *Oculus Sidereus*, which was a defense of Copernicus's theory and a summary of the teachings of Giordano Bruno concerning the plurality of worlds and life on other worlds.

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[10] Among them were *Jordanssteine* (1636, pub. 1684), a text containing Franckenberg's explanations and opinions concerning points of Christian doctrine, and the companion texts *Mir nach* and *Via veterum sapientum* (1637-9, pub. 1675).

[11] Later, Franckenberg was openly excited upon the posthumous publication of van Helmont's *Ortus medicinae* (Amsterdam, 1648) and considered it a signal for events of the Second Coming (*AvFB*: 48-49). Specifically, Franckenberg saw the publication of van Helmont's book as a sign for the beginning of the Age of Elias. Upon his return, Elias would perfect science and would provide the answers to all the unsolved problems of medicine and alchemy. Franckenberg initially became interested in the return of Elias when he first read the Rosicrucian text *Fama fraternitatis* (1614) as a university student.

[12] Franckenberg to N.N., 21 October 1641, *AvFB*: 140.

Franckenberg's manuscript (more of which will be discussed later), became secondary to an overriding concern to protect himself from the onslaught of the battles of the Thirty Years War and from orthodox Lutherans not pleased with his spiritual teachings. Because of these concerns, Franckenberg sought and found refuge in Danzig, where he could live and express his ideas without fearing for his life.

The reason that Danzig could afford such refuge was its staunch neutrality. During the Swedish-Polish war that began in 1601, the city's merchants and Senate had a vested interest in keeping the city neutral because of the city's importance as the principal port of trade on the Baltic. By the 1620s, they were able to convince the King of Poland to remove the royal Polish fleet that had been posted in Danzig. But starting in 1626, the Swedes intermittently occupied the harbor, inhibiting trade. The Swedes left in 1628, but only upon the condition that they receive tariffs from trade in Danzig and that there be no building, equipping or stationing of naval ships in Danzig. In 1635, the King of Poland tried to reintroduce a royal fleet in Danzig defying the provisions of the truce with Sweden. He met some support in the city from merchants, but the Senate was largely unsupportive and the harbor remained impartial. Because of the Senate's show of detachment from the King of Poland, Sweden signed a twenty-year truce with Danzig the same year and lifted the tariffs they had imposed on the city.[13] Danzig's neutral stance left it largely unscathed during the battles between Poland and Sweden and the battles of the Thirty Years War and made it a home for refugees like Franckenberg.

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[13] Cieślak and Biernat, *History of Gdańsk*, 154-163.

Intellectual Conditions in Danzig

When Franckenberg arrived in Danzig on July 9, 1642, conditions were ripe for the printing of his ideas in defense of Copernicus and of Bruno, because of the discussions that had taken place and books printed in the city about the ideas of Copernicus and Bruno in the previous fifty years before Franckenberg's arrival. In the previous chapters, I outlined attitudes towards Copernicus of others who lived in the city, including those of Mathias Meine, Bartholomew Keckermann, Peter Crüger and Andreas Gryphius. In addition to what has already been previously outlined, there were those in Danzig, not surprisingly, who took a decidedly negative stance towards Copernicus. Peter Lossius (1588-1639), the professor of Greek and oriental languages during the time Crüger was the professor of mathematics, participated in a disputation in 1636 titled *Disputatio physica de caelo*, in which he critically examined Copernicus's theory.[14] Yet even among other faculty in the Gymnasium who did not necessarily have an apt knowledge of the mathematical problems associated with calculating heavenly motions, Copernicus still held a respectable position.

During Franckenberg's stay in Danzig the professor of mathematics was Lorenz Eichstadt (1596-1660), who replaced Peter Crüger after Crüger's death in 1639. Eichstadt had earlier served as a physician in the German town of Stettin, but he was also well-versed in the science of the stars and he regularly issued prognostications, calendars and ephemerides. At the Danzig Gymnasium, the multifaceted Eichstadt held

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[14] Bieńkowska, "From Negation to Acceptance," 107. As with the disputation of Jacob Gerhard discussed in chapter 3 (see note 36 of chapter 3), more work should be done with Lossius's disputation both to test Bieńkowska's summary and to set it in the context of similar disputations and theses published from other German schools.

professorships in medicine, mathematics and physics from 1645-1660.[15] Eichstadt brought Copernicus's theory into the classroom. The private notebooks of one of his pupils contains a sketch of the heliocentric system and the school advertisement for the year 1648 announced that Eichstadt was prepared to deliver lectures on the heliocentric theory and the discoveries of Galileo.[16] Franckenberg noted the receptive nature that both Crüger and Eichstadt held towards Copernicus and he added both of them to a list of defenders of Copernicus he included in *Oculus Sidereus*.[17]

Copernicus's assertion that the universe must be immense in size provided added support to the later discussions of Giordano Bruno concerning a plurality of worlds and life on other worlds. Earlier, Crüger recognized the connection between Copernicus and Bruno in his prognostication for 1631 in which he questioned Copernicus based on his own unbelief in a vast and useless space between the sphere of Saturn and the sphere of the fixed stars (see Chapter 3). Crüger remarked that if one held to Copernicus's theories, one could even assume the reality of a plurality of worlds, and could possibly confirm it by direct observation. But Crüger left untouched remaining speculations that could come from Copernicus's hypotheses. "Whatever else could result from this

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[15] In addition to his output of texts concerning mathematics and the stars, Eichstadt wrote a book on osteology and incorporated theories of blood circulation into his work. See Maria Bogucka, "Health care and poor relief in Danzig (Gdansk): The sixteenth- and first half of the seventeenth century," in *Health Care and Poor Relief in Protestant Europe, 1500-1700*, Ole Peter Grell and Andrew Cunningham, eds. (London and New York: Routledge, 1997): 204-219, *214*. This article was republished as article thirteen in Bogucka, *Gdańsk/Danzig and its Polish Context*.

[16] Bieńkowska, "From Negation to Acceptance," 108.

[17] Abraham von Franckenberg, *Oculus Sidereus*, (Dantzig: G. Rhete, 1644), XIII.

opinion with respect to a plurality of worlds, I will not discuss here."[18] This was not to say that one was not free to talk of Bruno and his ideas in Danzig.

For his part, Franckenberg came to Danzig with an already-developed appreciation of Bruno. In the summer of 1640, he requested of two of his friends- A.W. van Beyerland in Amsterdam and Johann Permeier in Vienna- that they send him texts of Bruno.[19] To Franckenberg, Bruno's "very capable *Ingenium* is lit so high in the light of constantly working nature, that at the present time there are few of his like at hand."[20] In a conversation he later held with Georg Seidenbecher of Danzig, Franckenberg expressed his dismay for what he considered the mistreatment of the Italian Bruno, who was burned at the stake in his homeland "as if he were a magician and heathen."[21] In *Oculus Sidereus* it was Franckenberg's intention to contest misrepresentations of Bruno by resurrecting Bruno in the German vernacular for his immediate Prussian audience and for others. As for the intellectual resources and context needed by Franckenberg to accomplish his mission, Danzig suited his desires to discuss his ideas about the plurality of worlds and print them freely.

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[18] Crüger, *Cupediae Astrosophicae*, 1631: IV, Jji^{r}. See also, Bieńkowska, "From Negation to Acceptance," 107.

[19] From Breslau, Franckenberg wrote to van Beyerland, "It would please me [to attain] a publication (de Causâ, Principio et Uno by Giordano Bruno, the Nolan) [either] in Italian or Latin." Franckenberg to van Beyerland, 13 May 1640, *AvFB*: 126. Franckenberg made his request to Permeier in the postscript of a letter Franckenberg wrote on 12 July 1640. See Peuckert, *Das Rosenkreutz*, 282 and Ricci, "*Oculus Sidereus* di Abraham von Franckenberg," 51.

[20] Franckenberg, *Oculus*, XLI.

[21] G.L. Seidenbecher, *Conversatio* in *AvFB*: 355-363 (Latin), 363-371 (German translation), *356*, *365*.

Patronage

However, during Franckenberg's stay in Danzig, material conditions were less than ideal, notwithstanding the means to support intellectual work that Danzigers possessed. The budding class of rich merchants who lived like lords in the city often lived in excess even to the point that in the year Franckenberg arrived in the city, the Senate passed edicts to curb such excess living. As the English traveler Peter Mundy reported, in the city there was "High Feeding (For here is plenty and variety), as att their weddings, For the Moderation wheroff, as allsoe their exesse in apparell, there are this yeare, 1642, certayne edictts and orders sett Forth in print by the Burgameister and councell off the Citty."[22] Among the households where Franckenberg could have found a place in Prussia, he chose that of Martin du Pré a "hollandish businessman" and denizen of Danzig.[23] By November 1642 only three months after his arrival in the city, Franckenberg was already lamenting his poor condition in du Pré's household. He reported to his friend Johannes Permeier, "Indeed I have free room and board, but I must instruct the children for it and thereby lose, as it were, the best time for meditation and added to this I can hold no conversations."[24] Although his physical living conditions must have been comfortable, Franckenberg hoped to find a new patron, who would make

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[22] Peter Mundy, *The Travels of Peter Mundy in Europe and Asia, 1608-1667*, ed. Richard Carnac Temple, 5 vols. (London: Printed for the Hakluyt Society, 1907-36), 4:168. See also pages 180-181 for the feasting and drinking rituals of Danzigers.

[23] Franckenberg to Johannes Bureus, 22 March 1641, *AvFB*: 136, 137; and Franckenberg to Bureus, 27 October 1642, *AvFB*: 154, 156.

[24] Franckenberg to Johann Permeier, November 1642, *AvFB*: 160.

it possible for him to have the time and resources "to help in the investigation of the new philosophical world" that he envisioned in his *Oculus Sidereus*.[25] Indeed even at the time of his report to Permeier of his condition in Danzig, Franckenberg had already written his "Oculum Sydereum," and had sent a manuscript of it to Vienna, seeking corrections to possible paradoxes in the texts, and comments on the system of the World it contained which was completely different from any heretofore accepted.[26]

Upon its first inception before von Franckenberg arrived in Danzig, *Oculus Sidereus* was not meant as a plea for patronage. But by the time of its publication in 1644, references to and praises of the wealthy brewer and eventual astronomer Hevelius in the text suggest that Franckenberg meant it as a work showing his worthiness of patronage, specifically targeting Hevelius as a prospective patron. Before final publication, Franckenberg added references to Hevelius within the text. For example, when listing new discoveries in astronomy, Franckenberg cites Hevelius and his yet-unpublished work on sunspots at the end of his sources for knowledge on sunspots.[27] When listing the phases of Venus, Franckenberg again brought up the phenomena of sunspots "concerning which in the future something more sharply seen and known may see the light of day in the observations of the honorable H[err] Johann Hevelke."[28] Finally, Franckenberg unabashedly called Hevelius his "great friend" when he announced

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[25] Ibid.

[26] Ibid.

[27] Franckenberg, *Oculus*, XXV.

[28] Ibid., XXVII.

in *Oculus Sidereus* that Hevelius had portrayed the moon and its features in "40 or 50" figures done in his own hand, referring to the engravings that would show up in Hevelius's *Selenographia* of 1647, of which Franckenberg already showed an intimate knowledge by 1644.[29]

Franckenberg's attempts at patronage with *Oculus Sidereus* did not initially succeed. Two years after publication, he reported he had hoped to have won through his publication some funds for traveling and patronage "but fate and desire do not keep pace together." However, there was a glimmer of hope in his report that there were those who valued his work including Hevelius himself.[30] And a year later in 1647, Franckenberg's attempts to garner more favorable patronage must have succeeded, as evinced in a letter to Kircher in which he praises Hevelius as "a zealous friend of truth and of your works and to me an exceptional and gracious patron."[31] Yet never content with what he had, Franckenberg told Kircher in 1648 that he endeavored to collect all of Kircher's magnificent works, but that "in the meantime one must look around for patrons."[32]

Ultimately, Franckenberg's economic condition while living in Danzig was never satisfying. Not only did he receive little financial support from his home in Silesia,

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[29] Ibid., XXXII.

[30] "Nevertheless, there are some, albeit only a few, who value my work. Not the least among them are Herr Comenius and Herr Hevelius." Quote from Franckenberg to Samuel Hartlib, 25 August 1646, *AvFB*: 197, 200.

[31] Franckenberg to Kircher, 31 August 1647, *AvFB*: 210, 212. Franckenberg first referred to Hevelius as a patron in a letter to Kircher written only three days before the above-quoted letter. See, Franckenberg to Kircher, 28 August 1647, *AvFB*: 207, 208.

[32] Franckenberg to Kircher, 29 April 1648, *AvFB*: 218.

Franckenberg never felt at home in Danzig. He wrote that while in Danzig, he felt he subsisted on "foreign bread."[33] Despite his misgivings, Franckenberg still recognized that he was better off in Danzig than somewhere else and that he was privileged to be in the station he was during his stay there. He reported to Kircher that his friend Cyprian Kinner shared similar life experiences, including being an exile from his homeland, and that Kinner "now lives here [in Danzig] and is more fortunate."[34] But even Franckenberg must have recognized that despite Kinner's apparent ameliorated station in Danzig, Kinner still struggled to achieve even the basic level of comfort that Franckenberg enjoyed. A comparison between Franckenberg's stay in Danzig and Kinner's will help show what foreigners were up against while living in the city.

Franckenberg and Kinner had long been friends.[35] The deaf Kinner most likely knew Franckenberg during his childhood, for they both attended school in Brieg at the

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[33] Franckenberg to Samuel Hartlib, 25 August 1646, *AvFB*: 197, 200; and Seidenbecher, *Conversatio*, 355-56, 363-65. At the time of their conversation, Franckenberg "had lived in Danzig for seven years and had not even received seven Soldi" from home. He also referred to Hevelius as "all too peculiar."

[34] Franckenberg to Kircher, 27 February 1649, *AvFB*: 224, 225.

[35] Kinner received doctorates in both law and medicine. He worked dealing with State affairs for the Imperial Court under the patronage of Baron Michael Sendivogius starting in 1631. After two years of service to Sendivogius he was ennobled by the Emperor and in 1638 Kinner became a councilor to George Rudolf the Duke of Brieg. He married the daughter of the wealthy noble von Rhedern family, which brought him a healthy dowry that he set aside to further his project of educating children. Soon, however, his wife lost her patrimony and he the house in Brieg due to the Thirty Years War. In 1645, Kinner and his family, which at the time consisted of his wife and four children, moved from Brieg to join Jan Comenius in Thorn where Kinner and Comenius would collaborate on educational theories. See George Turnbull, *Hartlib, Dury and Comenius: Gleanings from Hartlib's Papers* (Liverpool: University Press of Liverpool, 1947), 384-396.

same time.[36] From 1645 to 1647, Kinner collaborated with Comenius in Thorn (today Toruń, Poland) near Danzig, on plans for the universal education of children. But their relationship soon soured and by May of 1647, Kinner began thinking about where he should move. He consulted his friend Peter Zimmerman, reverend of the Reformed Church in Thorn, who advised him to move to Danzig, a place suitable to Kinner's plans and personality and a place where there were possibilities for setting up a private school or practicing medicine that did not exist elsewhere in Prussia.[37]

We learn from a letter of September 11, 1647, that Comenius intended to cut his financial support of Kinner completely. Echoing Zimmerman's recommendation to Kinner to find refuge in Danzig, Comenius felt that Kinner could "support himself well and honourably by the practice of medicine, especially since there are those who will help him in that at Danzig."[38] Kinner had his doubts about finding people to help him start a medical practice in Danzig. Even though he had studied medicine, he never practiced it, devoting his time to political and diplomatic matters. Kinner also doubted that without financial help he could start a medical practice without an already-established reputation particularly because there were already many medical practitioners in Danzig.[39] Kinner's doubts were confirmed when no assistance was forthcoming. On November 6, Zimmerman wrote again to Kinner, this time lamenting that Kinner had not

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[36] Frankenberg relayed a letter from Kinner to Comenius written on June 17, 1645. See Turnbull, *Hartlib, Dury and Comenius*, 396.

[37] Ibid., 415.

[38] Ibid., 406. In his search to relocate Kinner, Comenius had asked Hevelius about the help Kinner might receive in establishing himself in Danzig.

[39] Ibid., 408-409.

been able to find support in Danzig "among the many thousands who spend their resources extravagantly."[40]

Kinner must not have been completely discouraged by his initial attempt to find a home in Danzig, for by July 1648, he had already decided he would live in Danzig, where he could at least have "conversation with learned men," specifically referring to Franckenberg, Mochinger and Johann Raue, another newcomer to Danzig.[41] Fortunately, he received assistance both from Raue and from his correspondent and friend Samuel Hartlib, a wealthy Prussian, who emigrated in 1628 to England, where he advocated useful learning. It was Raue who arranged free residence for Kinner from the Calvinist Daniel Crausius from August, 1648 to Easter, 1649.[42] Hartlib also promised financial support to Kinner so that he could stay in Danzig.

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[40] Ibid., 415.

[41] Ibid., 424.

[42] Ibid., 425. The outsiders Franckenberg, Kinner and Raue associated closely while living in Danzig. At the end of August 1649, Seidenbecher held his conversation with Franckenberg around the dinner table at Raue's house. See Seidenbecher, *Conversatio*, 363, 371. Raue was also no stranger to Comenius and his circle. During the 1640s, Danzig Bürgermeister Adrian von der Linde (b. 1610) a one time student of Chemnitz in Warsaw and of Hugo Grotius in Paris, was caught up in the universal reforms of Comenius. Apparently, von der Linde wanted Comenius's friend Johann Raue to hold a special chair in philology at the Danziger Gymnasium, which would be supported by a yearly stipend of 400 Reichstalern for 3 years. By 1645, the City had already set aside the money necessary to pay Raue to teach along Comenian lines in the Gymansium. See Foltz, *Geschichte des Danziger Stadthaushalts*, 160. Walter Faber, Raue's biographer, wrote that the City Council and von der Linde wished "that the project undertaken in the so-called pansophical works will succeed in the further advancement of young students." Comenius's pansophical plan, as outlined in his *Via lucis* of 1641 was to erect an academy of universal enlightenment and perfection. He was in close contact with several Danzigers including Johannes Mochinger, who had earlier

In many ways then, Kinner's economic situation mirrored Franckenberg's, living rent free with the promise of support from Hartlib. At first, Kinner was grateful to be in Danzig "in spite of the greater cost of living" compared to other cities in Prussia, because it was there that Kinner could find the intellectual stimulation he desired and a publisher to print his educational treatise *Elucidarium*, which Hartlib wanted to see through the press.[43]

However bright the promises that Hartlib and Raue offered Kinner and however appealing the opportunity to converse with learned men, none of this apparently could compensate for Kinner's sour experiences in Danzig. Kinner's goal was to have 200 copies of the *Elucidarium* printed by Andreas Hünefeld and sent to Hartlib before the winter months. In his letters to Hartlib during the summer months of 1648, Kinner constantly reminded him of the need for money in order to get his book printed, which need became ever more aggravated because, even with money down, in "Danzig printers are greedy and that Hünefeld is so supercilious as to deny that he ever agreed to print."[44] And even though Raue had arranged a house for Kinner, he still complained that it was not enough. Although it was typical for the Reformed Church in Danzig to offer larges sums of money to foreigners and to the needy, the Danzig Church refused Kinner,

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collaborated on a translation of Comenius's *Janua lingarum*. See Stekelenburg, *Albinus*, 228-240.

[43] Turnbull, *Hartlib, Dury and Comenius*, 427.

[44] Ibid., 424, 426. On Oct. 18, Kinner was still negotiating with Hünefeld over the printing of his book, which Kinner estimated the cost to be around 200 thalers. On Dec. 8/18, Kinner wrote Hartlib telling him the manuscript for the *Elucidarium* was completely finished "but there is no chance of his obtaining any help in Danzig towards the cost of printing it." Ibid., 428, 437.

because they thought he was unfairly publishing Comenius's work under his own name. For Christmas, the Kinners received a roast beef, some beer and pocket change for the children from Raue, and some money, butter and roast beef from Mochinger and his wife. These were the only gifts he received while living in Danzig.[45] By Easter time 1649, Kinner and his family left Danzig disenchanted by its intellectual allure and rich lifestyle, and searched for another place to publish his work first in the Low Countries and then in England. Kinner would never see it, though, because of his death on May 4, 1649.

Kinner's sad story illustrates that Danzig was not suited for all who sought refuge there. Johann Raue also left the city in 1652 after six years of trying to enact his reforms in the Danzig Gymnasium and Franckenberg likewise returned to his home in Silesia in 1650. Danzig never felt like home to Franckenberg. He referred to his stay there as a "10 year exile"[46] and was happy to return home. It is evident in the tone of his later letters and in his description of his routine activities that the quality of his daily life had improved after his return.[47]

All this is to say that intellectual and economic conditions in Danzig shaped the final form of *Oculus Sidereus*. As argued above, Franckenberg added references to Hevelius within his book. In addition, Franckenberg emphasized the Germanness of Copernicus's ideas and of the idea of a plurality of worlds. He also wrote the book in German making it more accessible both for his immediate Danzig audience and for others. In order to delineate further how conditions in Danzig may have molded the text

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[45] Ibid., 429.

[46] Franckenberg to Gerrit Schaep, 3 March 1650, *AvFB*: 255.

[47] Franckenberg to Kircher, 16 April 1651, *AvFB*: 274, 275.

of *Oculus Sidereus*, the next section situates Franckenberg's book within the history of ideas concerning the plurality of worlds by comparing and contrasting it to the *Discovery of a New World* of John Wilkins. Wilkins wrote his book in the English vernacular at about the same time Franckenberg was working on the German *Oculus Sidereus* and he based many of his arguments on the same sources that Franckenberg used.

Oculus Sidereus* and the *Discovery of a New World

In contrast to Franckenberg's attempts at patronage, at the time of the publication of John Wilkins's *Discovery of a New World* first in 1638, Wilkins enjoyed the flexibility that came with service as an Anglican chaplain to William Fiennes (1582-1662), the 8th Lord Saye. By leaving the authorship of his book anonymous and offering no dedication, Wilkins made it appear that with his *Discovery of a New World* he had no need to make it a plea for patronage.[48] Indeed, Wilkins's station in life at the time of the writing of his book drastically differed from Franckenberg's. From 1627 to 1634, Wilkins studied at Oxford, where he received both his Bachelor and Masters degrees. After graduation, Wilkins stayed on as a tutor for three more years with duties that included: one-on-one guidance of a pupil's plan of study, correspondence with the parents of students, and the care of the day-to-day welfare of students through discipline and tracking of finances.[49]

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[48] On this point see, Allan Chapman, "'A World in the Moon': John Wilkins and his Lunar Voyage of 1640" *Quarterly Journal of the Royal Astronomical Society* 32 (1991): 121-132, *128*.

[49] On some aspects of the tutorial system at Oxford, see W.A. Pantin, *Oxford Life in Oxford Archives* (Oxford: Clarendon Press, 1972), 37-43.

It was during these years as a tutor that he wrote the *Discovery of a New World* during his spare hours.[50]

In the English tradition of the early seventeenth century, the subject of a plurality of worlds served as a springboard for laughter. Ben Johnson's 1620 masque *News from the New World Discovered in the Moon* made sport of the idea that there were inhabitants on the moon and Bishop Godwin's skit *Man in the Moone* was more entertainment than argument describing the fictional character Domingo Gonsales's flight to the moon by means of attaching himself to a flock of wild swans.[51] Mary Baine Campbell argues that Godwin wrote *Man in the Moone* in the Spanish picaresque tradition. Paying homage to the Spanish literature which gave birth to and dominated picaresque, Godwin made the main character a Spaniard and patterned the humor in his book after picaresque humor. The humor in picaresque came from placing a nonaristocratic figure with the ideal of self-advancement in an impossibly low station (Godwin made Gonsales both a midget and the last of seventeen siblings) and then making him rise out of that low station in

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[50] See the excellent treatment of Wilkins's life in Barbara J. Shapiro, *John Wilkins, 1614-1672: An Intellectual Biography* (Berkeley and Los Angeles: University of California Press, 1969), 14.

[51] Godwin's book was written as a result of his witnessing Bruno's discourse at Oxford in 1583 when Godwin was a young graduate there. According to Dorothea Singer, Godwin promptly wrote *The Man in the Moone* as a skit on the whole affair, but the work was not published until after Godwin's death (*Giordano Bruno: His Life and Thought with Annotated Translation of His Work* On the Infinite Universe and Worlds [New York: Henry Schuman, 1950], 183).

comedic fashion, which in the Gonsales's case meant literally rising to the moon, a land rife with opportunity.[52]

Despite the fact that Wilkins announced his *Discovery of a New World* as "but the fruit of some lighter studies"[53] there is much that differentiates his more serious book from the lighthearted publications of his predecessors Johnson and Godwin. Above all, the title page to the *Discovery* claims that Wilkins wrote it "to prove, that 'tis probable there may be another habitable World in the Moone." According to Steven Shapin's account of seventeenth-century English philosophy and civil conversation, the English favored probabilistic arguments that did not assert too positively one's position. Temperate and probabilistic statements created credibility in one's argument.[54] Franckenberg's text, on the other hand, did not make a probabilistic argument. And although the two books built upon similar authorities as attested to by abundant citations in both texts, Wilkins's *Discovery* promised to make the idea of life on the moon plausible by arguing for its probability, whereas the title page to *Oculus Sidereus* promised readers a "higher understanding of God and his wonders."[55]

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[52] Mary Baine Campbell, *Wonder & Science: Imagining Worlds in Early Modern Europe* (Ithaca, N.Y.; and London: Cornell University Press, 1999), 156-158.

[53] John Wilkins, *The Discovery of a New World, or, A Discourse tending to prove, that 'tis probably there may be another habitable World in the Moone* (Third edition, London: John Norton for John Maynard, 1640), Preface, Aii, v.

[54] See Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago and London: The University of Chicago Press, 1994), 117-118, 221-222.

[55] Within the text of *Oculus Sidereus* itself, it is abundantly apparent that Franckenberg was also interested in proving the existence of life on the moon as well as on other worlds. In section XXXII, for example, Franckenberg notes that on the moon

The two books shared a common anti-Aristotelian philosophy and both confirmed Bacon's (and Shakespeare's) injunction that there is more to the World than dreamt of in the philosophies of the ancients. Franckenberg thought it foolish to say that the arts and sciences had progressed to the point where there was nothing else to advance, let alone to say that there was nothing new or better to discover.[56] As for Wilkins, "'tis not *Aristotle*, but truth that should be the rule of our opinions."[57] He explicitly adopted Bacon's philosophy as well. "Questionlesse, there are many secret truths, which the ancients have passed over, that are yet left to make some of our age famous for their discovery."[58]

Accordingly, Franckenberg and Wilkins listed astronomical phenomena about which the ancients did not comment, highlighting sunspots in their lists of newly observed phenomena. To his list, Franckenberg added discoveries that came as a result of Galileo's bold move to point a spyglass towards the heavens. Among them were the satellites of Jupiter, the phases of Venus, and the appearance of Saturn as "three stars

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there is earth and water, mountains and valleys, fields and forests, herbs and trees and all kinds of creatures. He cited among his authorities Kepler and Patrizzi, who wrote of "cities and castles, friends and enemies, as well as such animals and people" on the moon "that were much larger, more beautiful and resilient than those on earth, as the Pythagoreans had envisioned." Franckenberg also quoted from Gassendi's *Life of Peiresc*, which reported that through a telescope made by Cornelius Drebbel one could see "fields, forests, buildings and monuments" on the moon. Franckenberg cites page 303 of Gassendi's work for this quote. The quote shows up in Gassendi, *Viri illustris Nicolai Claudii Fabricii de Peiresc, senatoris Aquisextiensis, vita* (Hagae Comitis: Sumptibus Adriani Vlacq, 1651), 440; and in Gassendi, *The Mirrour of True Nobility & Gentility: Being the Life of the Renowned Nicolaus Clausius Fabricius, Lord of Pieresk, Senator of the Parliament in Aix*, trans. W. Rand (London: Printed by J. Streater for Humphrey Moseley, 1657), 128.

[56] Franckenberg, *Oculus*, III.

[57] Wilkins, *Discovery*, 26.

[58] Ibid., Aiii^{v} – A iv^{r}.

baked together"[59] As for the constitution of the heavens, Franckenberg and Wilkins agreed that there were no solid orbs. The two differed however in the purpose of their pronouncements. Wilkins's reason for listing the novelties of the heavens and specifically for discussing the subject of solid orbs had the single goal of proving the existence of life on the moon. According to Wilkins, there could not be life on the moon if there were solid orbs, which would include a solid orb for the moon that would prevent life there.[60] Franckenberg's reason for listing astronomical phenomena and modern ideas about the nature and existence of orbs was to set the stage for the appearance of the ideas of Copernicus and Bruno.

Wilkins's discussion of Copernicus and Bruno differed greatly from Franckenberg's. Wilkins's reason for introducing Copernicus's ideas was not to argue that a belief in the motion of the earth around the sun was a necessary step to believing in the plurality of worlds. Rather, Wilkins introduces Copernicus in order to make his argument more probable. "If our earth were one of the Planets" Wilkins reasoned, "then why may not another of the Planets be an earth."[61] In his list of "later Writers who assented to" the hypothesis of Copernicus, Wilkins included "Joach. Rhelicus [sic], David Origanus Lansbergius, Guil. Gilbert, and (if I may beleeve *Campanella*) *Innumeri*

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[59] Franckenberg, *Oculus*, XXVIII. Peter Crüger's dedication to his prognostication for 1639 was Franckenberg's source for the appearance of Saturn. Franckenberg cites as well the opinion of Campanella and Galileo, who held Saturn to be "dreyleibig" or a three-fold body.

[60] Wilkins, *Discovery*, 48.

[61] Ibid., 90-91.

alij Angli & Galli, Very many others, both English and French."[62] Franckenberg's text, on the other hand, was an explicitly patriotic one that boasted of the great minds Germany had fostered. Praising the Germans and their pursuits in restoring the Pythagorean tradition, Franckenberg extolled first and foremost Copernicus among others who "renew *Astronomia* or the art of the stars in our noble (currently miserable) Germany [Deutschland]."[63] And in a lengthy list of defenders of Copernicus up to his time, Franckenberg included the usual Germans like Rheticus, Maestlin and Kepler as well as less well-known Germans such as Ambrosius Rhodius and David Fröhlich who found their names alongside those of well-known foreigners like Galileo, Campanella, Gilbert and Descartes.[64]

In contrast to Wilkins, Franckenberg also showed great enthusiasm for Bruno's ideas by including a detailed summary of the eight books of Bruno's *De Immenso et Innumerabilibus* with special emphasis on speculation concerning life on the moon. Although he barely mentions Bruno's name, Wilkins appraisal of life of other worlds and especially life on the moon mirrors Franckenberg's. Wilkins scant reference to Bruno may possibly be attributed to the fun Bishop Godwin made of Bruno and his ideas in *Man in the Moone*. Wilkins only mentions Bruno in order to set up a contrast between

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[62] Ibid., 90. Wilkins's list is questionable.

[63] Franckenberg, *Oculus*, XI. The continuation of the Thirty Years War created the miserable condition Franckenberg refers to here.

[64] Ibid., XIII. Franckenberg's enthusiastic list is as questionable as Wilkins's.

Bruno's reasoning concerning the existence of a plurality of worlds and the proofs of Kepler and Galileo.[65]

The most crucial issue where Wilkins and Franckenberg would have disagreed was the relationship between the book of nature and the book of scripture. Gary Deason shows persuasively that Wilkins held to a radical separation of nature and scripture. Neither one could say anything of the other. Deason argues that even Galileo held that hidden meaning in scripture could tell us something about the nature of God's creation. But Wilkins's strict Calvinist reading of scripture did not allow for any interaction between investigations of nature and the understanding of scripture.[66] In the *Discovery of a New World*, Wilkins taught that the mission of the Holy Ghost does not include revealing natural secrets. For "if the Holy Ghost had intended to reveale unto us any naturall secrets, certainly hee would never have omitted the mention of the planets...And therefore you must know that 'tis besides the scope of the old Testament or the new, to discover any thing unto us concerning the secrets of Philosophy."[67] Wilkins employed a long-standing theory of accommodation arguing that writers of scripture accommodated their message to the understanding of an unlearned audience and had no need to reveal

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[65] Wilkins, *Discovery*, 82.

[66] Gary B. Deason, "John Wilkins and Galileo Galilei: Copernicanism and Biblical Interpretation in the Protestant and Catholic Traditions" in *Probing the Reformed Tradition: Historical Studies in Honor of Edward A. Dowey, Jr.*, Elsie Anne McKee and Brian G. Armstrong, eds. (Louisville, Kentucky: Westminster/John Knox Press, 1989): 313- 338. On Calvin's separation of disciplines, see Kenneth J. Howell, *God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science* (Notre Dame, Indiana: University of Notre Dame Press, 2002), 144-145.

[67] Wilkins, *Discovery*, 32.

the secrets of nature. Even after slipping and citing a couple of scriptures that could possibly say something about the inhabitants of the moon, Wilkins controlled his enthusiasm by declaring that he does not dare "jest with divine truths,...As I thinke this opinion doth not any where contradict Scripture; so I thinke likewise, that it cannot bee proved from it."[68] For Wilkins, scripture could neither confirm nor deny the principles of natural philosophy; the books of scripture and nature stood apart.

In contrast, part of the mission of Franckenberg's *Oculus* was to bring the books of scripture and nature together. Whereas Wilkins held to Calvin's teaching that, "It was not the purpose of the Holy Ghost to teach us astronomy,"[69] Franckenberg relied on a tradition of reconciling the books of scripture and nature that included authors like Pico, Patrizzi, Fludd and the German mystic Johannes Tauler.[70] At first, Franckenberg's discussion in chapter 48 of *Oculus Sidereus* seems to contradict or at least confuse this claim. According to Franckenberg, science and theology are: "*disparata & subordinata* and one can well have knowledge in theology or in a matter of faith according to the Holy scriptures. . . whether he has a not-even-so-exact knowledge of astronomy or

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[68] Ibid., 189. Wilkins also warned his readers that "absurdities have followed, when men looke for the grounds of Philosophy in the words of Scripture." (Ibid., 36).

[69] Wilkins quotes from Calvin's commentary on Psalms 136 in Wilkins, *Discovrse*, 52.

[70] Deason contends that the bringing together of scriptural and philosophical truths belonged more to a Catholic than a Protestant tradition (Deason, "Wilkins and Galileo"). The inspiration for Franckenberg's reconciliation, however, was an eclectic blend of spiritual thinkers both Catholic and Protestant. Just as he labeled his own version of Christianity as COR (catholicae, orthodoxae, reformatae), Franckenberg also held to a unique tradition of reconciling nature and scripture that could not be classified as strictly Catholic or Protestant. On the COR label, see Sammons, *Angelus Silesius*, 22.

philosophy. Because they are different faculties. The one concerns the conscience and is spiritual, the other concerns the knowledge of worldly things."[71] Here Franckenberg separated the faculties of astronomy and theology, but did not say that one could not relay knowledge about the other. However, in an earlier private letter Franckenberg doubted whether heavenly appearances and stars could be helpful in understanding scripture.[72] If there was any possibility of reconciling philosophy and theology, then the source of that reconciliation would need to come from theology.

Indeed, in Franckenberg's scheme for the union of philosophy and theology, it was theology that reigned supreme. Unlike Galileo's exegesis of Joshua in which he argues that a correct understanding of astronomy can offer an alternative interpretation of the biblical text (a philosophical demonstration explains a scriptural passage), Franckenberg's reconciliation of philosophy and theology took the opposite approach. For Franckenberg, God was the source of all wisdom.[73] Since no one held the idea that the earth is stationary as an article of apostolic faith then it would be safe for one to believe in the theory of Copernicus that the earth revolves around the sun, because that idea does not contradict a rule of faith.[74] When presenting the case for an infinite universe, Franckenberg first summarized Bruno, who employed "Physico-Mathematical reasons and causes."[75] Then he gave spiritual and theological reasons to prove the

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[71] Franckenberg, *Oculus*, XLIIX.

[72] Franckenberg to Bureus, 27 October 1642, *AvFB*: 153, 155.

[73] Franckenberg to Tobias König, 21 August 1649, *AvFB*: 230, 232.

[74] Franckenberg, *Oculus*, XLIIX.

infinite nature of God's creation by listing scripture upon scripture from the Old Testament and from the apocryphal writings of Baruch, Sirach and Solomon.[76] Franckenberg held to a form of fideism. His was a spiritual science in which faith in Godly inspiration, or the third force of philosophy as Richard Popkin calls it, informs both the empirical and rational forces of philosophy.[77] On the title page to *Oculus Sidereus* stands an engraving depicting the three forces of philosophy "*ratione*", "*fide*" and "*sensu*" [Fig. 1].

Fig. 1 From the title page to Franckenberg, *Oculus Sidereus*, 1644.

To the left is "ratione" and to the right at the same level is "sensu." Above both "ratione" and "sensu" stands "fide" at the pinnacle of the triangle formed by the three. Knowledge

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[75] Ibid., XXXIV.

[76] In chapter LI, Franckenberg lists: Baruch 3:24-25; Jeremiah 3:37; Sirach 16:17-18; 43:1, 36; 42:21; Wisdom of Solomon 11:22-23; and in chapter LII the list continues: Isaiah 40:12, 15, 16, 17, 22; Psalms 104:6; Job 5:9; 36:26; Psalms 102: 28; Genesis 15:5; Jeremiah 33:22; Sirach 42:17-18, 21-22; 43:29; Isaiah 40:26; Proverbs 30:4

[77] Richard H. Popkin, "The Third Force in Seventeenth-Century Thought: Scepticism, Science and Millenarianism" in *The Third Force in Seventeenth-Century Thought* (Leiden, etc.: E.J. Brill, 1992): 90-119. Popkin notes that John Dury, a leading figure of the group of seventeenth-century thinkers who accepted the governing authority of the "third force" in their philosophy, wrote the preface to a translation of one of Franckenberg's works (96).

ex fide reigns over knowledge gained *ex ratione et sensu*. In other words, the ultimate way to truth is *ex fide*.[78]

If there was any doubt as to the intentions of Franckenberg regarding the relationship between revelation and nature, then the title of his book alone would serve as a reminder of his purpose. *Oculus Sidereus* or the *Starry Eye* carried with it several connotations. First of all, since the Middle Ages there existed a distinction between eyes that saw spiritually and those that saw naturally. One of Franckenberg's spiritual companions, Johann Theodor von Tschesch, remarked there had not been a true *renovatio* of religion that the religious reformers of the sixteenth century had sought because no one had as yet learned to use his spiritual eyes (*oculus spiritualis*).[79] Franckenberg's starry eyes in a way fused the distinction between natural and spiritual eyes. They were natural in that they were still confined to the natural world, albeit a greatly expanded natural world, thanks to Copernicus and Bruno. They were spiritual for they allegedly saw other worlds not visible even through the telescope. The title of Franckenberg's book also evoked the title of Galileo's *Sidereus Nuncius* or *Starry Messenger*. With such a title, Galileo had intended to portray himself as a mediator between Cosimo II de' Medici his

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[78] Such triangular depictions of the forces of philosophy were not uncommon during the seventeenth century; see William B. Ashworth, Jr. "Light of Reason, Light of Nature: Catholic and Protestant Metaphors of Scientific Knowledge" *Science in Context* 3 (1989): 89-107.

[79] von Tschesch to Franckenberg, 12 September 1634, *AvFB*: 70. On the goal of early reformers to restore the ancient Church completely and their ultimate failure to realize their objective, see Gerald Strauss, "Ideas of *Reformatio* and *Renovatio* from the Middle Ages to the Reformation," in *Handbook of European History, 1400-1600: Late Middle Ages, Renaissance and Reformation*, Thomas A. Brady, Jr., Heiko O. Oberman and James D. Tracy, eds. (Leiden, New York and Köln: E.J. Brill, 1995), II: 1-30.

intended audience, and God.[80] Like Galileo's *Starry Messenger*, Franckenberg's text attempted to mediate between the reader and God. It served as a preface to the infinite expanses of heaven, as well as describing the "Universe or UNIVERSUM, the vast, extensive, deep, expansive and wide world. . . OCULUS INFINITUS, the all-seeing, unchanging EYE of eternity: the PAN-Theon. . . the eternal depth with her inhabitants; the great congregation of the ruling GODs."[81] Franckenberg took his faith seriously as something which could speak to his intellectual problems.

Despite the philosophy common to both Franckenberg and Wilkins and their shared opinions concerning Copernicus and Bruno, there was a deep rift that divided the two on the issue of the relationship of the book of nature and the book of scripture. Wilkins's Calvinist sentiments separated the worlds of scripture and nature and resonated with many of his contemporaries. Franckenberg's eclectic blend of Catholic, Protestant and mystical philosophies saw the realms of scripture and nature in harmony. While his book was published in Danzig, a city that was also eclectic in allowing Catholics, Lutherans, Reformists, as well as others to worship in the city, the book did not receive the welcome Franckenberg had hoped for. To the story of the reception of *Oculus Sidereus* I will turn next.

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[80] See Biagioli, *Galileo Courtier*, 129; and H. Darrell Rutkin, "Celestial Offerings: Astrological Motifs in the Dedicatory Letters of Kepler's *Astronomia Nova* and Galileo's *Sidereus Nuncius*" in *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*, William R. Newman and Anthony Grafton, eds. (Cambridge, Mass.: The MIT Press, 2001): 133-172, *145*.

[81] This is the third of Bruno's three definitions for the word "World" from book five of *De Immenso et Innumerabilibus* as summarized in Franckenberg, *Oculus Sidereus*, XXXIIX.

The Fortunes of *Oculus Sidereus*

Franckenberg had great expectations for his *Oculus Sidereus*. But despite his efforts to make it more accessible by writing it in German, his hopes were dashed by the muted reception of his book. In a letter to his friend Samuel Hartlib, Franckenberg reported of the "unfortunate *Oculus*, which had been received rather unfavorably by many, it will perhaps appear blind to the same people, who nevertheless are overcome themselves certainly from dimmed eyes and offer not something clear, but rather something incomprehensible."[82] Among those who received his book, there were those who left little or no record of their reactions to the book. For example, Franckenberg sent the Lutheran pastor Johann Rist a copy of *Oculus Sidereus* in the year following its publication, but he never received a reaction from Rist.[83] He also gave a copy of his book as a gift to Georg Seidenbecher during one of their conversations, but Seidenbecher never recorded what he thought of the book let alone if he had ever even read it.[84] Despite the silence of some, there were those who were excited about the book to one degree or another.

One of the first to receive Franckenberg's book was his good friend Samuel Hartlib, who by the time of publication had gathered much influence in the intellectual circles of London. Franckenberg and Hartlib first met as classmates in the Gymnasium at

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[82] Franckenberg to Hartlib, 25 August 1646, *AvFB*: 197, 200.

[83] At the time of one of his conversations with Georg Seidenbecher on 30 August 1649, Franckenberg had written a letter to Johann Rist that he read aloud to Seidenbecher in which Franckenberg queried Rist what he thought of the *Oculus Sidereus* that he had sent him in 1645. (Seidenbecher, *Conversatio*, 360, 368).

[84] Seidenbecher, *Conversatio*, 357, 365.

Brieg in 1611.[85] And although their lives took very different paths, the two kept regular correspondence. Hartlib acted as a gracious intermediary for the attempted publication of Franckenberg's works. Concerning *Oculus Sidereus*, Hartlib must have been quite impressed with it because he was party to its translation into Latin and to the effort of having it published. Shortly after its publication, Franckenberg sent Hartlib a copy of *Oculus Sidereus* along with other books via Hartlib's brother Georg, but the books were stolen en route. On August 25, 1646, Franckenberg again sent a copy of his book, but this copy was different. In hopes that someone would some day translate *Oculus Sidereus* into Latin, Franckenberg revised the text and added marginalia to three copies of the work, including the one he sent to Hartlib.[86] Hartlib did not act immediately on the translation and publication of the *Oculus* into Latin. Nonetheless by 1655 he had a Latin manuscript of the book ready for publication, but this must have been an inopportune year for Latin publications in England, for in a letter to Dr. John Worthington, Hartlib lamented that his efforts were frustrated by English printers unwilling to print a Latin text. "I have tried some of our stationers here for the printing Oculus Sydereus, but the Treatise being in Latin, they are not willing to adventure upon it, so it is like to lye by, till

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[85] Donald R. Dickson. *The Tessera of Antilia: Utopian Brotherhoods & Secret Societies in the Early Seventeenth Century* (Leiden, Boston, Köln: Brill, 1998), 226, n. 153.

[86] Franckenberg to Hartlib, 25 August 1646, *AVFB*, 200. For more on Hartlib and Franckenberg see, Margaret Lewis Bailey, *Milton and Jakob Boehme: A Study of German Mysticism in Seventeenth-Century England* (New York: Haskell House, 1964), 84-88.

I can spare some means to help it forward."[87] So although *Oculus Sidereus* had been favorably received by Samuel Hartlib, one of England's most well-known immigrants, its further fortunes of possibly joining the works of Bruno himself were halted by English printers of the Interregnum.

Despite the disinterest on the part of English stationers in *Oculus Sidereus*, their fellow countryman and enthusiastic traveler, Peter Mundy found great worth in Franckenberg's work. Mundy (b. 1597) was of the same generation as Franckenberg and Hartlib. During the 1640s, Mundy not only visited but also lived in Danzig. By no means a serious practitioner of the science of the stars, Mundy was still an avid sky watcher and showed curiosity in astronomical phenomena. In his diary, he wrote of his measuring the white nights found in the North and pondered the reason for their existence.[88] By 1655, Mundy owned his own telescope which he used regularly to observe the night sky.[89] When Franckenberg's *Oculus Sidereus* and Hevelius's *Selenographia* were published during the 1640s, Mundy was excited to read both while living in Danzig.

In addition to observations of city life in Danzig, Mundy recorded in his diary his reactions to the books he read including *Oculus Sidereus*. Around 1647 he wrote his "Opinions: Eternitie and unmeasurablenesse undeniable, containing tyme and

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[87] Hartlib to Worthington, 12 December 1655 in *The Diary and Correspondence of Dr. John Worthington*, James Crossley, ed., v.1 (Manchester: Printed for the Chetham Society, 1947), 65.

[88] *Travels of Peter Mundy*, 4:121-124, 130-131.

[89] For an overview of Mundy's interests in astronomy, see Mrs. Walter Maunder "Peter Mundy's Astronomy" in *Travels of Peter Mundy*, 5:183-194, and the Appendix.

proportions." Mundy summarized the structure and argument of *Oculus Sidereus* "wherin hee [Franckenberg] brings Authors to mayneteyne thatt nott only the Moone is another world butt allsoe the starres, and thatt Not only those wee see, butt allsoe infinite others outt off the reach of our sight, and on serving the other wonderfully; as the Moone serves us, soe doeth our world serve thatt for a Moone." Mundy further relayed opinions contained therein concerning the infinite nature of the ethereal expanse, the fixed stars as suns which contain their own sources of light, and infinite other planetary bodies that revolve around their own respective suns and rotate on their own axes. Franckenberg's "cheifest allegations" Mundy informs us "are outt of Jordanus Brune, an Italian, who wrote a booke, De Immenso & Innumirabilibus: unmeasurablenesse Innumerablenesse."[90] Mundy also recommended Franckenberg's book for learning about "the New found starres about Jupeter, etts., the increasing and decreasing of Venus and other matters to such like purpose."[91]

To his diaries, Mundy also appended discussions of topics that interested him, but that did not belong to the regular flow of his travel accounts. In one such appendix, Mundy added what he called an "Instrument" that depicted the Copernican system on moveable discs with a hint of Bruno [Fig. 2].

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[90] *Travels of Peter Mundy*, 4:217.

[91] Ibid., 4:230.

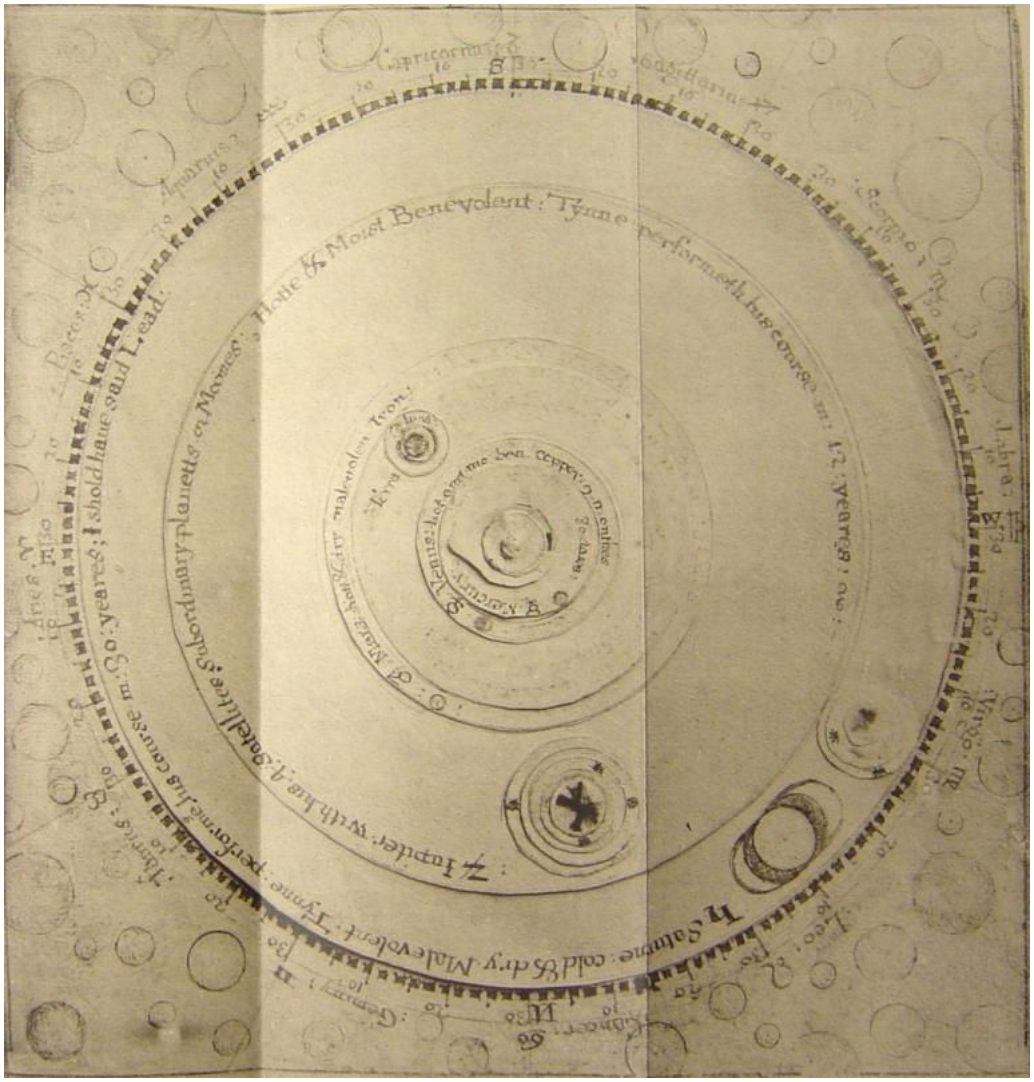

Fig. 2 Peter Mundy's rendition of the Copernican system with infinite world systems of Bruno, ca. 1647. Reprinted from *Travels of Peter Mundy*, Plate XII facing 4:226.

In his volvelle "Instrument," the sun is at the center; planets orbit the sun in their own spheres; the moons of Jupiter are represented, as well as the rings/moons of Saturn; and beyond Saturn are circles representing the world systems of other stars! Indeed Mundy was fascinated with the ideas of Bruno as received through the medium of Franckenberg's text.

Mundy's depiction of an expanded universe of stars and star systems is similar to that of Thomas Digges's [Fig. 3]

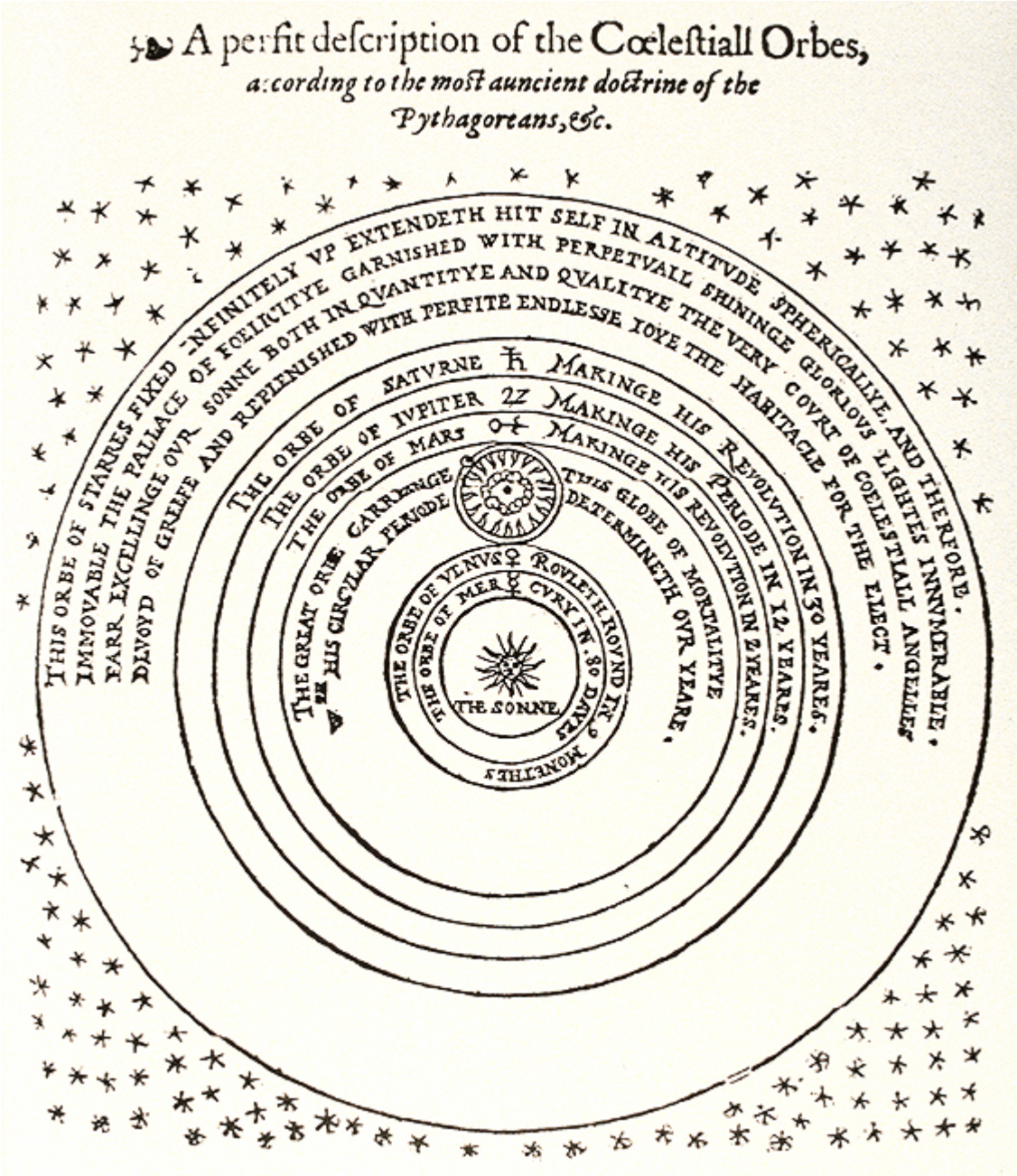

Fig. 3 From Thomas Digges, *A Perfit Description of the Coelestiall Orbes* (1576).

The greatest similarity between Digges's woodcut and Mundy's "Instrument" is that they both portray the stars as expanding outward from the sphere of Saturn. In other words,

there is no sphere of the fixed stars for Digges or Mundy. It is interesting to note here, however, that the Englishman Mundy did not discover the English tradition of thoughts concerning the plurality of worlds until several years after he had read Franckenberg's *Oculus* in German. In an appendix to his diaries titled "Concerning the Paradox of the Earthes Motion" Mundy makes reference to Richard Burton's discussion of the plurality of worlds in the *Anatomy of Melancholy* long after he had already digested the texts he read during his stay in Danzig.[92] Sadly, Richard Temple, the editor of Mundy's diaries, axed many of Mundy's other thoughts in his appendixes concerning astronomy in general and the plurality of worlds in particular based on a recommendation by J.L.E. Dreyer not to print them because they were not original.[93]

After the initial period of celebrating Bruno's ideas, Mundy took a more sober but still positive stance concerning the existence of a plurality of worlds and an infinite universe. Sometime after 1651, seven years after Franckenberg's book was published, Mundy recognized that embracing Bruno's ideas was even more radical than accepting

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[92] On Burton's ideas concerning the plurality of worlds, see, Richard G. Barlow, "Infinite Worlds: Robert Burton's Cosmic Voyage" *Journal of the History of Ideas* 34 (1973): 291-302.

[93] Dreyer wrote Temple, "This MS. (Appendix to Peter Mundy's Travels) does not seem to me to be worth printing. It is a confused medley of notes taken from various popular books of the 17th century, and opinions are freely attributed to various great astronomers which they had never set forth. There is not a single original idea, nor anything showing that the author had made any special study of astronomy. Many of the names are badly mis-spelt." See, *Travels of Peter Mundy*, 4:228, n.1. The original manuscript of Mundy's work is still housed in the Bodleian Library.

Copernicus's hypothesis that the earth revolves around the sun.[94] If one had doubts about Copernicus, one would not even entertain Bruno according to Mundy. For if one still held that the planets and stars revolved around the earth as did the ancients, then it would be difficult to accept the calculations of Copernicus and the thought of Bruno that made the distances of the planets and stars from the earth much larger. According to Mundy:

> If the Motion of the earth be thought absurd, how much greater will the absurdity bee to conceave that those Numberlesse vast bodies of such an unmeasurable distance should performe such incredible courses, especially if they will butt consider the motion of the first Moveable that Mooveth all the Rest, which must exceed in a greater Measure all the rest. Herein let every Man resolve as his fancy leads him.[95]

Unlike Franckenberg, who held that the governing principle upon which to build knowledge was by *fide*, Mundy resorted to his senses. He recognized that when one spoke of planets revolving around the stars as if they were suns, one could only speak hypothetically because one could not actually see them. "As for the fixed starres, whether they be soe many suns having worlds that goes about them, as this our earth wheeleth about our sun, it is beyond my poore capacity to determine."[96] Nevertheless, after Mundy obtained a telescope and viewed the Milky Way through it, he confessed, ""I looked allsoe where were no starres nor signe of any, but with the tellescope I saw many and I conceive there are yet more starres out of the glasse, even to *Innumerabilibus Dios*

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[94] In the same entry that he rediscussed implications of Bruno's thought, Mundy also mentions Vincent Wing's almanach for 1651. See *Travels of Peter Mundy*, 4:229.

[95] Ibid., 4:229.

[96] Ibid., 5:146.

le sabe."[97] No doubt it was Mundy's hope that there were unseen planets and stars as Franckenberg and Bruno testified, even if one could not yet see them.

Mundy earlier recognized that no one had disproved the idea of a plurality of worlds, there had only been those who had discussed its possibility. He noted, "This is allsoe no New opinion. For itt hath bin mayneteyned off old by the ancientt Philosophers, as Anaximander and others, and cannot bee disprooved by discourse."[98] Nevertheless, he reasoned "that there is an immense unmeasurable endless space. Whither it contains innumerabilities, as Jordan Brunus mentions in his booke *De Innumerabilibus et Immenso*, thatt is, innumerable suns and worlds, God knows."[99] He even mustered the French skeptic Pierre Charron into the defense of Bruno citing Charron's *De la Sagesse* as at least partly agreeing with Bruno that there are innumerable suns and planets, for "as Charron saith againe, it sheweth Gods infinite wisedom and power."[100] In the end, Mundy embraced wholly the ideas of Bruno concerning the infinite nature of the universe and at least hoped for the idea of a plurality of worlds as these ideas were explained to him by Franckenberg in *Oculus Sidereus*.

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[97] Ibid., 5:150.

[98] Ibid., 4:217.

[99] Ibid., 5:146.

[100] Ibid.

Johannes Scheffler (Angelus Silesius)

Although Franckenberg's book did not enjoy widespread positive reception, his personal relationship with Johannes Scheffler (who later took on the name Angelus Silesius after his conversion to Catholicism) between the years 1650 and 1652 produced in Scheffler a following of Franckenberg's and Bruno's ideas. When Franckenberg returned to his home near Oels in Silesia 1650, Scheffler was a young graduate in medicine from the University of Padua who was a physician at the court of the prince of Oels. The younger Scheffler most likely met the older Franckenberg the same year and Franckenberg must have taken an instant liking to this young protégé, for he offered him several books as gifts including a copy of *Oculus Sidereus* and left Scheffler the remainders of his library in his will.[101] It was Scheffler who gave Franckenberg's funeral sermon in 1652, in which it is obvious that Franckenberg was still hurt by the poor reception of his books, especially the *Oculus Sidereus*, during his final years and that he had expressed his disappointments to Scheffler. In his sermon, Scheffler expressed Franckenberg's frustrations:

> I need not endeavor here to elevate your praise
>
> The writings will give you enough evidence
>
> Which your spirit has created from the source of wisdom
>
> And which have made you known to the pious in all the land

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[101] Peuckert. *Das Rosenkreutz*, 313. According to Peuckert, Scheffler's copy of *Oculus* is in the University library in Breslau (now Wrocław, Poland).

Whoever does not love and praise you, must not know you at all

And, he who does know you, calls good evil

He may say what he will, but you will blossom still

Immoveable is eternally your ornament[102]

In his other writings, Scheffler was not about to let the poor reception of Franckenberg's works elsewhere affect his endearment to Franckenberg and his ideas. In his collection of devotional poetry titled the *Cherubinischer Wandersmann*, Scheffler hid a distich containing a final tribute to Franckenberg's sincere attempt to place the plurality of worlds within the realm of devotion. Sandwiched between verses on the wonder of man and the virtue of productivity is this quaint announcement:

There are many thousand suns

You say that in the firmament there is only one sun

But I say that there are many thousand suns

(I:141)

[102] Johann Schefflern (Phil. et Med. D. Fürstlichem Württemb. Ölnischen Leib- und Hofmedico), *Christliches Ehrengedächtniß des weiland WohlEdlen und Gestrengen Herren Abraham von Franckenberg...* (Ölse: Johann Seyfert, n.d.) in volume 2 of Angelus Silesius, *Sämtliche Poetische Werke*, Hans Ludwig Held, ed. (3rd edition; München: Carl Hanser Verlag, 1949): 23-27, *24*. I have translated the rhyme of these verses into prose in order to give a more exact picture of the content of Scheffler's praise rather than the form of it.

Scheffler's short tribute to the ideas that Franckenberg advocated stands as the only positive reaction in German to Franckenberg's ideas that I have found.

Kircher

The story of the reception of Franckenberg's work, however, is not yet over. In an article on the sources for Athanasius Kircher's *Ecstatic Journey*, Ingrid Rowland argues that Kircher's use of the idea of *panspermia* or life force emanating from the sun, and the idea of an infinite, immense and limitless universe filled with mutable heavenly bodies "could only have derived from reading Giordano Bruno."[103] Specifically, Rowland claims that Kircher must have read Bruno's poem *De Immenso et Innumerabilibus*. I will not argue here that Kircher did not read Bruno's poem, something we do not know and may never know. Rather, I will argue that because we know Kircher owned Franckenberg's text and that because *Oculus Sidereus* contained a detailed summary of Bruno's poem then it is just as plausible to argue that Kircher could have derived many details of his cosmos through the medium of Franckenberg's text. At the least, *Oculus Sidereus* may have been the springboard for Kircher to think about a plurality of worlds even if it was not the ultimate source for his ideas.

Kircher and Franckenberg engaged in regular correspondence during the 1640s. In the spring of 1647, Franckenberg hesitatingly wrote Kircher "I would have also sent my *Oculus Sidereus*, which I published four years ago, if it had not been shunned because it was in German and because of certain astronomical paradoxes as well as several flaws

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[103] Ingrid D. Rowland, "Athanasius Kircher, Giordano Bruno, and the *Panspermia* of the Infinite Universe" in *Athanasius Kircher: The Last Man Who Knew Everything*, Paula Findlen, ed. (New York and London: Routledge, 2004): 191-205, *197*.

sprinkled throughout the text."[104] Nevertheless, Franckenberg eventually sent Kircher a copy of *Oculus Sidereus* that Kircher received sometime before the end of the year 1651.[105]

Kircher expressed his ideas concerning a plurality of worlds in his *Ecstatic Journey* published in 1656 and again in 1660.[106] In the *Ecstatic Journey*, Kircher (Theodidactus) relates a fictional journey he takes beyond the sphere of Saturn into the realm of the fixed stars. The angel Cosmiel serves as Theodidactus's guide and shows him other systems of planets that surround their own respective suns. However, Kircher's vision of a plurality of worlds is unique in that it is a plurality of Tychonic world systems where each respective sun revolves around its own earth while the rest of the attendant planets of each system revolve around their respective suns. Despite the problematic physics that a plurality of geoheliocentric systems could introduce, Kircher

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[104] Franckenberg to Kircher, 1 March 1647, *AvFB*: 203-204, 205.

[105] Franckenberg to Kircher, 21 October 1651, *AvFB*: 284-286. This letter provides evidence that Franckenberg had sent Kircher a copy of *Oculus Sidereus* via their intermediary Lazarus Henkel.

[106] Athanasius Kircher, *Athanasii Kircheri e Soc. Iesv Itinerarivm Exstaticum* (Rome: Vitalis Mascardi, 1656); Athanasius Kircher, *R.P. Athanasii Kircheri e Societate Jesu, Iter Extaticum Coeleste* (Herbipoli: Joh. Andr. & Wolffg. Jun. Endterorum hæredibus, Prostat Norimberg æ apud eosdem, 1660). For descriptions of the *Iter exstaticum*, see Brian L. Merrill, *Athanasius Kircher (1602-1680), Jesuit Scholar: An Exhibition of his Works in the Harold B. Lee Library Collections at Brigham Young University* (Provo, UT: Friends of the Brigham Young University Library, 1989), 26-29. For a translation of the passages in the *Iter exstaticum* relating to the plurality of worlds beyond the sphere of Saturn, see Otto von Guericke, *Experimenta Nova (ut vocantur) Magdeburgica* (Amsterdam: Johannes Jansson of Waesberg, 1672). Trans. by Margaret Glover Foley Ames as *The New (So-Called) Magdeburg Experiments of Otto von Guericke* (Dordrecht, Boston and London: Kluwer, 1994), Book VII, Chapter 4.

remained fully in line with his Jesuit brethren who adopted a Tychonic system as their own after the condemnation of Copernicus's theory by Catholic authorities in 1616.[107] Kircher also played it safe by not listing among his authorities Giordano Bruno, who was burned at the stake in 1600 for heretical ideas (including his denial of the divinity of Christ) and whose work was placed on the Index of Prohibited Books in 1603. In fact, most of Kircher's authorities at the end of the *Ecstatic Journey* were Church Fathers and Catholic authors such as St. Anselm, the Venerable Bede, Christopher Scheiner and the Jesuit Francesco Grimaldi as well as more familiar names such as Riccioli, Torricelli, Cysat, Boulliau, Mersenne, and Gassendi. In addition, Kircher listed Hevelius's *Selenographia* and quotes extensively from it despite the fact that Pope Innocent X lamented that such a fine book was produced by a heretic. Yet neither in his list of authorities nor in the section of his book concerning the journey into the celestial realm does he mention Franckenberg or his *Oculus Sidereus*.[108]

Nevertheless, there are distinct similarities between the ideas contained in Kircher's and Franckenberg's texts and it is possible that Kircher could have found

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[107] On the Jesuits' adoption of Tychonic systems, see Ugo Baldini, "The Academy of Mathematics of the Collegio Romano from 1553 to 1612" in *Jesuit Science and the Republic of Letters*, ed. Mordechai Feingold (Cambridge, Mass. and London: The MIT Press, 2003): 47-98, *64* and *n. 65*; in the same volume see also the articles: Edward Grant, "The Partial Transformation of Medieval Cosmology by Jesuits in the Sixteenth and Seventeenth Centuries" and Alfredo Dinis, "Giovanni Battista Riccioli and the Science of His Time." In 1616, *De revolutionibus* was "suspended until corrected" by the Index. See "Decree of the Index (5 March 1616)" in *The Galileo Affair: A Documentary History*, ed. Maurice A. Finocchiaro (Berkeley, Los Angeles and London: University of California Press, 1989), 148-150.

[108] On the Pope's comment see Ivan Volkoff, Ernest Franzgrote and A. Dean Larsen, *Johannes Hevelius and His Catalog of Stars* (Provo, Ut.: Brigham Young University Press, 1971), 18.

support for his ideas on *panspermia* and the infinite nature of the universe in *Oculus Sidereus*. According to Franckenberg, the elemental world is not what is represented in Aristotelian philosophy but is rather a more fluid mixture that allows for change in heavenly bodies. Fire is not an element,[109] water is the prime element upon which everything else is based,[110] yet despite the importance of water, all the elements exist in each other and do not exist without the others.[111] As for *panspermia* or the idea that there are seminal seeds issuing forth from the sun infusing the substance of the planets, Franckenberg summarized books four and five of Bruno's *De immenso* stating that the substance of Venus and Mercury is the same as that of the sun, that everything is in everything and that the sun is a source of light and life for her attendant planets.[112] Finally, although the idea of an infinite, immense and limitless universe was not unique to Nicholas of Cusa or Giordano Bruno, Franckenberg summarizes Bruno maintaining that space (or "Raum" in the original German) is immeasurable, eternal and unfathomable,[113] and that there are innumerable suns and earths.[114]

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[109] The fifth point in the third book of Bruno's poem as summarized in Franckenberg, *Oculus*, XXXVI.

[110] The ninth point in book five of *De immenso* from Franckenberg, *Oculus*, XXXIIX.

[111] The fourth point from the sixth book of *De immenso*, Franckenberg, *Oculus*, XXIX.

[112] Franckenberg, *Oculus*, XXXVII-XXXIIX.

[113] Franckenberg, *Oculus*, XXXIV. While Franckenberg states this at the beginning of his summary he also does not neglect to cite others who discussed similar claims about the expanse of the universe. His authorities include Rheticus (*Narratio*

Conclusion

Although this chapter has summarized a few of the positive readings of *Oculus Sidereus*, the book still suffered a poor response from Franckenberg's German-speaking counterparts. Such an unfavorable response did not result from its being printed in the city nor from hostility of Danzigers themselves. By the time Franckenberg published *Oculus Sidereus* in 1644, the general religious sentiment within the city had shifted from a bent towards Calvinism to a moderate Lutheranism.[115] If anything, Danzigers would have been more receptive to Franckenberg's reconciliation of scripture and nature now that they had steered away from Calvin and his teachings warning against mixing scripture and nature. However, Franckenberg, for one reason or another, did not benefit from a positive reception of his work from Danzigers nor from Germans in general, except for Johannes Scheffler.

Scheffler's final testament to Franckenberg's vision brings up another point. It serves as an exception to Guthke's general claim that seventeenth-century German literature did not engage with the idea of a plurality of worlds. There is still, however, validity to Guthke's claim that there was a "tendency" in German literature to ignore such discussions. The existence of *Oculus Sidereus* as well as the short couplet in Scheffler's poetry does not provide enough evidence to completely counteract the German

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Prima), Kepler (*De stella nova* and the appendix to the 1621 edition of *Mysterium Cosmographicum*) and Copernicus (*De revolutionibus*).

[114] Franckenberg, Oculus, XXXV.

[115] On this point see Michael G. Müller, "Science and Religion in Royal Prussia around 1600" in *Religious Confessions and the Sciences in the Sixteenth Century*, Jürgen Helm and Annette Winkelmann, eds. (Leiden, Boston, Köln: Brill, 2001): 35-43, *36*.

"tendency" to ignore Bruno. Guthke suggests that the source for such a muted reception was the wars of religion. Franckenberg suffered dearly from the Thirty Years War but was still able to give birth to *Oculus Sidereus*, his "mystical child," in Danzig.[116]

Nevertheless, there may be something to the idea that the Thirty Years War played some role in keeping Germans, Prussians and others from engaging with the idea of a plurality of worlds. Printers may have been too busy printing other things, and writers may have been too occupied writing on other subjects.[117] At a conceptual level, Franckenberg's text connected a mystical outlook to the plurality of worlds idea and this combination may have been fatal for the idea. According to the thesis of Robin Bruce Barnes discussed in chapter two, during the Thirty Years War mystical thought lost out to energies that were given to solving the more earthly problems of death and poverty. Franckenberg's text was an anomaly, as were the conditions in Danzig itself, which was not embroiled in the Thirty Years War.

Retrospectively, Franckenberg must have also realized that publishing his book in German may have had something to do with its poor reception. This may be why he asked Hartlib to help with a translation of it into Latin. The reality that neither Kircher nor Hevelius openly referenced *Oculus Sidereus* in their weighty Latin tomes could have been due to its being published originally in German and not in the learned language of Latin. This is quite ironic for an age when the most celebrated practitioners of the

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[116] He called *Oculus Sidereus* a "mystical child" in a letter he sent to Hartlib, 25 August 1646, *AvFB*: 198 200.

[117] There is definitely room in the future for statistical analysis to see what printers were printing in German areas between 1618 and 1648, and to analyze whether their printing habits significantly changed before and after the war.

science of the stars like Galileo and Kepler could write to their audiences in the vernacular.

The possibility that a Latin text would be more desirable in establishing authority among all classes of readership rather than a book in the vernacular presents a challenge to Science Studies scholarship. In his seminal work in the sociology of science, Ludwig Fleck posited that translation from the specialist language of early twentieth-century life sciences to lay language stabilized knowledge.[118] If we were to apply Fleck's hypothesis of translating specialized knowledge to lay language to the seventeenth century, then a translation of ideas from Latin to German should have been the means of stabilizing knowledge. But that was not the case for Bruno's ideas in seventeenth-century Danzig or in any other part of the German-speaking area. In this respect, Guthke's claim stands firm. The most well-known books on the plurality of worlds to be published in seventeenth-century Germany were in Latin, including Giordano Bruno's *De immense* and Johannes Kepler's *Somnium*, both published in Frankfurt.

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[118] Ludwig Fleck, *Genesis and Development of a Scientific Fact*, trans. Fred Bradley and Thaddeus J. Trenn (Chicago: University of Chicago Press, 1979), 113-115. On Fleck's work see also Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Cambridge: Cambridge University Press, 1998), 34.

Chapter 5

Describing Other Worlds: Hevelius's *Selenographia* (1647)

During his stay in Danzig, Peter Mundy appreciated both Franckenberg's *Oculus Sidereus* and the works of Hevelius. Of Hevelius's *Selenographia* published by Andreas Hünefeld in 1647, Mundy noted Hevelius's descriptions of the moon "deciphering in her land and sea, Mountaines, valleies, Ilands, lakes, etts., making it another little world, giving Names to every part, as wee in a mappe of our world. This is allsoe None of his owne Invention, butt noted long Since, butt not brought to effect soe exactly and plaine to demonstration."[1] Mundy saw in Hevelius not an innovator, but a communicator. Likewise, commenting on Hevelius's geography of the moon with its earthlike features and possible inhabitants, Franckenberg wrote Athanasius Kircher that for things never before seen "I am the preacher and he is in his work the self-proclaimed descriptor."[2] Hevelius's nomenclature for features on the moon in *Selenographia*, and the publication and reception of the book will be the focus of this chapter. In order to understand the contents of *Selenographia* more fully, it is the argument of this chapter that Danzig's representation of itself as exemplifying the classical world will add to an understanding of Hevelius's surroundings and that those surroundings shaped what he included in his work.

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[1] *Travels of Peter Mundy*, 4:217.

[2] Franckenberg to Kircher, 27 February 1649, *AvFB*: 225.

Mapping the Moon

The reactions of Mundy and Franckenberg confirm the thesis of Mary Winkler and Albert Van Helden that Hevelius's detailed visual descriptions of the moon were his "greatest contribution to astronomy."[3] Before Hevelius, observers like Galileo added images to their text in order to illustrate what they were saying in words. In his *Sidereus Nuncius* of 1610, Galileo desired to push the point that the moon was not a perfectly smooth sphere, as previously thought, but rather that it had mountains and valleys [Fig. 4].

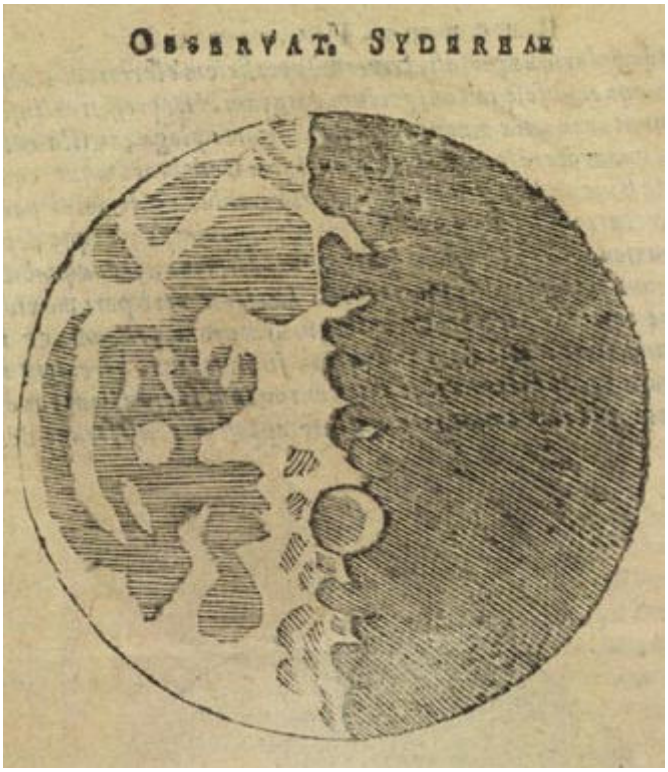

Fig. 4 From Galilei, *Sidereus Nuncius*, 1610.

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[3] Mary G. Winkler and Albert Van Helden, "Johannes Hevelius and the Visual Language of Astronomy," in J.V. Field and Frank A.J.L. James, eds. *Renaissance and Revolution: Humanists, Scholars, Craftsmen and Natural Philosophers in Early Modern Europe* (Cambridge: Cambridge University Press, 1993), 97-116.

He spent several pages describing the moon and its features and then offered washes that retained only a supportive role. For Hevelius, on the other hand, images were primary and text played a secondary role, acting in some instances solely to explain what was in his images. In his first major work, his *Selenographia* of 1647, Hevelius reversed the importance of images versus text. For him the point was to create a visual description of the moon.

Apart from describing *Selenographia*, Mundy reported on Hevelius's other projects including his work on sunspots, which "keepe noe certaine Motion," his confirmation "Thatt aboutt Saturn and Jupiter are other starres or planetts, which regard the said 5 and 4 for their center as other planetts do the Sunne" and his conviction in Copernicus's theory, holding it "not only for a supposition butt an undoubted truth."[4] However, Mundy's imagination was caught up above all in the wonders of the moon that Hevelius's telescope revealed. Putting Hevelius's descriptions to the test, Mundy entered into his journal his own observations of the moon. "This much I may say, having my selfe made triall with a Tellescope, none of the best, allso my owne sight somwhat impaired, that the generall parts represent themselves according to the figures, but to perticulerize punctually as in the said booke is to bee seene, or any way to com Near it, passeth my ability." Although in his own estimation Mundy was not able to match the detail of what he could see through his own telescope compared to what he saw in the engravings of *Selenographia*, he still ventured the dark part of the moon "to bee Water, and contrarily the whiter part to bee land, because it appears very cragged and uneven."

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[4] *Travels of Peter Mundy*, 4:216.

Taking his impetus from Franckenberg and Hevelius, Mundy projected possible inhabitants onto the moon and drew his own map of the moon on a leaf in his journal in which he called the seas of the moon "The new Atlantick" and the land "Vtopia" [Fig. 5].[5]

Fig. 5 Peter Mundy's drawing of the moon, ca. 1647. From *Travels of Peter Mundy*, Plate XIII facing 4:230.

Although Mundy most likely took the actual nomenclature for his drawings from Thomas More and Francis Bacon, his inclination to label features on the moon to begin with

[5] Ibid., 4:230.

probably stemmed from his appreciation for Hevelius's practice of naming features on the moon. While Mundy's drawing is not surprising for a mid-seventeenth century reader and diarist, it does portray a unique blend of thought about life on other worlds and the propensity to name features on the moon.

Recent scholarship suggests several reasons to explain why Hevelius applied the names he did to the features of the moon. Jennifer Downes argues that to understand Hevelius and his attempt at a geography as well as a chorography (depictions of individual features) of the moon we need first to understand the practices of sixteenth-century terrestrial geographers and cosmographers and their reasons for applying certain designations to earthly as well as heavenly features.[6] With respect to the nomenclature, Ewen Whitaker and Scott Montgomery summarize Hevelius's reasons for choosing the names he did.[7] Among several options Hevelius pondered, one was to follow the pattern of the ancients who named stars after great men in their time "men of surpassing virtue, people worthy of praise above others in the world (their intention was to establish a perpetual memorial for posterity)."[8] However, for Hevelius, applying names of recent and current men of mathematics to features on the moon was not an option, because he

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[6] Jennifer Downes, "Cosmography and Chorography: The Geographical Tradition and the Telescope" talk given at HSS, Cambridge, Mass., November 21, 2003.

[7] See Ewen A. Whitaker, *Mapping and Naming the Moon: A History of Lunar Cartography and Nomenclature* (Cambridge: Cambridge University Press, 1999), 51-57; and Scott L. Montgomery, "Johannes Hevelius: A Moon of Higher Origins" in *The Moon and the Western Imagination* (Tucson, AZ.: The University of Arizona Press, 1999), 169-190.

[8] Johannes Hevelius, *Selenographia: sive, Lunae Descriptio* (Danzig: Andreas Hünefeld, 1647), 224, as translated in Montgomery, *Moon and the Western Imagination*, 185.

did not want to invoke the wrath of those who might misinterpret his choice of names as a move to bolster a religious creed or the reputation of friends. Accordingly by his own account, he ruled out titles like "the Ocean of Copernicus, the Tychonic Ocean, Sea of Kepler, Lake of Galilei, Marsh of Maestlin, Island of Scheiner, Peninsula of Gassendi, Mount Mersenne, Boulliau Valley, Wendelin's Bay, Crüger Promontory, Strait of Eichstadt, Linemann's Desert, etc."[9] Instead he chose to adopt a different strategy applying terrestrial geography to the moon: "provided that the hemisphere of the Moon facing us could be fittingly ordered to a certain part of the Earth's globe" [Fig. 6].[10]

The idea of the moon being a "counter-terrestrial" globe had been around since at least the time of Plutarch, but did not receive the kind of force that Hevelius gives it in his lunar map.[11] By his own account, Hevelius saw a likeness of the Mediterranean region on the moon and decided to project the geography of the Mediterranean onto the moon's surface:

> Immediately I had put my mind to this work of ferreting out an answer, and had contemplated practically all of Geography, I found to my perfect delight that a certain part of the terrestrial globe and the places indicated therein are very comparable with the visible face of the Moon and its regions, and therefore names could be transferred from here to there with no trouble and most conveniently; namely, think of the part of Europe, Asia and Africa that surround the Mediterranean Sea, Black Sea and Caspian Sea, and all the other regions including and adjacent to them,

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[9] Hevelius, *Selenographia*, 224, my translation.

[10] Hevelius, *Selenographia*, 225, as translated in both Whitaker, *Mapping and naming the Moon*, 55 and Montgomery, *Moon and the Western Imagination*, 186.

[11] On the moon as a "counter-terrestrial" world, see Campbell, *Wonder & Science*, 153.

which are: Italy, Greece, Natolia, Palestine, Persia, a part of Sarmatia and Tartary, Egypt, Mauretania, etc."[12]

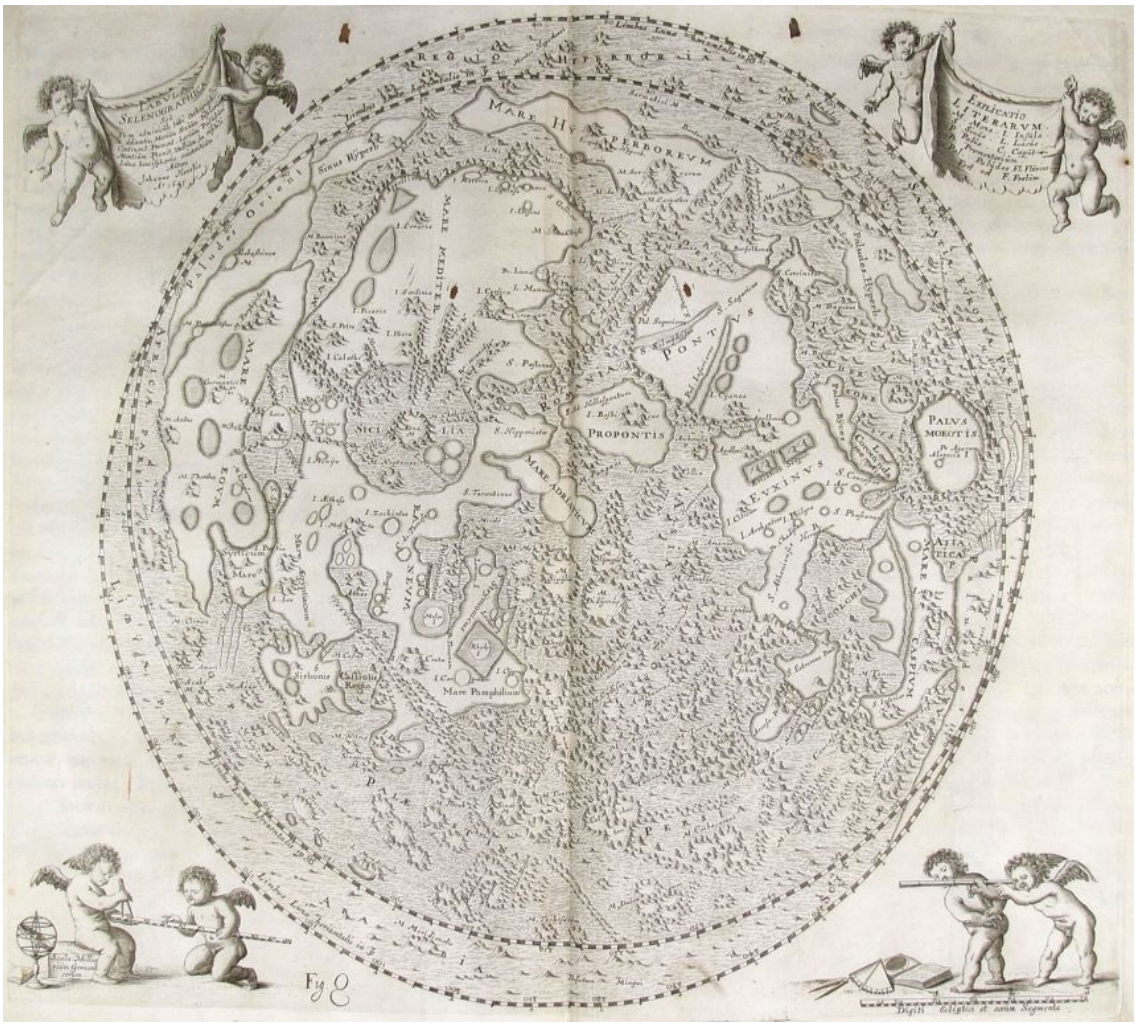

Fig. 6 Hevelius's map of the moon with nomenclature. Figure G in Hevelius, *Selenographia* (1647). Courtesy of L. Tom Perry Special Collections, Harold. B. Lee Library, Brigham Young University, Provo, Utah.

Why did Hevelius settle on such a selenography for the moon? Again by his own account, he maintained that "adepts in astronomy will acquire quite easily the knowledge

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[12] Hevelius, *Selenographia*, 225 as translated in Whitaker, *Mapping and naming the Moon*, 55. Montgomery provides a slightly different translation. See Montgomery, *Moon and the Western Imagination*, 186-187.

of all these things: since the names introduced here in their proper order will be most familiar to historians, poets, and all those learned in letters."[13] His intended audience consisted not only of practitioners of the science of the stars, but those learned in history and poetry as well.

Hevelius's own explanation for why he applied the nomenclature that he did is wanting. Scott Montgomery observes that "Hevelius, no doubt, wanted his naming scheme to endure and saw the need to find some neutral, harmonious ground that might avoid the conflicts then raging throughout Europe. This neutral ground was a second charting of the classical world that might serve the unifying purpose of monumentalizing the (presumed) origins of Western scholarship." Montgomery continues, "Hevelius, with his adherence to ancient ways of seeing, sought to embody an ancient seat of origins whose means and thought were being superseded by those of the moderns. An eternal honorarium to Greece and Rome was not well suited to an age eager for new confidences of its own."[14] However, there is more to Hevelius's maps than a quest for neutral ground and a return to classical geography. Hevelius was also keenly aware that what he produced in *Selenographia* would reflect not only on himself but on Danzig as well.

Bringing Fame to Danzig

The first place to look when researching Hevelius in context is the relationship he had with Peter Crüger. Hevelius was one of Peter Crüger's most dedicated students. He

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[13] Hevelius, *Selenographia*, 228 as translated in Montgomery, *Moon and the Western Imagination*, 187.

[14] Montgomery, *Moon and the Western Imagination*, 190.

inherited from his teacher both an interest in the study of the stars and the actual instruments that Crüger used to make observations. We learn of Crüger's instruments from the report of the Frenchman Charles Ogier, a visitor in Danzig between 1635-1636, who met Crüger and recorded in his diary some of the Crüger's activities. For December 29, 1635, Ogier recorded that Crüger "showed us two Globes arranged according to the system of Copernicus and gave us the necessary explanation of them."[15] We also know that Crüger used an armillary sphere and constructed sundials.[16] Crüger stored many of his astronomical instruments in the Danziger Zeughaus (armory), which was a logical place since it was the storehouse for instruments and armaments made by the same craftsmen.[17] In addition to seeing a sextant that Crüger owned, Ogier recorded that he viewed:

> a curious mathematical instrument used for counting and observing the stars, which was built according to Crüger's conception and with his support…by an acquaintance, a Danziger master who recently died. This instrument was made out of metal, measured more than ten feet in height, and around five feet in width and was fitted with a cogwheel, on which a variable runner or a ruler engaged according to the need.[18]

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[15] "Ogier's Bericht," 60. Also quoted in Maria Bogucka, *Das alte Danzig: Alltagsleben vom 15. Bis 17. Jahrhundert* (Leipzig: Koehler & Amelang, 1967), 213. Ogier's travel account was originally published in Latin.

[16] Januszajtis, "Peter Krüger," 129.

[17] It was not unusual for instrument makers to be armorers as well. A fine example is Christoph Trechsler (ca. 1540-1624) who was both steward and armorer for the armory in Dresden as well as the court instrument maker for the electoral court in Dresden. On Trechsler, see Bruce T. Moran, "German Prince-Practitioners: Aspects in the Development of Courtly Science, Technology, and Procedures in the Renaissance" *Technology and Culture* 22 (1981): 253-274, esp. 270.

What Ogier is referring to here is a large azimuthal quadrant, the construction of which Crüger initiated around 1618 according to Hevelius's later account of the instrument.[19] We also know from other sources that Crüger spared no expense in the construction of his instruments. As discussed earlier in chapter two, Paul Nagel noted that Crüger was willing to pay more than 600 gulden to construct them.[20] Also discussed earlier in chapters two and three, Crüger admired Tycho Brahe and his work. The principal type of instrument Tycho used for observations was the quadrant.[21] That the quadrant was Tycho's instrument of choice might partially explain why Crüger, following Tycho, invested in an expensive quadrant.

In 1639, plague struck Danzig and took with it the 59-year-old Crüger. After his death, his instruments gathered dust in the Zeughaus, where they were largely neglected. Nevertheless, visitors to the city who toured the Zeughaus were still able to see Crüger's instruments. One such visitor was Peter Mundy, who, upon seeing the azimuthal

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[18] K. Ogier, *Dziennik podrózy do Polski 1635-36* (Gdańsk, 1950-53), II, 189. Translated into German in Bogucka, *Das alte Danzig*, 213. Translation into English from Bogucka's German is mine.

[19] Hevelius, *Machina Coelestis Pars Prior* (Danzig, 1673), 150.

[20] Nagel, *Prognosticum Auff des Jahr 1622*, Aiv^{v}. The gulden, made of gold, was the coin of the rich. According to Strauss, craftsmen in Nuremberg during the sixteenth century made approximately 25 gulden a year, but could receive more lucrative commissions. See Strauss, *Nuremberg in the Sixteenth Century*, 204-206.

[21] Allan Chapman, "Tycho Brahe- Instrument Designer, Observer and Mechanician" *Journal of the British Astronomical Association* 99 (1989): 70-77, esp. 73.

quadrant in 1642 called it "an excellent Instrument."[22] In 1644, the City Senate removed the azimuthal quadrant from the Zeughaus and offered it to Hevelius [Fig. 7].

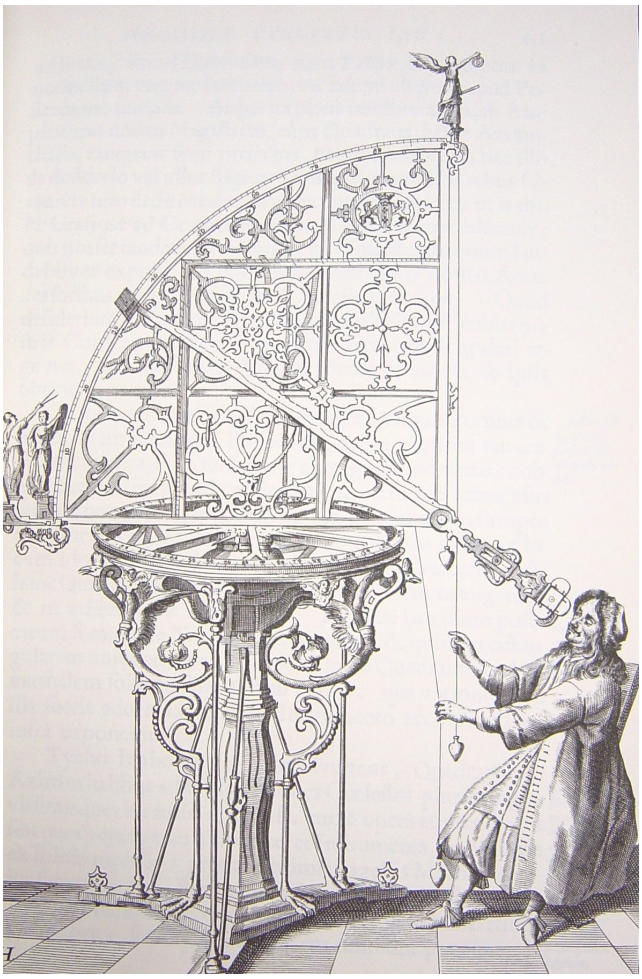

Fig. 7 Peter Crüger's azimuthal quadrant that Hevelius later used. In Hevelius, *Machina Coelestis*, 1673.

With a few minor changes and adjustments, the instrument became Hevelius's favored observational tool.[23] Readily seen in the engraving of the quadrant is the abundance of ornamentation, unnecessary to observational accuracy. The statuettes on either end of the

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[22] *Travels of Peter Mundy*, 171-172.

[23] Volkoff, et al. *Hevelius and His Catalog of Stars*, 21-28.

quadrant, the metal work within the cross-bracing and flourishes on the base of the instrument made it more than simply an observational instrument. It could also be a conversation piece or a decorative statue, as well as a pleasant aesthetic instrument to spend time with observing.[24] Thus, while Crüger initially commissioned the instrument in the tradition of Tycho, in Hevelius's hands, the quadrant surpassed Tycho's comparatively functional instruments described in the *Astronomiae Instauratae Mechanica* of 1598.

While on his deathbed, Crüger expressed his wish that Hevelius observe the solar eclipse of June 1, 1639, for he was too weak to do so himself. It was in conjunction with this request that Crüger admonished Hevelius to dedicate himself to the study of astronomy "with little doubt, but that you will never regret it; for this praiseworthy labor can bring honor to your native land and will be to the profit of astronomy."[25] Hevelius accepted Crüger's challenge to dedicate his time and talents to studying the stars in order to add to the reputation of his home.

Crüger died shortly after the solar eclipse, which the celebrated poet Martin Opitz portrayed as a symbol of the cosmos mourning Crüger's death:

On the Solar Eclipse before the blessed H[err] Crüger's death

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[24] On the unnecessary ornamentation and rhetoric of instruments during the seventeenth century, see J.L. Heilbron, "Some Uses for Catalogues of Old Scientific Instruments" in eds. R.G.W. Anderson, J.A. Bennett and W.F. Ryan, *Making Instruments Count: Essays on Historical Scientific Instruments presented to Gerard L'Estrange Turner* (Aldershot, Hampshire; Brookfield, Vermont: Variorum, 1993): 1-16, esp 14-15.

[25] Hevelius, *Machina Coelestis Pars Prior*, 41, my translation. See alternative translation in Volkoff, et al. *Hevelius and His Catalog of Stars*, 12. The original Latin text reads: "Minimè dubitans, quin te nunqum istius rei pœniteat. Nam hocce negotium, ut est honestum, sic quoque in commodum Astronomiæ, ac Patriæ Tuæ aliquando cedere potest honorem;"

Not only the Earth bears sorrow for you here

Which, Crüger, approvingly treasured you above its own adornment

The stars mourn also; [and] the clear shine of the sun

Desires to be eclipsed itself, before you leave us.[26]

Hevelius took Crüger's admonition to heart and by doing so ensured that the eclipse that took place at the time of Crüger's death would not also forever darken Crüger's astronomical work.

In order to bring added glory to his city, Hevelius tapped into and exemplified the attributes for which citizens in the city wanted to be known. As noted in chapter 1, Danzigers modeled their city as a republic, and by the seventeenth century, citizens of the city looked to her government when they thought about the ideal conditions necessary for a utopian civil system. One enthusiastic Danziger was Johannes Mochinger (1603-1652), who in his youth studied at the Gymnasium in Danzig at the same time as Georg Hartlib, the older brother of Samuel Hartlib.[27] An admirer of Cicero, Mochinger studied at the university in Wittenberg, a typical move for young Danzigers of means. Upon the

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[26] Translated from the German verse as found in Herbert Hertel, "Die Danziger Gelegenheitsdichtung der Barockzeit" in *Danziger Barockdichtung*, Heinz Kindermann, ed. (Leipzig: Philipp Reclam, 1939): 165-230, *182*. The second stanza of Opitz's poem is as follows:

After you, the desire of time, you, the honor of this city
The Earth to this time has taken delight in you
Which you have measured; [and] after the adornment of heaven
Its course, its workings and variety is described by you
And After God has felt your faithfulness and course of life
And Earth, heaven and God have also treated you as is proper
The Earth will give you rest, heaven will offer far and wide
Your name, which will not die, and God will grant salvation

[27] Hartlib matriculated into the Danzig Gymnasium in April 1608.

completion of his studies, he presented a disputation on April 4, 1623, under the presiding authority of Johannes Avenarius titled *De amplificatione rerum publicarum*, in which Mochinger discussed how to achieve better living conditions in cities. He held up as his exemplar the city of Danzig, which he "counted among the most beautiful cities in Europe" and talked about how Danzig fit "the utopian thinking of the time concerning the ideal city and how the perfect humanitarian organized system crystallized" there.[28]

While Mochinger surely inflated Danzig through the rhetoric of his dissertation, the city's humanitarian efforts were indeed exemplary. Above all, Danzig prepared itself to meet the needs of the poor and the afflicted. As a port town, the city needed to deal with both transient travelers who required relief, and the poor of the city (meaning those who could not pay urban taxes) who at the beginning of the sixteenth century made up 20% of the population of the city and who steadily grew in numbers. Danzig was home to nine richly endowed hospitals that were more often poorhouses than they were refuges for the sick. Although these houses could not adequately handle the problems of poverty and disease in the city, they provided enough to curb such problems and to make them manageable. In order to regulate medical practices, the city created in 1530 the post of

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[28] Van Stekelenburg, *Albinus*, 69. After his studies in Danzig (where he matriculated on June 20, 1618) and Wittenberg, Mochinger traveled throughout western Europe before settling down at the University of Straßburg, where he worked for two years and continued his studies in theology. In 1628, he returned home to Danzig, where he was appointed Deacon in St. Katharine's (1629), a Professor of Eloquence in the Gymnasium (1630) and later the Pastor of St. Katharine's (1638). Mochinger held correspondence with several utopian thinkers including Matthias Bernegger, an admirer of J.V. Andreae's *Reipublicae christianopoltanae descriptio* (1619); and he participated in utopian projects such as the translation of the *Janua Linguarum* of Jan Comenius, another disciple of Andreae (Stekelenburg, *Albinus*, 66, 70). Mochinger was also a member of Samuel Hartlib's *Societas Reformatorum et Correspondency* [sic] (Dickson, *Tessera of Antilia*, 148-158, *155*).

"town physician" and created in 1636 the *Collegium Medicum* to be a collective governing board over the practices of physicians. As a result of the interest in medicine in Danzig, physicians and educators found the city an amenable place to further their work. They dissected human corpses, they propounded the theory of blood circulation and the physician John Schmidt was attempting "intravenous injection of medicine on his patients" during the 1660s.[29] Although Danzigers could not completely solve the problems of poverty and sickness, they strove to alleviate such problems through their hospitals and their schools as well, which offered scholarships and classes for the poor.[30]

Several Danzigers were involved in the planning of an envisioned utopian community they called Antilia. They came to Danzig from the University of Rostock, where they had met during the mid-1620s and where they first discussed Antilia, which received its name from a fabled island in the Pacific that was supposed to have seven lost bishops who oversaw seven cities on the island. One of the leaders of the group was Johann Abraham Pömer (1604-1687) who entered Rostock in March 1625 and then settled in Danzig, where he married a widow, Helena Bachmann, in 1628.[31] Others in the group became well-placed men in Danzig society including Hermann Rathmann (1585-

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[29] Bogucka, "Health care and poor relief in Danzig," 204-219, *214*.

[30] As discussed in chapter 1.

[31] Pömer was born in Sulzbach (near Nuremberg) and led an itinerate life staying in Danzig only for a short time (he fled the city in the summer of 1629 upon the threat of war) before traveling through Prague, Poland, the low countries, England and northern Germany during the decade of the 1630s. With Helena Bachmann, Pömer fathered a son, Gottfried Christian (1629-1644), but Helena died on November 5, 1629 due to complications that she incurred during childbirth (Dickson, *Tessera of Antilia*, 115).

1628) a pastor of St. Catherine's.[32] Johann Pömer told J.V. Andreae that the group applied Andreae's utopian principles from the *Christianapolis* to the laws of Antilia.[33] Rathmann put down the laws in writing.[34] The plan for Antilia was possibly put into action in the summer of 1629 in Livonia, where one of the members of the group known only as Fridwald, along with his brother-in-law (possibly the Danziger printer Andreas Hünefeld) led a small group of laborers.[35] In any case, Antilia was short-lived. Nevertheless, it stands a representation of the desires of some in Danzig to create idealistic living conditions

Apart from their experiments in creating a modern utopia and their endeavors to create a city structure that could manage the pain and suffering of the sick and poor, Danzigers looked to the classical world of the past as a model of emulation. In practice and in rhetoric, the city became a Neolatium to its citizens and to visitors.[36] For example, although the official language of city meetings and records was German, when city

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[32] Ibid., 120-121. Dickson records that the group also included: one Fridwald, a former fellow student of Mochinger and Georg Hartlib at the Danzig Gymnasium; David Riccius, a relative of Christoph Riccius (1590-1643) who taught history and law in the Danzig Gymnasium to Fridwald, Hartlib and others; and possibly Johann Botsack (1600-1674) a Lutheran theologian in Danzig who, after his time in Rostock, was a professor of Hebrew and Rector at the Danzig Gymnasium.

[33] Ibid., 133.

[34] Ibid., 122. Dickson reports that David Riccius told Hartlib that "Ratmannius of Dantzigk made the Leges Antiliae et dextra." Dickson believes however that "Hein or Pömer more likely had a larger role in drafting them."

[35] Ibid., 125.

[36] Classically, Latium referred to the land of the Latins, an area in Italy where Rome was situated.

officials greeted foreign guests, they did so in Latin.[37] The French diplomat, Charles Ogier recorded that in 1635, his delegation arrived in Danzig to witness the treaty between Danzig and Sweden, in which Sweden forfeited its rights to a share of customs tariffs in the port that it had established in 1629. Upon the arrival of Ogier's group, they were greeted by the city secretary who gave the entourage "a Latin address; indeed from the moment we reached Prussia, it was as if we entered old Latium; because everything was negotiated in Latin."[38] With all the experiences he had as a diplomat at home and abroad, the Parisian Ogier was struck by the reception in Latin he received in Danzig. Citizens within the city likewise represented themselves as reflecting the manners of the ancient classical world.[39] In 1641, Georg Bernhardi wrote a book-length poem (albeit in German) on the "Origin and Building" of Danzig that praised both artists and philosophers in the city who exemplified the spirit of the ancients. "Here as in Greece, you want to become Greek/ Here you may find Latins who, if they please, speak Latin."[40]

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[37] As a republic however, Danzig desired not only to be seen as a classical host to her visitors, the city also desired to alleviate and ameliorate the condition of the poor and uneducated in the city. So although the official language was German, the city often issued proclamations in Polish as well to facilitate understanding for the poor. Bogucka, "Mentalität der Bürger von Gdańsk im XVI.-XVII. Jh.," 69.

[38] "Ogier's Bericht," 19-20.

[39] Representations here refer to the images that individuals created about themselves in order to portray themselves to others. Representations, consequently, shaped how others viewed the creators of such images, as well as how the creators viewed themselves. On representations, see Roger Chartier, *Cultural History: Between Practice and Representation*, trans. Lydia G. Cochrane (Cambridge: Polity Press, 1988), 5-9.

[40] Georg Bernhardi, *Kürze und einfältige jedoch eigentliche und gründliche Beschreibung Von dem Ursprung und erster Erbawung Der Hoch- und Weitberümten*

Citizens of Danzig looked not only to ancient ideals of classical life to pattern themselves after, they also looked to the republican myth surrounding the city of Venice. Having had close ties with Venetians during the sixteenth century because of the commerce that passed through their ports, Danzigers knew what a republican ideal could possibly do for their city. By the seventeenth century, it was customary for citizens of Danzig to refer to their city as the Venice of the North. There were physical manifestations of this attribution in the architecture of newer civic structures in the city such as the Rathaus or town hall, which was destroyed by two fires in 1550 and 1556, providing the opportunity for civic authorities to build a new Renaissance-style building to house their Senate.[41] Construction for the new Rathaus started in 1593 and included rotunda murals patterned after murals in the civic buildings of Venice.[42]

Königl. Kauff-See und Handel Stadt Danzigk (Halberstadt, 1641) as quoted in Hertel, "Danziger Gelegenheitsdichtung," 216.

[41] Maria Bogucka, "Town Hall as Symbol of Power: Changes in the Political and Social Functions of Town Hall in Gdańsk till[sic] the End of the 18th Century," 33-34, article nineteen in Bogucka, *Gdańsk/Danzig and its Polish Context*. Bogucka writes that the "Gdańsk Town Council, assuming the pose of the Roman or Venetian Senate desired without any doubt to make Gdańsk into a Venice of the North" (35).

[42] Peter Oliver Loew, "Danzig und Venedig, in Trauer vereint: Ein Stadtvergleich als Beitrag zur lokalen Mentalitätsgeschichte (16. bis 20. Jahrhundert)," *Zeitschrift für Ostmitteleuropa-Forschung* 51 (2002): 159-187, *163* and *n. 14*. Concerning the Danzig rotunda murals painted by the Dutchman Isaak van der Blocke from 1606-08, Sergiusz Michalski earlier argued that they did not necessarily receive their inspiration from Venetian murals. While still admitting that there were many similarities between Danzig and Venice such as their political structures, Michalski maintains that van der Blocke could have patterned his mural after any number of similar murals that existed all across Europe ("Gdańsk als auserwählte Christengemeinschaft" in *Ars Auro Prior: Studia Ioanni Białostocki Sexagenario Dicata* (Warsaw: Państwowe Wydawnictwo Naukowe, 1981): 509-516, *512*). Michalski's earlier argument does not detract from Loew's general point connecting Danzig architecture to Venetian architecture. See Loew, "Danzig und Venedig," 164.

Denizens of Danzig also expressed pride for their city through poetry. One theme running through the Danziger poetry of the 1640s was the placement of the city in close relationship with the heavens. The refugee Georg Greflinger, for example, summoned the assistance of Apollo to situate Danzig among the stars:

Apollo help me, I want to sing of Danzig

And, where it is possible, bring it to the stars,

There where it also belongs[43]

Later in his poem Greflinger asked, "How shall I set you [Danzig] firmly enough in the stars."[44] One way he found to do it was by praising the beauty of Danziger women by comparing them to the stars.

Flee, Venus in shame

The daughters of this city are superior to you

Heaven can also barely harbor as many stars

As at this time the beautiful city of Danzig has

Of beautiful women and also beautiful maidens[45]

Whereas Greflinger turned to Apollo to help him give praise to Danzig, J.G. Salicetus placed Danzig somewhere within the cosmic realm of the stars.

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[43] Georg Greflinger, "Das blühende Danzig" (Regensburg, 1646) as reprinted in Hertel, "Danziger Gelegenheitsdichtung," 223. Stekelenburg reports that Greflinger like Abraham von Franckenberg and others found Danzig as a refuge station. He lived in the city from 1639-42 and again from 1644-46. See Stekelenburg, *Albinus*, 175.

[44] Greflinger, "Das blühende Danzig" in Hertel, 226.

[45] Ibid., 228.

I sing about you Danzig, Princess of all places

You royal city, richer than Molocco's treasures

Nature's masterpiece, you are more than a microcosm

Europe's miracle work, you are another tent in heaven

You are truly Cesala, you, you I will describe

You, you should my hand detail up to the border of the stars

There where you belong: nevertheless forgive me

Whence your starry praise is not worthy of your charge[46]

For Salicetus, Danzig was the seat of the Gods. It was "heaven itself."[47]

Selenographia as Propaganda for Danzig

The poetry that praised Danzig to the stars was a form of propaganda for the city that added to its self-image as a protector of the poor, a city that exemplified classical (especially Latin) tastes and mimicked the successes of the Venetian's republic, all of which to be taken into account when one is trying to understand Hevelius's works. Upon opening Hevelius's *Selenographia*, his first major work, one is struck immediately by Hevelius's highlighting of Danzig and how he portrayed it openly. A distinctive feature in the front matter of *Selenographia* in particular is the placement of several poems of celebration by friends close to Hevelius for the achievement of sharp observations of the moon and successful publication of his findings. More than mere commemorative pieces,

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[46] Salicetus, "Vergöttertes Danzig" (1643) as reprinted in Hertel, "Danziger Gelegenheitsdichtung," 217-218.

[47] Salicetus, "Vergöttertes Danzig" in Hertel, "Danziger Gelegenheitsdichtung," 220.

the poems are also a chorus of Danziger voices taking pride in their city and the work issuing forth from one of her presses. From the city Syndic Vincent Fabricius to Benjamin Engelke the son of an elite family in Danzig, the poems' authors held close ties with Hevelius and with the image of the city.[48] Also included among the authors were Gymnasium professors Lorenz Eichstadt and Johannes Mochinger, the city secretary Michael Borck, elementary school rector Johannes-Georgius Moeresius, as well as Abraham von Franckenberg and Cyprian Kinner.[49]

Most telling of the prefatory pieces is Johannes Mochinger's ode "On Prussia" which praises both the famous mathematicians that Prussia has produced as well as the cities that raised them:

> And of three of her inhabitants, **Nicolaus Copernicus**, **Peter Crüger**, **Johannes Hevelius**, Mathematicians, for one, above all most excellent,
>
> Three cities, Königsberg, our Prussia esteems as excellent. The first is Thorn, that honorable sixth point (Senio), then fair Elbing comes second. Third is Danzig, both three and four times more blessed. Altogether beautiful cities not one by name: Of which it is not necessary now to speak of all her endowments.

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[48] Vincent became the city Syndic in 1644. In 1649, he represented Danzig along with Bürgermeister Adrian III. von der Linde and Danzig Senate member Georg von Boemeln at the crowning of Johann Casimir as King of Poland. In 1666, Fabricius became a member of the City Senate without being on the Bench first. See Curicke, *Beschreibung*, 101, 128 and Stekelenburg, *Albinus*, 202, n. 8.

[49] Michael Borck became secretary of the city in 1611. See Curicke, *Beschreibung*, 130. Johannes-Georgius Moeresius was both a teacher and later rector of St. Peter school. Like Michael Albinus, Moeresius was a prolific writer of occasional poetry. He wrote over 200 of such poems most of which are spiritual songs and sonnets. See Stekelenburg, *Albinus*, 175.

Another distinctive feature in the front matter of *Selenographia* was the simple announcement of the publisher's name, Andreas Hünefeld. While the announcement may have been simple the consequences could be heavy. At the time Hevelius was working on *Selenographia*, there were two major printers in the city, Georg Rhete and Andreas Hünefeld. Dick Van Stekelenburg provides evidence to show that Hünefeld's publications were known for their beautiful appearance, specifically for the attractive typography, which was a major reason why authors chose to publish with him.[50] To be sure, Rhete and Hünefeld had different printing styles and printed different types of works. Their stories add to an understanding of why Hevelius chose to print with Hünefeld.

While Hünefeld enjoyed Hevelius's patronage in 1647, it was Rhete who ran the printing business started by Franz Rhode in the sixteenth century. Rhode's son Jacob Rhode (d. 1602) carried on the family business and printed among other things the Danziger hymnal in 1587. Upon Jacob Rhode's death, his sons Martin (d. 1614) and Jacob continued printing until 1619 when Georg Rhete (1600-1647) of Stettin took over the Rhode family print shop. But the Rhode/Rhete print shop did not remain the only shop in Danzig despite its powerful privileges to be the exclusive printer for the Danzig Senate and Gymnasium, which privileges brought Rhete a free room and exemption from

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[50] Ibid., 178. Stekelenburg maintains that "Hünefeld worked with well-known engravers and artists, who also gave his excellent printings a pleasant appearance in respect to the typography." Working for Hünefeld were, among others, the artist Elias Nosky and the engraver Jacob Sandrat.

taxes. Competition for Rhode/Rhete came in the person of Andreas Hünefeld (1581-1666), a bookman from Halberstadt who began printing in Danzig in 1608.[51]

Hünefeld represented a different direction of printing for the city. Whereas Rhete and the Rhodes dealt largely with works of state, the publications of the Gymnasium and with religious and devotional texts, Hünefeld ventured into new genres such as the periodical *Zeitung* or newspaper, the first of which he issued in 1618. He became the printer for the many Rosicrucian texts that were printed in the city during the 1610s and was successful enough to be a formidable rival to Rhete even without the privileges that Rhete enjoyed. And although Rhete was the official printer for the Gymnasium, Hünefeld still printed many of the disputations given in the Gymnasium as well as the writings of its professors.[52] Their rivalry reached a climax in 1631 when Hünefeld began the project of printing Jan Comenius's *Janua linguarum*. Rhete soon found out and envied Hünefeld's work that was so closely related to his own responsibilities to publish educational texts. He subsequently sought and gained support from the City Senate, which ruled in 1632 that Rhete alone would have the privilege to print Comenius's *Janua linguarum* in its original Latin form, leaving Hünefeld the right to print the work in German and Polish if he wished. But the issue did not stop there. Hünefeld trumped

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[51] On the history of the Rhete and Hünefeld presses, see Karl Heinz Kranhold, *Frühgeschichte der Danziger Presse* (Münster: C.J. Fahle, 1967), 22-23. Hünefeld actually took over the business of Wilhelm Guilemothanus, who opened his shop in 1605, but only operated for one year before his death in 1606. Guilemothanus's widow ran the shop until 1608 at which time Hünefeld took over.

[52] Hünefeld printed several of the disputations over which Peter Crüger presided (I have counted at least three in 1615, 1616 and 1618) including Jacob Gerhard's disputation discussed in chapter 3, as well as several of Crüger's textbooks and prognostications.

Rhete by turning to King Wladislaus IV, who on April 4, 1633 gave Hünefeld alone a royal privilege to print the *Janua linguarum* and the works of Comenius.[53]

After the Comenius affair, the two developed increasingly distinct printing styles that rivaled each other in quality. Above all, Rhete specialized in printing the unique visual poetry of Michael Albinus and others. Visual poetry was meant to be verbally engaging as well as pleasing to the eye, due to the use of varying sizes of lines, which created outlines for poems that resembled shapes and objects referred to in the lines.[54] In praise of Rhete's life and works, Albinus penned the following verse:

> To Herr Georg Rhete – Bookprinter in Danzig and valuable friend
>
> How very useful your work remains
>
> My Herr Rhete, I say without shying away
>
> You the ornament on the pier
>
> In which we greatly delight
>
> Because of your beautiful art
>
> Everyone showers favor on you
>
> Who in his good life
>
> Was devoted only to books[55]

But even Albinus recognized the increasing advantages of printing with Hünefeld. After the Comenius incident, Hünefeld's reputation within the city and throughout Poland and

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[53] Kranhold, *Frühgeschichte derDanziger Presse*, 22.

[54] See Rypson, "Seventeenth-century Visual Poetry from Danzig."

[55] On this poem and on the relationship between Rhete and Albinus in particular, see Stekelenburg, *Albinus*, 177-178.

German-speaking lands increased. He won the allegiance of the poet Martin Opitz, a close confidant of the King, reprinting his *Buch von der Deutschen Poeterey* in 1634 and later printing Opitz's *Deutschen Poëmata* in 1641. Hünefeld included other genres in his trade list. In 1632 he published the Polish bible and his print shop became the most important center for the dissemination of polish Reformation literature. With Poland becoming increasingly Catholic at the beginning of the seventeenth century, Calvinists, Lutherans, and Czech Brethren had no publishing outlets, except for Hünefeld's printing house in Danzig. Issuing forth from his press were hundreds of Polish Reformation books that consisted of nearly half the total output of such printed works in Poland during the first half of the seventeenth century. Most important to the argument of this chapter, the books issuing forth from Hünefeld's shop were noted for their attractive type faces and fine engravings. The strong ties that Danzig had with the Low Countries resulted in the commerce of excellent Dutch artists in addition to the many Dutch businessmen and merchants who made their homes in the city. To help him with typography, drawings and engravings Hünefeld hired well-trained illustrators with Dutch connections.[56] In 1645, Michael Albinus turned to Hünefeld to print his *Biblische-Linde*.[57] Two years later, when Hevelius was ready to have his *Selenographia* printed, he chose Hünefeld as the printer, who was able to handle the large format and typography of *Selenographia*.

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[56] On Hünefeld and his reputation, see Stekelenburg, *Albinus*, 210.

[57] Of Albinus's complete work, Rhete's shop printed around 75% of it and Hünefeld's shop printed the rest. Stekelenburg, *Albinus*, 177.

Evidence that *Selenographia* was meant as a propaganda gift to others showing the excellence of Danzig is prominently featured in the frontispiece to the book [Fig. 8].

Fig. 8 Frontispiece to Hevelius, *Selenographia* (1647). Courtesy of L. Tom Perry Special Collections, Harold. B. Lee Library, Brigham Young University, Provo, Utah.

Scott Montgomery offers perceptive analysis of the frontispiece. [58] At the top of the engraving, Contemplation flies on the back of an eagle with a detailed miniature of the moon on the upper-left of the engraving and an image of the sun with sunspots on the

[58] See, Montgomery, *Moon and the Western Imagination*, 179-181.

upper-right. Below Contemplation, float two putti holding a banner with a phrase from Isaiah 40:26, "Lift up your eyes on high, and behold who hath created these things." At the center of the image, al-Hazen (the Latin name for the 11th century figure al-Haytham, who wrote a book on observations of the moon) and Galileo flank the title for *Selenographia*. Galileo exemplifies those who seek truth through the senses and al-Hazen stands for those whose path to truth is through reason. In his analysis of the frontispiece, however, Montgomery does not mention that there stands at the base of the image a city portrait of Danzig!

Ever since Anton Koberger printed idealistic views of German cities in Hartmann Schedel's *Nuremberg Chronicles* of 1493, it had been a typical practice for German printers to place portraits of their cities within the frontispieces of the books they produced.[59] The uniquely German practice of adding city portraits in the frontispieces of books, Gerald Strauss maintains, came as a by-product of the delight Germans had in the "splendors of their great cities."[60] Books printed in Danzig likewise included her skyline. Examples can be found on the title pages of Peter Crüger's prognostications (also printed by Andreas Hünefeld), where scenes of Danzig as well as the Danzig shield figured prominently at the bottom.[61] Thus, the inclusion of the landscape of Danzig in Hevelius's *Selenographia* came as part of a local tradition as well as a larger German tradition of highlighting cities of printing.

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[59] Smith, *Northern Renaissance*, 71.

[60] Strauss, *Nuremberg in the Sixteenth Century*, 4.

[61] I have been able to examine personally Crüger's prognostication for 1628. See Peter Crüger, *Newer und Alter Schreib Calender auff das Jahr nach der gnadenreichen geburt unsers Herren Jesu Christi M.DC.XXVIII* (Danzig: Hünefeld, 1627)

By having the image of the place of observation included in the engraving, Hevelius could have also been hearkening to the frontispiece of Kepler's *Rudolphine Tables*, which likewise had at the base of the Temple of Urania a portrait of Hven, Tycho's Island and place of observation [Fig. 9].

Fig. 9 Frontispiece to Kepler, *Tabulae Rudolphinae*, 1627. Courtesy of L. Tom Perry Special Collections, Harold. B. Lee Library, Brigham Young University, Provo, Utah.

How the portrait of Hven was added to the final engraving is an interesting story in itself, but it also provides a valuable parallel to the possible reasons for the image of Danzig in the frontispiece to *Selenographia*. Having been commissioned by Kepler to prepare a sketch for the *Rudolphine Tables* frontispiece, Wilhelm Schickard did not originally add Hven. When Kepler submitted both the sketch and the text of the book to Tycho's heirs, however, they insisted that Tycho be figured more prominently in the engraving. In addition to clothing Tycho in his royal robes and elephant medallion, the final engraving contains a sketch of the island of Hven that had likewise stood out in Tycho's earlier publications.[62] For Hevelius, a profile of Danzig would become a standard fixture in the engravings of his later works. Adding a profile of the city had precedence in German printing traditions, which differed notably from printing sensibilities of southern Europe. As noted by Scott Montgomery, the frontispiece to Giambattista Riccioli's *Almagestum novum* (1651) appears to be patterned after the *Selenographia* frontispiece.[63] Among the dissimilarities, however, was the major difference that the *Almagestum novum* frontispiece did not include a profile of Riccioli's Bologna or any city or geographical area for that matter. It is this contrast that makes Hevelius's inclusion of the Danzig profile in his frontispiece such a salient feature. In effect, the profile of Danzig in *Selenographia* served as an icon of propaganda for the city, just as similar profiles did for other books printed in Danzig and for books printed in other German cities.

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[62] For the story of the *Rudolphine Tables* frontispiece, see Owen Gingerich, "Johannes Kepler and the *Rudolphine Tables*" in *The Great Copernicus Chase and other adventures in astronomical history* (Cambridge, Mass.: Sky Publishing Corporation; Cambridge: Cambridge University Press, 1992), 123-131.

[63] Montgomery, *Moon and the Western Imagination*, 194.

After the completion and publication of *Selenographia*, Hevelius received immediate praise and reward for his work from those within the city's walls and those outside as well. At the time of publication, Hevelius was serving as a representative from the Old Town on the City Bench. The city seized the opportunity to offer him a gift of their gratitude "for the offering of his *Selenographia*." Their reward to him was a weighty silver cup with an accompanying kettle that they had commissioned for 1,620 Marks.[64]

Reactions from others outside of Danzig were praiseworthy for differing reasons. The congratulations he received from Cambridge for his descriptions of the moon two years after publication told Hevelius he had "given us a new world that the ancients could conjure up only thru magic" and he had "discovered and described this new heavenly America for us."[65] And in a report from 1660, we learn that the King of Poland had visited Hevelius's house, perhaps to observe the moon using his instruments. But he was out of luck the day he visited, for the sky in Danzig was overcast and he could therefore not contemplate the mountains, valleys and rivers of the moon that a view through Hevelius's telescope promised.[66]

Above all, there were those who recognized Hevelius's desire to bring fame to his city and they wished him further success in fulfilling his aspirations. Most telling is the

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[64] Foltz, *Geschichte des Danziger Stadthaushalts*, 160. Andres Mackensen was the name of the craftsman who built the cup and kettle.

[65] University of Cambridge to Hevelius, 16 December 1649 in Brandstäter, *Hevelius Leben*, xi.

[66] Brandstäter, *Hevelius Leben*, xxi.

reaction from the young Danish mathematician Villum Lange (1624-1682) who after his studies in Italy traveled through the Low Countries and wrote Hevelius in the Fall of 1652. "As I was in Leiden," Lange wrote, "I borrowed your book [*Selenographia*] from a young Danziger and read it through in 4 days." His chance meeting with the young Danziger is an instance showing that Hanse traffic to the Low Countries was an important source for the circulation of knowledge. And although he failed to record who the young Danziger was (most likely a student at the University of Leiden), as a result of his reading of *Selenographia* Lange told Hevelius to "continue to make your hometown famous."[67]

Conclusion

Peter Crüger's promise that a life dedicated to astronomy could bring fame to Danzig was attractive to Hevelius who, as one of the city's senators and most prosperous businessmen, had vested interests in the city's economic and political health. The neutral ground Hevelius sought in his naming of features on the moon and the classical geography he projected onto the lunar surface owe their existence to Hevelius's life in Danzig. In *Selenographia*, he not only avoided attaching names of astronomers to lunar features in order not to insult anyone, but he must have been also aware that his work

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[67] Wilhelm Lange to Hevelius, 3 October 1652 in Brandstäter, *Hevelius Leben*, xiii. On September 15, 2004, I gleaned scant reference to Lange's studies in Italy from the webpage "Scandinavians in Italy" at http://www.dkinst-rom.dk/nemi/scand/siitl.htm Lange succeeded George Fromm in the chair of astronomy at the University of Copenhagen. Fromm, in turn, had succeeded Christian Longomontanus in the same chair. See the brief paragraph on Lange in Kristian Peder Moesgaard, "How Copernicanism took root in Denmark and Norway" in *The Reception of Copernicus' Heliocentric Theory*, ed. Jerzy Dobrzycki (Dordrecht, Holland; Boston, Mass.: D. Reidel, 1972): 117-151, *135*.

would have an impact on the way Danzig was perceived by others in general. Scott Montgomery maintains that "Hevelius did not draw the Moon as an overtly political idea" like others of his time.[68] Montgomery specifically contrasts Hevelius's *Selenographia* to the 1645 lunar map of the Catholic Belgian Michael Florent Van Langren (ca. 1607-1675), whose predilection to apply the names of Catholic royalty to features of the moon made his map a noticeably partisan document. In counterargument to Montgomery's appraisal of *Selenographia*, I argue that although Hevelius's book may not have been political in the same way as Van Langren's map, it was political in that it portrayed a Danzig that loved the Latin classical world and a Danzig that birthed an astronomer from guilded stock who could create such a work of learned breadth.[69]

Hevelius's local situation weighed into the reasons he constructed his *Selenographia* the way he did. It also helps explain why his nomenclature for lunar features lost out to those of contemporaneous selenographers, above all that of the Jesuit Giambattista Riccioli. Riccioli's map in his *Almagestum novum* (1651) succeeded by simplifying the nomenclature using the names of famous and recognizable astronomers without preference to time, place or creed. Montgomery suggests that Hevelius's naming scheme was quickly superseded by that of Riccioli because:

> the classical Mediterranean world of Hevelius's Moon yielded titles that were often unwieldy (e.g., Promontorium Freti Pontici) and were soon exhausted. Moreover, Hevelius had assigned single names to multiple features, thus creating an obstacle to any mapping at smaller scales. Riccioli himself noted that the names of classical geography were

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[68] Montgomery, *Moon and the Western Imagination*, 178.

[69] On Van Langren's map see Montgomery, *Moon and the Western Imagination*, 157-168.

> becoming less known, a situation that would worsen during the following century with the final downfall of Latin as the language of European science.[70]

So although Hevelius succeeded in portraying the classic-loving nature of his city and in bringing fame to his fatherland, his success came at the expense of having a lunar map that would become outdated and antiquarian by the end of the seventeenth century. Today, only ten of the names Hevelius applied to lunar features are still used by modern selenographers, and six of those names have been moved to describe other features than the ones Hevelius intended. As for Riccioli's names, 89 percent of them are still in use.[71]

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[70] Montgomery, *Moon and the Western Imagination*, 205.

[71] Whitaker, *Mapping and naming the Moon*, 209-217.

Chapter 6

Hevelius's "Last Judgment"

After the publication of *Selenographia*, life for Hevelius constantly fell under scrutiny from his colleagues at home and abroad. In his desire to follow Peter Crüger's admonition to bring fame to his home town, Hevelius produced a string of works on solar eclipses, the libration of the moon, his observations of Saturn, and the transit of Mercury across the face of the sun, all the time working on a much larger work that would deal with the natural history of comets, his *Cometographia* that would be published in 1668. However, his observations of a comet that appeared at the end of 1664 and the beginning of 1665 would become the source of the first great trial of Hevelius's astronomical life. His observations of the comet disagreed in a few particulars with those of the vocal French observer Adrien Auzout, as well as the independent observations of Christiaan Huygens and Giovanni Domenico Cassini. A heated debate ensued between Hevelius and Auzout that was ultimately mediated by the Royal Society of London in favor of Auzout. In the judgment against Hevelius's observations, leaders of the Royal Society followed the formula of the president of the Society, Lord Brouncker, whose opinion that "the difference" between Hevelius and Auzout "depending principally upon a matter of fact, 'tis the authority, number and reputation of other Observers, that must cast the Ballance."[1]

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[1] Oldenburg to Boyle December 30 1665, (*Correspondence of Boyle*, ii, 610). This is not to say that Brouncker was necessarily set against Hevelius when he devised this formula. Before the comet controversy, John Wallis wrote Hevelius telling him that

In *A Social History of Truth*, Steven Shapin argues that what compromised Hevelius's standing in the Royal Society during and after the dispute with Auzout over the comet of 1664 and 1665 was his social standing and his insistent rhetoric that his observations were correct. "Hevelius was a brewer and a son of a brewer," Shapin reminds us.[2] As for his rhetoric, Hevelius firmly defended his position in the controversy with Auzout. According to Shapin, Hevelius weakened his position by not engaging in the probabilistic discourse proper to gentlemen of the Royal Society. By being a brewer and by not behaving like an English gentleman, Hevelius undermined his reputation among members of the Royal Society.

The reputation that Lord Brouncker referred to, however, was not tied to social standing.[3] This chapter will argue that the reputation that mattered to Brouncker and others in the Royal Society was Hevelius's reputation as an observer, the reputation he achieved in the eyes of scholars across Europe and his reputation as a senator in the Danzig Senate. Hevelius had the reputation required by Lord Brouncker's formula, even though he was not an English gentleman. His problem was that there were not others

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Brouncker had "a very high opinion" of Hevelius and his studies (*CHO*, 2:170). And concerning the controversy itself Moray reported to Oldenburg early on that he thought Brouncker "inclines to think Hevelius not mistaken" (29 October 1665, O.S., *CHO*, 2:582).

[2] Shapin, *Social History of Truth*, 289-290.

[3] David Lux and Harold Cook have similarly argued that the Royal Society's trust in observers was not based on social rank or educational credentials, but rather on personal contact with observers and on character references. See Lux and Cook, "Closed Circles or Open Networks?: Communicating at a Distance during the Scientific Revolution," *History of Science* 36 (1998): 180-211, esp. *188*.

with similar reputations who saw what he saw. He did not have numbers on his side nor did he have corroborating independent observations.

Hevelius largely stood alone in his debate with Auzout and increasingly he stood apart from other members of the Royal Society, especially Robert Hooke, who criticized Hevelius's methods of observation for privileging naked-eye observations of stellar positions. This chapter will also argue that near the end of his life, Hevelius turned away from trying to please the gentlemen of the Royal Society and turned towards scales of judgment depicted in civic judgment scenes and last judgment paintings that he would have seen regularly as a Senator in the Danzig Senate and citizen of the city. The frontispiece to Hevelius's posthumously-published book *Uranographia* (1690) is a "Last Judgment" scene in a form similar to that of paintings in the churches and civic halls of Danzig.

Hevelius's Reputation, the Republic of Letters and the Royal Society of London

Concerning Hevelius's reputation as an observer, there were those, especially in Prussia, who could readily vouch for the accuracy of Hevelius's observations. For example, Albert Linemann (1603-1653), a professor of mathematics in Königsberg praised Hevelius's acumen even before the publication of *Selenographia* in 1647. For his prognostication for the year 1644 printed in Königsberg, Linemann relied on Hevelius's observations of sunspots as part of his own explanation. While basing his explanations on the categories of Christoph Scheiner that sunspots are either distortion effects in the air, clouds above the surface of the sun, or changes on the surface itself, Linemann chose to report Hevelius's actual observations of sunspots as seen through "Holländische

glasses."[4] Comparing the observations of Scheiner and Hevelius, Linemann wrote, "No less accurate also are such observations that have been administered in Prussia at Danzig, praise God, by the true, dear, sensible and industrious man Herr Johan Höwelcke (may God the Lord preserve him with good health and long life for many years).[5] Linemann's report, however, was not a simple transmission of Hevelius's observations. To give his readers a better picture of Hevelius's observatory, he offered explanations for how and when the Danzig astronomer made his observations. Hevelius observed the sunspots "through an efficient and expensive instrument," Linemann noted, and he "saw three maculas in the middle of the sun on October 23 at 9 o'clock." If one accepted the observations of Hevelius and "reads Herr Scheiner," one would virtually have a catalog of sunspots. Further Linemann maintained, if one questioned Hevelius's observations and is among the "doubting Thomases still," one need only become personally acquainted with Hevelius, "whose eyes, of anyone in all humanity, can actually open without any doubt."[6] Through his description of Hevelius's observations and personal

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[4] Like Crüger before him, Linemann decided to print extracts of his prognostications over a period of eighteen years. Also like Crüger, Linemann's prognostications were filled with answers to natural philosophical questions that were not necessarily connected to the prognostications themselves. In his prognostication for 1644, one of the questions Linemann addressed was whether it was true that heavenly bodies suffered changes as did the earth. He used the example of sunspots for his answer. Albert Linemann, *Deliciæ Calendario-Graphicæ: Das ist, Die Sinnreichsten und allerkünstlichsten Fragen und Antwort. Darinnen die Edelsten Geheimnüsse der Physic, Astronomi, Astrologi, Geographi*. (Königsberg: Pasche Mensen, 1654), 147-154, *148*.

[5] Linemann, *Deliciæ Calendario-Graphicæ*, 149-150.

[6] Linemann, *Deliciæ Calendario-Graphicæ*, 150.

attributes, Linemann attempted to persuade his readers to accept the veracity of his observations and his standing as a truth teller.

Hevelius also had a solid reputation as a reliable observer among members of the Royal Society of London. Indeed, he was a member of the society and even before he gained a nomination and membership into the society in 1664, shortly before the comets appeared that would lead to his debate with Auzout, Hevelius enjoyed an established reputation with the society. Upon an order of the Royal Society to "assure him [Hevelius] of the esteem, which the society had of his merits, of which he had given such demonstrations to the learned world in the books published by him,"[7] the secretary to the Royal Society, Henry Oldenburg initiated correspondence with Hevelius on February 28, 1663. He wrote that members of the Royal Society were so impressed by his works, especially his recent *Mercurius in Sole visus* (Danzig, 1662) on the transit of Mercury across the face of the sun that it "provided an occasion for your merits in the republic of letters to be praised to the skies in that assembly of the Muses."[8] By mid-seventeenth century, letter writers and authors used the Republic of Letters as a trope to refer to an imagined community of learned friends across Europe regardless of nationality or native language.[9]

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[7] Thomas Birch, *The History of the Royal Society of London for Improving Natural Knowledge, from its First Rise*, 4 vols. (London: Millar, 1756-57), I, 194; cf. Henry Oldenburg, *The Correspondence of Henry Oldenburg*, eds. A. Rupert Hall and Marie Boas Hall, 13 vols. (Madison: University of Wisconsin Press; London: Mansell; London: Taylor and Francis, 1965-1986), 2:29. Hereafter cited as *CHO*.

[8] Oldenburg to Hevelius, 28 February 1664, *CHO*, 2:27.

Lorraine Daston has argued that rhetoric supporting the idea of a Republic of Letters in the seventeenth and eighteenth centuries embodied two ideals. First, that it was a meritocracy that did not regard title or wealth. And second, that its citizens would be detached from religious, familial or local associations in their judgments of other citizens in the Republic.[10] Oldenburg told Hevelius that the Republic of Letters had as its foundation a network of friends bound by the common goal of seeking truth whose minds ideally "are unfettered and above partisan zeal, because of their devotion to truth and human welfare."[11] The ideals of merit and detachment made it possible for intellectuals to gain social status in the Republic of Letters, regardless of gentility or nobility. For Hevelius, the ideal of merit meant that he could gain reputation in the Republic of Letters through his astronomical work.

It was a purpose of the Royal Society to formalize the Republic of Letters. Oldenburg wrote, "For it is now our business, having already established under royal favor this form of assembly of philosophers who cultivate the world of arts and science

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[9] On the Republic of Letters as an imagined community, see Kasper Risbjerg Eskildsen, "How Germany Left the Republic of Letters" *Journal of the History of Ideas* 65 (July 2004): 421-432, *421*; and Robert Mayhew, "British Geography's Republic of Letters: Mapping an Imagined Community, 1600-1800" *Journal of the History of Ideas* 65 (April 2004): 251-276, *253-254*. The idea of a Republic of Letters started circulating in the late fifteenth and early sixteenth centuries to refer to a network of letter writers who participated and engaged in intellectual debates across nationalities and over extended periods of time. Their conversations through letters came as a part of an attempt to replace the dialectical model of the disputation standard in university settings. See Marc Fumaroli, "The Republic of Letters," *Diogenes* 143 (1988): 129-154, *134*.

[10] Lorraine Daston, "The Ideal and Reality of the Republic of Letters in the Enlightenment" *Science in Context* 4 (1991): 367-386.

[11] Oldenburg to Hevelius, 28 February 1664, *CHO*, 2:27.

by means of observation and experiment and who advance them in order to safeguard human life and make it more pleasant, to attract to the same purposes men from all parts of the world who are famous for their learning…"[12]

Others in Europe had earlier represented Hevelius as a citizen in the republic of letters. Shortly after the publication of *Selenographia*, for example, Athanasius Kircher urged Hevelius to continue "to enrich the republic of letters through such lovely works" and would later exclaim to Hevelius that through his works he would "survive even the republic of letters."[13] And in the spring of 1665 before the explosive debate with Auzout began, Hamburg comet-observer Stanislaw Lubieniecki (1623-1675) called Hevelius a senator in the republic of letters.[14]

As for his social standing, there is no denying that Hevelius was the son of a brewer and a brewer himself. In seventeenth-century Danzig, however, being a brewer did not necessarily degrade one's social standing. To be a brewer meant one was powerful and rich. While this was not necessarily the case during the sixteenth century, by the middle of the seventeenth century in order to be a successful brewer in the city, one had to be rich. "Gdansk breweries could not challenge competition from outside, especially from the breweries in the suburbs, and declined. The number of brewers fell

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[12] Ibid.

[13] Kircher to Hevelius, 14 February 1648 and 30 January 1655, in Brandstäter, iv, xvi.

[14] Lubieniecki to Nicolaus Heinsius, 24 March 1665 in Stanislaw Lubieniecki, *Theatrum Cometicum*, 3 vols. (Amsterdam: Typis Danielis Baccamude, Apud Franciscum Cuperum, bibliopolam, 1668), 1:264, "Viri in Reipublicae literariae Senatu Illustrissimi." Also in Brandstäter, xxviii. In 1668, Lubieniecki completed his *Theatrum Cometicum*, a massive illustrated compendium of over 415 recorded comets from the Flood to the comet of 1665.

from about 150 in the middle of the sixteenth century to 54 in the middle of the seventeenth."[15] Those who could survive in the suffering economy for brewers in the seventeenth century were prosperous. And although the local economy suffered, Danzig brews still enjoyed a distinguished reputation abroad. As George Greblinger remarked in a poem of praise for the city in 1646: "The brewing of this city is proclaimed far and wide; one may travel to Holland and move to further places, but will always find Danziger beer."[16] Hevelius beer was brewed under the names "Danziger Bier" and "Jopenbier" and was widely known. With his four breweries, he held a monopoly in the beer brewing business in Danzig.[17]

Even though Hevelius was a brewer, the Royal Society offered him membership. Steven Shapin argues that, by their nature, merchants, artisans and businessmen were untrustworthy in the eyes of gentlemen because they often lied for their own advantage.[18] But the Royal Society, a gentleman's club, did invite Hevelius, the brewer, to join them. Why? First of all, at the time of Hevelius's election into the Royal Society and the time of his dispute with Auzout, there was no explicit indication that any member of the Royal Society knew that Hevelius was a brewer, or that anyone cared. In the correspondence and meetings of the society, I have yet to find any mention of Hevelius's brewing business until Edmond Halley reported to the society at the first of the year 1696 that

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[15] Cieślak and Biernat, *History of Gdańsk*, 111.

[16] Löschin, *Geschichte Danzigs*, 1.405.

[17] Stekelenburg, *Albinus*, 49.

[18] Shapin, *Social History of Truth*, 93, 223.

when he personally visited Hevelius in 1679, Hevelius "assured him that what we call Spruce-beer, was after it was drawn of from the Malt boyl'd for 24 hours together which gave it that glutinous thickness it usually hath."[19]

Secondly, and more importantly, what members of the Royal Society explicitly knew about Hevelius's character and reputation was that he was a member of the Danzig Senate. In his first letter to Henry Oldenburg, Hevelius concluded, "Give my greetings to all my well-wishers, particularly the whole Royal Society, my patrons and admirers, and all my friends…One who constantly esteems and reveres your learning and virtues *Johannes Hevelius* Consul of Danzig, and temporary Magistrate."[20] Hevelius was not a noble, but he was also not merely a brewer. He had risen to the top level of Prussian civic status – that of a member of the Danzig Senate. Social structures in Danzig allowed for a nonnoble brewer to achieve important status in the city and in civic government. As discussed in chapter one, there were three orders in civic government, the "Hundred Men," the Bench and the Senate. By the time of his induction into the Royal Society and his dispute with Auzout, Hevelius had already passed from the Bench to the Senate. Although one should not map the social structures of London onto the Prussian city of Danzig, Hevelius's standing in the city was about as close to that of a gentleman in London as one could achieve. Using the *Kleiderordnung* (1628) of Strasbourg, a German city similar to Danzig, Lorraine Daston points out that the social hierarchy of Strasbourg consisted of the aristocracy at the top with patricians, rich merchants and intellectuals

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[19] *Correspondence and Papers of Edmond Halley*, Eugene Fairfield MacPike, ed. (London: Taylor and Francis, 1937), 236.

[20] Hevelius to Oldenburg, 4 January 1664, *CHO*, 2:138-139

together just below.[21] Hevelius's indication of his civic post did not go unnoticed by Oldenburg, who addressed him in his next letter as "Mr. Johannes Hevelius, Senator of the Hanseatic town of Danzig."[22] Even though Oldenburg was cautious about his relationship to Hevelius in their initial correspondence, it is evident that he treated him with respect.

Apart from his merit in the Republic of Letters, his standing in the Danzig Senate and his reputation as a trustworthy observer of the stars, Hevelius exhibited other attributes that would engender trust in the Royal Society. Steven Shapin argues that to show that one was a gentleman in early modern England, one had to be much like Robert Boyle, the focus of Shapin's work. Above all, Boyle exemplified a pious Christian and a scholarly philosopher (not just a mere scholar), making him a gentleman in the eyes of others.[23]

While he was not an English gentleman and was not versed in English courtly literature or etiquette, Hevelius still exhibited the traits of a pious Christian and scholarly philosopher.[24] He referred to his objective of restoring the catalogue of the fixed stars

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[21] Daston, "Ideal and Reality of the Republic of Letters," 370.

[22] Oldenburg to Hevelius, 9 May 1664, *CHO*, 2:176.

[23] For Shapin's entire argument see his "Who was Robert Boyle?" in *Social History of Truth*, 126-192. Quote from p. 179.

[24] Hevelius had already built a strong reputation in Prussia and in Germany as a pious observer. From Wittenberg, Aegidius Strauch wrote him on July 31, 1654, "we admire you here as the most spiritual and careful mathematician." And in his address on June 13, 1658 during the celebrations of the hundredth anniversary of the founding of the Danzig Gymnasium, professor of medicine and of mathematics Lorenz Eichstadt talked of Hevelius hoping that God would "stand by the side of this great man with merciful

with the rhetoric of piety: "by divine aid, I hope to achieve my goal shortly if God give me life, health, and leisure."[25] Oldenburg remembered Hevelius's professed piety when the plague hit London in 1665. Distressed and upset about this "pestilential infection," he wrote Hevelius, "You, who are so pious, will join your prayers for the restoration of our well-being to our own."[26] Oldenburg believed that prayer could help eradicate evil.[27] As for Hevelius's intellectual standing, Stanislaw Lubieniecki reported his "outstanding merits in astronomy" to Oldenburg, and several recognized him as learned, ingenious, and among those with clever wits.[28]

Apart from his genteel attributes, Hevelius was just the type of individual who fit easily into the Royal Society. He had close ties with several members of the group that founded the society, including John Wallis, whom he met on his grand tour through London in 1631 and with whom he corresponded thereafter.[29] According to Wallis, the group met:

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help, who was sent to us from heaven" for the purpose of observing the stars. See Brandstäter, *Hevelius Leben*, xv, xx-xxi.

[25] Hevelius to Oldenburg, 4 January 1664, *CHO*, 2:138-139.

[26] Oldenburg to Hevelius, 13 August 1665, *CHO*, 2:452-453.

[27] There has been some question about Hevelius's religious affiliation. See William Ashworth, "Light of Reason," 103. There should not be. His family members were long-time supporters of the Lutheran St. Catherine's church in the heart of Danzig and Hevelius remained a leader of the congregation during his lifetime. See Stekelenburg, *Albinus*, 50.

[28] Lubieniecki to Oldenburg, 23 April 1667, *CHO*, 3:391. As a learned natural philosopher, see for example, Oldenburg to Hevelius, 23 November 1664, *CHO*, 2:304. For other traits see: Flamsteed to Oldenburg, 28 February 1671, *CHO*, 7:465; Oldenburg to Boulliau, 30 May 1672, *CHO*, 9:68.

> to discours and consider of *Philosophical Enquiries*, and such as related thereunto; as *Physick, Anatomy, Geometry, Astronomy, Navigation… the Nature of Comets, and New Stars, the Satellites of Jupiter, the Oval Shape of Saturn, the spots in the Sun, and its Turning on its own Axis, the Inequalities and Selenography of the Moon, the several Phases of Venus and Mercury, the Improvement of Telescopes, and grinding of Glasses for that purpose,…* [30]

Hevelius was interested in all of these same things. In one of their regular meetings during the spring of 1664, the Royal Society unanimously elected Hevelius a member.[31]

As a member of the Royal Society, Hevelius was expected to publish about the stars. When Oldenburg informed Hevelius that he had been elected a member of the society, he represented him, without qualification, as a contributor to a common, lettered enterprise. "Our Fellows are particularly pleased because they see that you persist unchanged in whole-hearted pursuit of astronomy and attach prime importance to constant and attentive observations of the fixed stars, through which you will remove from the catalogue of their places its numerous errors and adorn the *Machina Coelestis*, on which you are laboring, for the benefit of letters." As if that were not enough pressure to produce his catalogue of fixed stars and much anticipated *Machina Coelestis*, Oldenburg added, "As for your *Cometographia* which you say is in press and which you

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[29] "In the families of the Gdansk councillors and benchers there was a long-standing and carefully observed tradition of sending adolescent sons abroad for a tour lasting several years." See Cieślak and Biernat, *History of Gdańsk*, 156. On his own tour, Hevelius traveled from London to France, where he met Mersenne, Gassendi, Boulliau and Kircher.

[30] C.J. Scriba, "The Autobiography of John Wallis, F.R.S.," *Notes and Records of the Royal Society of London*, 25 (1970): 17-46, *27*; as quoted in Scriba, "John Wallis," *DSB*.

[31] *CHO*, 2:176, note 2. Oldenburg sent Hevelius his certificate with a letter on the 21st of May, 1664. See *CHO*, 2:186-189.

wish to submit to the judgement of our Society, we congratulate you on that undertaking and acknowledge with pleasure your remarkable favor to us. The philosophy of comets has hitherto been hidden; in your work you have excelled in such things as, we greatly hope, will do much to disclose it."[32] Oldenburg showed Hevelius that with the election to the Royal Society came great responsibility to continue with his publication projects.

Oldenburg knew about *Cometographia* from an incident involving Hevelius and his printing press. In his initial letter to Oldenburg, written four months before his election to the Royal Society, Hevelius told Oldenburg that he already followed the motto of the Royal Society "Nullius in Verba." "Of this my *Cometographia* – a pretty large work which I have now in hand and in the press – will give proof."[33] Since *Selenographia*, Oldenburg could expect Hevelius's work to be excellent.[34] *Cometographia* would be equally impressive, but one of Oldenburg's motives in continuing his correspondence with Hevelius was to recruit him as a printer for the Society. For Oldenburg had difficulties with the Royal Society's printer, John Martyn.

In the early part of 1664, Martyn was to publish Ulugh Beg's Persian catalogue of stars. Martyn was not agreeable to publishing Beg's work, because of "the prospect of having to obtain a set of Persian type."[35] So Oldenburg was left without a printer. On

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[32] Oldenburg to Hevelius, 21 May 1664, *CHO*, 2:186.

[33] Hevelius to Oldenburg, 4 January 1664, *CHO*, 2:139.

[34] See Winkler and Van Helden, "Hevelius and the Visual Language of Astronomy."

[35] Beg's catalogue was compiled in the Hegira year 841, corresponding to 1437 A.D. Beg observed and recorded the positions of 1018 stars at his observatory outside of

May 9, 1664, in his first letter to Hevelius after Hevelius's nomination to the Royal Society, Oldenburg offered him the opportunity to publish Beg's work.[36] This letter never reached Hevelius, and in the meantime, John Wallis betted that Hevelius would accept the opportunity to publish. "Concerning Ulegbeg's [sic] translation & publishing: I believe that Hevelius will be willing to print it; but it must then bee onely in Latine."[37] As Adrian Johns presents the story, the whole problem with Martyn was the difficulty in publishing anything in Persian.[38] Something else must have concerned Martyn however, for Wallis was willing to settle on a Latin edition of Beg's catalogue. We see a hint of Wallis' disgust with Martyn, when he mentioned to Oldenburg the "difficulties which ye Printers interpose."[39]

Even with Wallis's faith in Hevelius, the printing of Beg's catalogue would not take place in Danzig. With Oldenburg's first letter of May 9th lost, he wrote Hevelius again on November 23, 1664 about the opportunity. Hevelius finally replied the next June that he would not be able to publish the catalogue. He reasoned that, "because of my *Cometographia's* now being in the press,…, it would seem wise to leave the entire

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Samarkand (now in present day Uzbekistan near the border of Tajikistan). For information about Ulugh Beg, see V.P. Sheglov's introduction to the reproduction of Hevelius' *Star Atlas*, xi-xxv. For more about Martyn, see Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago: University of Chicago Press, 1998), 496-497. Quote from page 496.

[36] Oldenburg to Hevelius, 9 May 1664, *CHO*, 2:174-176.

[37] Wallis to Oldenburg, 17 May 1664, *CHO*, 2:180.

[38] Johns, *Nature of the Book*, 496.

[39] Wallis to Oldenburg, 17 May 1664, *CHO*, 2:181.

work of Ulug-Beg to be printed by you, lest any of it be lost."[40] By this time, the curator of the Bodleian library, the English orientalist and translator Thomas Hyde had undertaken a full Latin/Persian edition. Hevelius's point was moot.[41] Although Hevelius rejected Oldenburg's invitation to print Beg's catalogue, when it came to the controversy over his observations of the comets of 1664 and 1665, Oldenburg and Wallis seemed to be Hevelius's only allies as the rest of the Royal Society cast judgment against him.

Comets of 1664 and 1665

According to Hevelius, there were two comets that appeared in 1664 and 1665 – the first in December of 1664 and lasting through February of 1665. It was Hevelius's observation for this first comet on the 18th of February, 1665 that caused major disagreement with Adrien Auzout [Fig. 10]. To Hevelius's eye, the comet passed near the first star of Aries. Auzout and his companions did not see the comet on the 18th but they did observe it on the 17th and then again on the 19th and the line between those two observations did not allow for Hevelius's observation for the 18th. The *Philosophical Transactions* reported Auzout's observation that "the Comet on Febr. 17 was distant from that *first Star* of *Aries* at least 1 degree and 17 minutes."[42] The only option that would have allowed Hevelius's observations to be correct was for the comet to have swerved

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[40] Oldenburg to Hevelius, 23 November 1664; Hevelius to Oldenburg, 1 June 1665, *CHO*, 2:300-309, 396.

[41] Sheglov, xv.

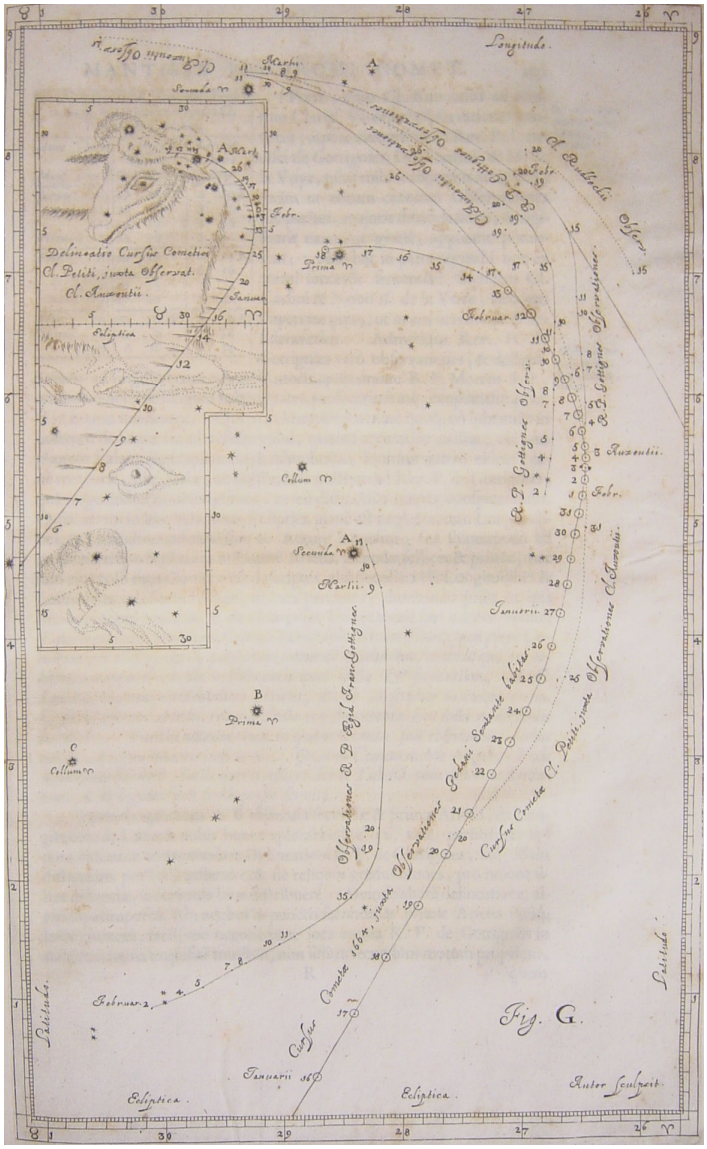

Fig. 10 Observed paths of 1665 comet from Hevelius, *Mantissa Prodromi Cometici*, 1666, figure G facing p. 128.

out of its gently curving path on the 18th of February down to the first star of Aries and then swerving back to its previous path where the French observers saw it again on the 19th of February. Both the discrepancy of over a degree in the differing observations and

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[42] "An Account of *Hevelius* his *Prodromus Cometicus*, together with some Animadversions made upon it by a *French* Philosopher." *Philosophical Transactions* (1665): 108.

the unusual path that the comet would have taken in order for both Hevelius and Auzout to be right were not acceptable to the Royal Society.[43] (As a sidenote: neither of the comets of 1664 and 1665 have returned so we are not able to map their current paths to the paths they took in the 1660s. The only evidence we have of their existence and of their paths come to us through the observations of the actors in this chapter).[44]

The idea that Hevelius might have fudged the position just enough to conform to a previously-thought-out hypothesis that comets followed parabolic or hyperbolic paths rather than straight ones or broad curves could never be substantiated. Opposed to Kepler, who argued for the rectilinear motion of comets, Hevelius held that comets were waste matter formed in the atmospheres of the outer planets Jupiter and Saturn and flung off initially in a spiral motion. Once a comet escaped the atmosphere of an outer planet, it would then travel first along a straight line as Kepler had argued but would then deform into a conic path due to the disc shape of its head.[45] But by his own account, the comet Hevelius observed in the early months of 1665 did not follow a path that he had expected. Up to February 14th, the comet had followed a path that Hevelius accepted with more

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[43] By current calculations, Hevelius's accuracy of observations was within 35 to 45 seconds at the time he observed the comets. As a referent, Tycho's accuracy was between 30 to 50 seconds. See J. Wünsch, "The Accuracy of Hevelius's Astrometric Measurements" *Journal for the History of Astronomy* 30 (November 1999): 391-406. Others have calculated even more accurate observations for Hevelius and Tycho. By his own account, Hevelius claimed that he was accurate to within 15 to 30 seconds of arc and some have claimed that Tycho's accuracy was often between 20 to 25 seconds of arc. All this is to say that a discrepancy over 1 degree would have been a huge error for Hevelius. See Shapin, *Social History of Truth*, 273.

[44] See Shapin, *Social History of Truth*, 287.

[45] For an excellent summary of Hevelius's cometary theory see, J.A. Ruffner, "The Curved and the Straight: Cometary Theory from Kepler to Hevelius" *Journal for the History of Astronomy* 2 (1971): 178-194.

curvature as the life of the comet wore on and as it came closer to the sun. Between the 14th and the 18th of February, atmospheric conditions in Danzig were not suitable for observation. Eagerly awaiting for the sky to clear, Hevelius was surprised when he could observe the comet again, "but in a place where I by no means expected it to be visible, namely, near the first star of Aries."[46] Accordingly, when Hevelius finally finished his treatise on comets, *Cometographia*, in 1668, he included a caveat to his original hypotheses, adding that a comet might experience drastic changes in motion, especially in its final days, due to an uneven distribution of weight resulting from uneven disintegration.[47]

When it came to the judgment of the veracity of Hevelius's observations, it was ultimately the sheer number of those who supported Auzout's observations over Hevelius's that led the Royal Society to favor Auzout's. In his claim that Hevelius's report was inaccurate, Auzout maintained that there were "several very intelligent *Astronomers* of *France* and *Italy* concurring with him therein, (whereas M. *Hevelius* to him seems to stand single, as to this particular)"[48] Lord Brouncker's formula was cited in

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[46] Hevelius, *Prodromus Cometicus*, 18, "sed eo loco, ubi illum extare haud sperassem: nempe prope ipsam primam Stellam Arietis." Translation based upon that of Simon Schaffer as quoted in Shapin, *Social History of Truth*, 273.

[47] For Hevelius's explanations of exceptional cometary motions, see Ruffner, "The Curved and the Straight," 191. While I have no exact proof as to when Hevelius provided for irregular motions of comets, I suspect it was after the comet of 1664-1665 appeared. Hevelius had printed the bulk of the first nine of twelve books of *Cometographia* before the 1664-1665 comet appeared. His final explanations and caveat for cometary motions are in book nine and it is not unthinkable that he could have added sections relating to irregular cometary motions to book nine before he completed printing the last three books of *Cometographia* by 1668.

the final judgment of Hevelius's observations and was therefore the leading criterion in the judgment. From the outset, Hevelius had little chance to sway the society according to Brouncker's formula, which favored multiple witnesses. Although the science of the stars had its admirers in Danzig, Hevelius was one of the only practitioners who was known widely (except for possibly his cousin Johannes Hecker)[49] and he was therefore outnumbered by those in Paris and in Italy. His authority and reputation were sound but he lacked independent confirmation.

Elements of the Royal Society desired to act quickly and pass judgment as to whose observations they wanted to accept – Hevelius's or Auzout's. A leading voice was that of Sir Robert Moray, who did not want the issue to linger. Moray wrote to Oldenburg from his refuge in Oxford that the difference between Hevelius and Auzout should be judged by the "ablest to judge, as L. Brouncker, Dr Wallis, Dr Pell, & Dr Wren."[50] While already knowing of Auzout's claims and waiting to examine what Hevelius would lay out in his *Prodromus Cometicus*, a shorter work specifically on the first comet of 1664 and 1665, Moray wrote Oldenburg, "I am as much affrayed as any

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[48] "Account of *Hevelius* his *Prodromus Cometicus*," 108.

[49] Hecker was a colleague of Hevelius in the Danzig Senate and was also an astronomer in his own right, having published in Danzig in 1662 the *Ephemerides motuum coelestium ab anno 1666 ad annum 1680*. He held correspondence with Henry Oldenburg and Robert Boyle, who were both interested in Hecker's work. After listing available philosophical books for purchase, Oldenburg once told Boyle in 1665 that he found "nothing else, worth buying, except it be johannis Hockeri, Dantiscani (Hevelius kinsman) Motuum Caelestium Ephemerides, ab Aº 1666. ad 1680; grounded upon ye Tychonian observations and Keplerian Hypotheses, and ye Rudolphin Tables, composed ad Meridianum Uraniburgecum" (*CHO*, 2:512).

[50] Moray to Oldenburg, 28 September 1665, O.S., *CHO*, 2:528.

body, that Hevel. Be found to be mistaken as I told you formerly and so is every one that sees Auzouts letter. Insomuch as none of us here can devise an excuse for him, if Auzout sayes true."[51] The decision against Hevelius came quickly after this expression of Moray's doubts. Without leaving much of a record as to why they made their decision, Moray told Oldenburg that the Society had decided against Hevelius and Oldenburg was commissioned to "give Hevelius his doom."[52]

Oldenburg still had an opinion about the truth of Hevelius's claims, even though he served the Society largely as mediator to the dispute and as messenger. He reported to Robert Boyle his experience upon reading Hevelius's defense in the *Prodromus Cometicus*. "'Tis, me thinks, very pleasant to read, and built upon an Hypothesis, wch is ingenious, full of speculation, and appearing sufficient to solve all ye phaenomena of Comets. This may movere salivam (make the mouth water)."[53] Nevertheless, upon the Society's quick judgment, Oldenburg drafted and sent Hevelius his "doom" letter, "as the observations of the French, the Italians, and the Dutch (in so far as they are known to us)

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[51] Moray to Oldenburg, 19 October 1665, O.S., *CHO*, 2:574.

[52] Moray to Oldenburg, 8 January 16665/6, O.S., *CHO*, 3:8.

[53] Oldenburg to Boyle, 18 September 1665 O.S., *CHO*, 2:512. Boyle questioned Oldenburg's admiration for Hevelius's observations, for by his own experience, the report of Auzout more readily matched what he saw of the comet than did the report of Hevelius. He wondered that "Hevelius should soe widely mistake in affirming yt, wch disagrees soe strangely not only wth Monsr Auzouts Observations at Paris, but wth wt if I much misremember not my Ld Brouncker, Sr Rob. Murry, & I observd at London" (14 October 1665, O.S., *CHO*, 2:569).

agree wonderfully well with our own, we are quite confident that you will fall in with this consensus of opinion."[54]

Even though the prevailing attitude was that the case was closed once Oldenburg sent his letter, there were those in the Royal Society who were not satisfied with the decision and acted as though the judgment was not final. John Wallis, for one, was a vocal advocate for Hevelius. Not exactly sure who to agree with, Wallis nevertheless voiced his admiration for Hevelius, writing that his "book hath had ill fortune." Even after others had so hastily judged Hevelius and Auzout, Wallis still expressed his own frustration in trying to figure out how to decide between the two. "I have no reason to suspect that either of them would willingly falsify an Observation: And yet how both can be solved, without allowing two Pheanomena, I cannot tell."

In working out a defense for Hevelius, Wallis examined his post-comet publications, the *Prodromus Cometicus* and the later *Mantissa* (1666), which specifically responded to Auzout's claims. Wallis came to the conclusion that the error in observation between Hevelius on the one hand and Auzout and his friends Pierre Petit, Giovanni Alfonso Borelli and Christiaan Huygens on the other "may, with as much probability at lest, be cast on their part as on his. Especially his Instruments being much better; & himself a diligent & long experienced observer."[55] In contrast to Lord Brouncker's formula of authority, number and reputation, Wallis looked rather to the quality of the instruments and the experience of the observer to cast the balance. Accordingly, he offered an alternative explanation that would have given both Hevelius

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[54] Oldenburg to Hevelius, 27 January 1665/6, O.S., *CHO*, 3:30.

[55] Wallis to Oldenburg, 31 January 1666/7, *CHO*, 3:330.

and Auzout the benefit of the doubt by stating that there were possibly two different comets in the sky on the date in question and that Hevelius and Auzout were possibly observing two different things. Hevelius "speakes so fair for two Phaenomena," Wallis argued "that though I am not forward to grant it, yet I am not able to answere some arguments so as to satisfy myself. But I should be glad to see ye series of observations made by our own number, from wch I should expect more satisfaction than from those of Auzout, whose observations are but very lame as to ye desiding the doubt."[56]

Hevelius was initially pleased to understand that his dispute with Auzout would be mediated by knowledgeable astronomers of the Royal Society "to whom as they are all skilled in these matters and impartial judges, I commit the whole business; and I will willingly acquiesce in their judgment whatever it may be." He added however that in his trial, he would only accept a judgment that considered his defense as well, for it was his testimony that what he had "depicted with great care and reproduced was only that which I had plainly seen, together with other notable persons."[57] Hevelius mentions here the presence of multiple and "notable" witnesses, the sticking point for the Royal Society, but he failed to specify who his witnesses were.

In previous observations, Hevelius did not neglect to report who his witnesses were. Concerning Hevelius's *Mercurius in Sole Visus*, Thomas Streete (1622-1689) objected that the angle between the line Mercury followed as it traveled in front of the face of the sun and the line of the sun's ecliptic was larger than Hevelius had observed.

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[56] Wallis to Oldenburg, 12 February 1666/7, *CHO*, 3:342.

[57] Hevelius to Oldenburg, 16 January 1666, *CHO*, 3:6

In civil conversation the two worked through the mediation of Oldenburg and held a disputation that did not blow up and remained what Hevelius called a "friendly controversy."[58] What is noteworthy in his replies to Streete is Hevelius's indication that "truly, I have pledged myself to 'nullius in verba' and so I always depict something exactly as I have observed it. If necessary, I can produce eyewitnesses who were present at that observation, especially the famous Mr. Büthner, our Professor of Mathematics, who will acknowledge that the original drawing corresponds very accurately indeed with the one engraved on copper and printed in the book."[59] Hevelius's reports of his observations of the comet of 1664 and 1665 did not name his companions or assistants. It did not matter. The submission of independent observations in favor of Auzout's observations swayed the Royal Society against Hevelius's observations.

Still, when Hevelius received Oldenburg's "doom" letter, he was not completely satisfied that the trial was over. At first, he reacted with disappointment, "I was not a little distressed to perceive from your letter of 24 January that in the controversy between Mr. Auzout and myself I was condemned without a hearing by some of the chief astronomers of the Royal Society." But "on the other hand" Hevelius continued "it was a great comfort to me to learn from your last letter of 30 March that those distinguished astronomers would gladly receive any substantial points that I could lay before the public concerning what had been proved and alleged so far."[60] Although Auzout said he would

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[58] Hevelius to Oldenburg, 1 June 1665, *CHO*, 2:398.

[59] Hevelius to Oldenburg, 1 June 1665, *CHO*, 2:397.

[60] Hevelius to Oldenburg, 3 July 1666, *CHO*, 3:170.

one day write a reply to Hevelius, he never did and seemed to have let the comet controversy drop after the "doom" letter had been issued to Hevelius. For his part, Hevelius could not forget the hurt he had suffered at the hands of the Royal Society and he never felt that the judgment of his observations was complete. To Oldenburg, he wrote, "The famous Mr. Auzout plays out time in making his reply, doubtless in order to cause the Royal Society to suspend its judgment, or even to put it off altogether, and moreover so that he may enjoy that judgment by certain individuals, made without hearing my side, published in the English journal."[61] Hevelius wrote that he was still willing to submit to the judgment of the Royal Society, as long as it took into consideration his defense.

In his continued defense, Hevelius left no doubt that he was personally and carefully responsible for the reporting of the observations, despite his statement that others were present when he made the observations of the comet of 1664-1665,. "I have presented each and every figure of the comets that I have observed myself, and delineated them in either the *Prodromus*, the *Mantissa*, or *Cometographia*, having engraved them on copper with my own hands, and sketched them in pencil upon paper at the very instant of time when I was observing them with the telescope, employing every care of which I was capable."[62] Hevelius's strategy here was to show that there were no distortions, introduced by middle men or assistants, between what he saw and what was represented in his publications. He made his own observations; he personally drew what he saw; and

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[61] Hevelius to Oldenburg, 31 June 1668, *CHO*, 3:447-448.

[62] Hevelius to Oldenburg, 21 December 1668, *CHO*, 5:245.

he made his own reports. But despite his best efforts to keep the controversy alive, Hevelius's defenses were left largely unexamined by the English and the French. His reputation among the French suffered terribly as a result of the debate with Auzout. Henri Justel (1620-93), secretary to Louis XIV, regularly informed Oldenburg of scholarly happenings in Paris and told him in the Fall of 1668 that in the French Academy "I have not yet found anyone who wants to have Mr. Hevelius' books. The Academicians have discovered that he has made several mistakes. They say that he is neither a mathematician nor a good philosopher."[63]

Machina Coelestis

In what follows, I will argue that the comet controversy was truly a turning point in Hevelius's life and that it shaped all of his subsequent work. According to the dictum of Lord Brouncker, Hevelius failed because he did not have authority, numbers or reputation on his side. By looking at what Hevelius added in his later works, it could be argued that he took Brouncker's formula seriously and desired to show that he met the demands of the formula. Removed as he was from the Royal Society and from the astronomical activities of those in Paris, Hevelius used *Machina Coelestis*, his next book after *Cometographia*, as the medium by which he could persuade and show those in London and Paris his methods of observation and the genealogy of his learning. Although he dedicated the book to his patron Louis XIV, Hevelius wrote to a larger audience that only knew of his authority through what they could see in *Selenographia* and in his dispute with Auzout. In the introduction to *Machina Coelestis*, Hevelius

[63] Justel to Oldenburg, 3 October 1668, *CHO*, 5:79.

therefore offered a history of astronomy that would serve as a lineage of his astronomical authority, and in the engravings throughout the book, he depicted his observatory, collaborators and assistants.

Peter Dear, Nicholas Jardine and Peter Miller have all studied the relationship between the writing of history and how such writing was connected to claims about authority, epistemology and correct method in philosophical discourse. Peter Dear gives a constructivist account of tradition. For Dear, recourse to tradition "acknowledges a temporal dimension in human affairs and tries to control it by perception of both similarity and difference between past and present….any particular tradition is something that is always actively created by its present users."[64] Such active creation is reflected in "humanist" histories that, as Nicholas Jardine writes, promoted "the 'useful arts' and the prevalent theme of human understanding as manifest through imitation of the creative acts of the divine intelligence."[65] The construction of history and lineages in the seventeenth century bolstered the authority of the individual, who often used the rhetoric of glorifying God and His creation to warrant the pursuit of natural philosophy.

In the seventeenth century, typical themes within histories of astronomy were the "restoration and renaissance of the mathematical arts." According to Jardine's survey of sixteenth-century histories of astronomy, the themes of restoration and renaissance

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[64] Dear, *Discipline and Experience: The Mathematical Way in the Scientific Revolution* (Chicago: University of Chicago Press, 1995), 97.

[65] Nicholas Jardine "Historiography and validation" in *The Birth of History and Philosophy of Science: Kepler's* A Defence of Tycho against Ursus *with Essays on its Provenance and Significance* (Cambridge: Cambridge University Press, 1984): 258-286, *263*.

assumed that the mathematical arts were fully understood by Adam, Moses, Abraham or some other ancient figure. It was up to moderns like the "*restaurator*" Copernicus to restore ancient knowledge of the stars.[66] In this same vein, Peter Dear has likewise noted that the sixteenth- and seventeenth-century themes of restoration and renaissance within astronomical discourses mirrored Protestant efforts to restore the practices of the ancient Church. However, unlike the iconoclastic actions of Church reformers, Dear advances the thesis that astronomical restoration embraced the traditions found within histories of astronomy. While not rejecting traditions, seventeenth-century astronomers in their discourse claimed to sift out corrupt astronomical practices in order to restore the pure astronomical practices of the ancients. With these practices restored, seventeenth-century astronomers would then be prepared to further the restoration of the stars and build upon previous astronomical knowledge.[67]

In addition, Peter Miller notes that in the tradition of Scaliger, history could also be a means of integrating diverse cultures. "Scaliger's work on chronology suggested the possibility of constructing a new history of Europe that integrated the ancient Egyptian, Israelite, and Phoenician worlds of the eastern Mediterranean with the Greek and Roman civilizations of the western."[68] Such integrative history could reflect one's own concerns about diverse cultures in seventeenth-century-European cities like Danzig.

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[66] Jardine, *Birth of History and Philosophy of Science*, 264, 269.

[67] Dear, *Discipline and Experience*, 115-123. See also James J. Bono, *The Word of God and the Languages of Man: Interpreting Nature in Early Modern Science and Medicine* (Madison, Wisc.: The University of Wisconsin Press, 1995), 212-213.

[68] Peter N. Miller, *Peiresc's Europe: Learning and Virtue in the Seventeenth Century* (New Haven and London: Yale University Press, 2000), 10. See also, Anthony

Much like histories of astronomy written during the sixteenth century, Hevelius highlighted the lineage of astronomical knowledge that passed through the Patriarchs of the Judeo-Christian tradition.[69] Although the Chaldeans, Egyptians and possibly even Orientals had prior knowledge, Hevelius stressed trying to figure out the lineage of astronomical knowledge as it passed through the Patriarchs. Did Abraham, for example, take astronomy to Egypt or did he get it from the Egyptians?[70] And what about Moses and Job? Using the Jewish historian Josephus as a source, Hevelius asked:

> Moreover, did not the descendants of Seth's sons begin to worship Urania, with nothing foolish intervening, and spread their worship further along the corridors according to Josephus? And was Abraham the first to exist who taught this science to the Egyptians? Or as Josephus said in truth, was it the great-grandson of Abraham [referring to Joseph of Egypt] who received this science from the Egyptians? Or did he take it from them? We do not find any trace in holy scripture, and thus the matter still lies before the judge.[71]

Whether Abraham and his descendants gave astronomical knowledge to the Egyptians or received it from them, Hevelius was sure that the *prisca astronomia* was alive and well at

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Grafton, *Joseph Scaliger: A Study in the History of Classical Scholarship*, 2 vols. (Oxford, 1983, 1993).

[69] Lineages that highlighted the source of ancient astronomy as passing through the Israelites took on several forms during the sixteenth century. Some emphasized the placement of *prisca astronomia* with the Greeks or the Egyptians over the Israelites. See Anthony Grafton, "From Apotheosis to Analysis: Some Late Renaissance Histories of Classical Astronomy" in *History and the Disciplines: The Reclassification of Knowledge in Early Modern Europe*, Donald R. Kelley, ed. (Rochester, N.Y.: Rochester University Press, 1997), 261-276.

[70] Abraham's role in the *translatio studii* (transmission of the study) of the science of the stars between Egypt and Canaan was a lively topic during the early modern period as well as the medieval period. On this question during the medieval period see John A. Tvedtnes, Brian M. Hauglid and John Gee, eds. *Traditions about the Early Life of Abraham* (Provo, Ut.: FARMS, Brigham Young University, 2001).

[71] Hevelius, *Machina Coelestis Pars Prior*, 11.

least by the time of Moses. "Nevertheless, by the time of Moses in about the year 1550 before Christ, or even a little earlier than this, certainly by the time of the Jews and Job, already a part of the science of the stars was known, also it was not entirely unknown to the Chaldeans and Babylonians, and it is clear out of the prophets it was indeed more than enough."[72]

Hevelius continued his lineage providing a gloss on the history of astronomy as it passed through the Greeks, finally arriving at his own era, which for him was the era in which Copernicus revived the hypotheses of the Pythagoreans. After Copernicus, Hevelius traced his astronomical heritage largely to northern Europeans and included names such as Peter Apian, Johannes Schöner, Erasmus Reinhold, Pedro Nunes, Gemma Frisius, Johannes Stadius, Michael Maestlin and Konrad Dasypodius.[73] His lineage was not complete without reporting the contributions of Tycho Brahe and his successor, Johannes Kepler. If it was not enough that Hevelius copied Tycho and Kepler in style and in subject matter, Hevelius claimed direct lineage to Kepler by announcing that he had in his possession Kepler's manuscripts![74] But his immediate predecessor and master in the lineage of astronomical knowledge that he constructed was Peter Crüger. Hevelius described how he came to study under Crüger: "Then it happened this way by the will of God (to the best recollection), because my eager friends followed me in persuading and

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[72] Ibid.

[73] Ibid., 32-33.

[74] Ibid., 35. On the fate of Kepler's manuscripts see Max Caspar, *Kepler*, C. Doris Hellman, trans. (New York: Dover, 1993), 361-367. According to Caspar, Kepler's son Ludwig retained his father's manuscripts and after his death in 1663, Hevelius purchased the manuscripts from the family at great expense.

encouraging my parents, they agreed that with enough desire, I might apply myself to the study of mathematics; which I obtained rather easily."[75] Although mathematics was easy at first, Hevelius recollected he needed a "mathematician of erudition" who could assist him further. That person was Crüger. According to Hevelius, Crüger taught him the rudiments of arithmetic, geometry, trigonometry, chronology, astrology, gnomons and the sphere. Crüger also encouraged his young pupil to learn the art of engraving and how to work with metal for the construction of instruments. He encouraged imitating Tycho in his admonition to Hevelius to devote his life to making observations.[76] For Hevelius, Crüger was his link to a grand genealogy of past astronomers whose authority could not be questioned. Hevelius grounded his claims as a truthful observer of the stars, by representing himself with a recognizable lineage of authority,

Concerning numbers, *Selenographia* had depicted Hevelius as observing alone. An engraving in *Selenographia* gave a picture to the Royal Society that Hevelius was alone in his observations [Fig. 11].[77] When it came to the debate over the first comet of 1664 and 1665, Hevelius's isolation hurt him. He needed to show that he was not alone. Increasingly throughout his later publications, Hevelius included depictions of his assistants. After the debate with Auzout, Hevelius's next major work to come to press was his monumental *Cometographia* (1668), which included a list of nearly four hundred comets observed from ancients through to his present. This book had been in preparation

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[75] Hevelius, *Machina Coelestis Pars Prior*, 38-39.

[76] Ibid.

[77] On the rhetoric of Hevelius's images in *Selenographia*, see Winkler and Van Helden. "Hevelius and the Visual Language of Astronomy."

for a decade before the comets of 1664 and 1665 appeared, so we should not expect to see in it an immediate change in the depictions of his observatory or the addition of assistants in the engravings.

Fig. 11 Hevelius observing with a telescope. Figure F in Hevelius, *Selenographia* (1647). Courtesy of L. Tom Perry Special Collections, Harold. B. Lee Library, Brigham Young University, Provo, Utah.

The major shift in Hevelius's depictions of his observatory came in *Machina Coelestis Pars Prior* (1673). In addition to the main purpose of the book- namely to describe and display his astronomical instruments in similar fashion to what Tycho Brahe had done in his *Astronomiae Instauratae Mechanica* of 1598- Hevelius also used the forum of his engravings to depict his observatory and his assistants. Of these engravings,

the most widely-known today are two which depict Hevelius and his second wife Elizabeth observing together [Fig. 12].[78]

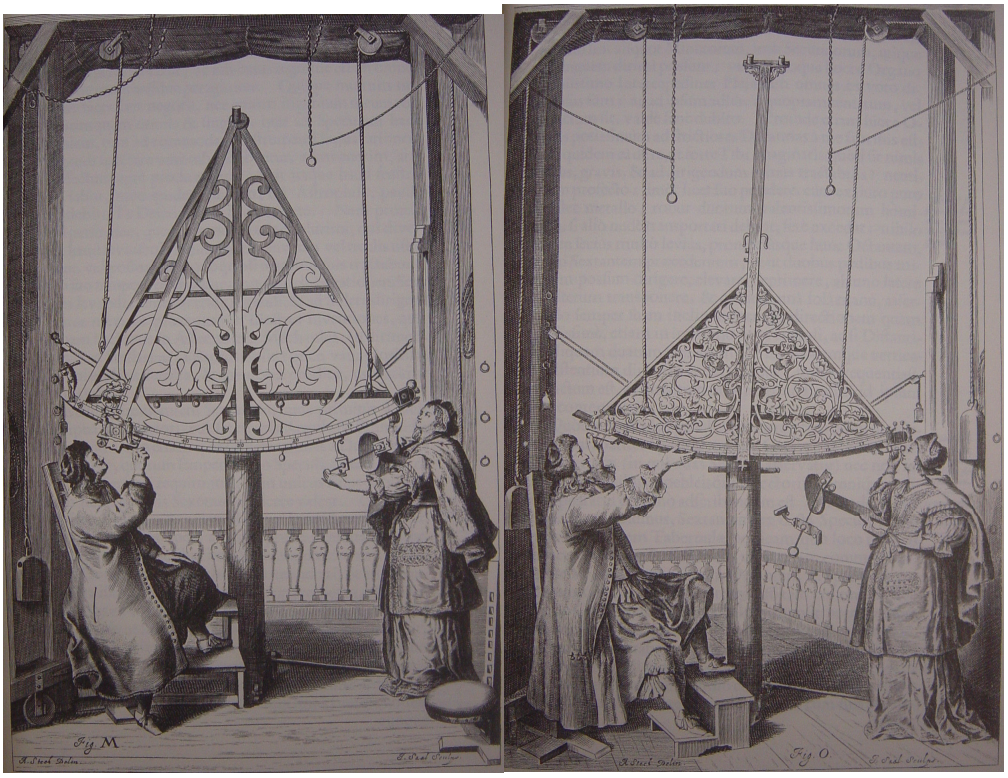

Fig. 12 From Hevelius, *Machina Coelestis*.

Two other engravings portray Hevelius observing with one other assistant. In the first of these, a faceless assistant aids Hevelius in the use of his large sextant. The other entails a story that could support Hevelius's image in London and in Paris. The text of *Machina Coelestis* reports that in 1661 Frenchman Ismaël Boulliau visited Hevelius at his

[78] The first engraving portraying Hevelius and Elizabeth depicts them using a large sextant whereas the second one has them observing through a large octant. The first image appears in several recent publications including the cover of Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996).

observatory in Danzig. Together, they observed a solar eclipse through the projection of the image of the eclipse from a telescope onto a sheet of paper [Fig. 13].[79]

Fig. 13 From Hevelius, *Machina Coelestis*.

Boulliau visited Hevelius the same year that Louis XIV took personal control of his regency. The personal connection to Boulliau would bode well for Hevelius in the new regime of Louis XIV, a powerful and wealthy patron who awarded the Danzig

[79] On Boulliau's relationship with Hevelius see Robert A. Hatch, *The Collection Boulliau (BN, FF. 13019-13059): An Inventory* (Philadelphia, Penn.: The American Philosophical Society, 1982), xlviii-l.

astronomer a regular stipend from 1663 to 1671 and a grant in 1679.[80] The image of Hevelius's close interaction with a respected French observer could also show the Royal Society of London that Hevelius was not as disconnected or as disassociated from Paris as the fallout after the dispute with Adrien Auzout would suggest.

If the images of Hevelius with a single assistant were not enough to show that he was not alone, then another group of engravings in *Machina Coelestis* would serve as a more convincing portrait of the numbers of persons involved in managing Hevelius's instruments. Two engravings concern the set-up and use of Hevelius's massive telescope in a field outside Danzig's city walls. In each plate, there are a half dozen assistants involved in the setup of the instrument as well two dozen bystanders in one and three dozen in the other. The manpower to run the naked-eye instruments of Hevelius's observatory was even more intense. In one engraving, Hevelius depicts eight observers using the instruments of his roof-top observatory [Fig. 14]. Visually, *Machina Coelestis* served to show others that Hevelius's observations were the combined product of several individuals' observations (not just his alone) boosting the observatory in the tradition of Tycho Brahe, who earlier employed multiple assistants to take part in his large observatory. Nevertheless, despite his efforts to bolster his authority and provide visuals of multiple witnesses who were seeing what he saw, Hevelius could not escape further internal criticisms of the Royal Society against his observations.

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[80] On Louis XIV's patronage of Hevelius, see Karolina Targosz, "Johann Hevelius et ses démarches pour trouver des mécènes en France" *Revue d'Histoire des Sciences et de leurs Applications* 30 (1977): 25-41.

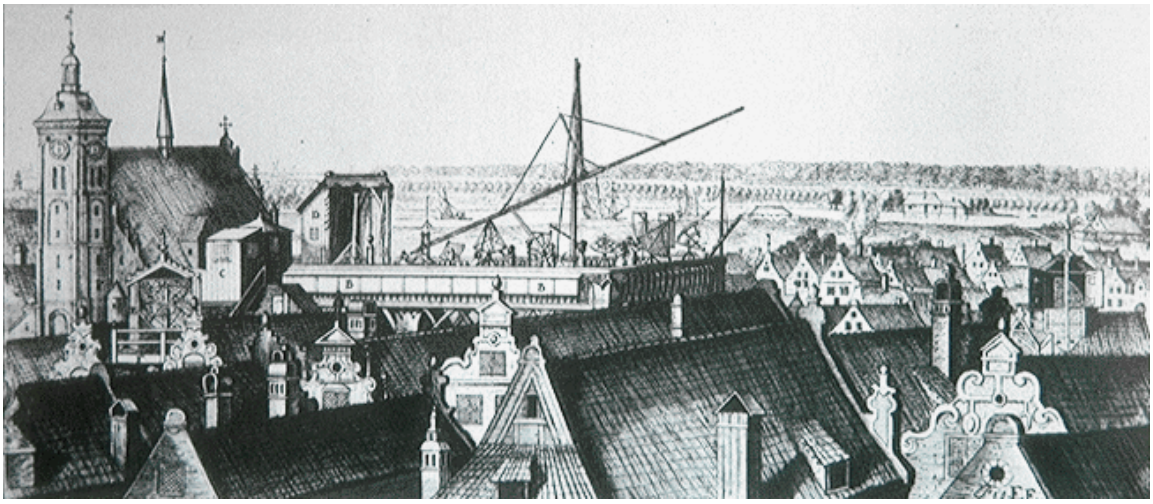

Fig. 14 Hevelius's rooftop observatory from *Machina Coelestis*. Hevelius owned three houses in Danzig's Old Town. The church seen to the left of the observatory is St. Bartholomew's. Merchants and sailors coming to and going from Danzig would be able to see Hevelius's observatory from the mouth of the Vistula river, seen in the background of this engraving.

Troubles with Hooke

Machina Coelestis met an audience that had long awaited its arrival. Oldenburg knew of Hevelius's plans for its publications a decade before it appeared and he often solicited news of its progress. Flattering Hevelius, even after the comet controversy, Oldenburg announced that "The whole learned world burns with a desire to see your *Machina coelestis*. In this context I boldly affirm that you are unremittingly engaged upon the work with indefatigable care and labor and that in a short time you will add the final touches."[81] Christopher Kirkby, an Englishman visitor in Danzig who corresponded with Oldenburg about the activities of Hevelius and others in the city, wrote that in "what time his publique affaires leave him free" Hevelius was busying himself with completing the *Machina Coelestis*.[82] Hevelius's cousin Johannes Hecker added, "it is still in the

[81] Oldenburg to Hevelius, 23 January 1668/9, O.S., *CHO*, 5:355.

press giving us opportunity to correct the astronomical tables which show remarkable discrepancies from the heavens."[83] And in the year of publication, Oldenburg hoped that Hevelius's "*Machina* will soon come from the press to the enrichment of our libraries."[84]

The long-anticipated arrival of *Machina Coelestis* with its extravagant descriptions of naked-eye instruments did not come without its detractors. Since at least as early as 1667, Robert Hooke vocally advocated the use of telescopic sights over the use of naked-eye instruments. In a brief he wrote to Oldenburg that was then relayed to Hevelius, Hooke reasoned that "Telescopic sights so greatly surpass those commonly used in instruments of all kinds, whether quadrants, sextants, or levels, especially for any kind of celestial observation, that with them an instrument of one span radius can be made much more accurate than another of sixty-foot radius, however good, having common sights."[85] Hevelius objected to Hooke's claim that a small instrument fixed with telescopic sights could make measurements as accurate as a large instrument with no sights, "As a trial (to which I challenge him) will more than adequately teach him."[86] Despite Hooke's misgivings, Hevelius pressed forward with the production of *Machina Coelestis*, describing his naked-eye instruments in lavish detail.

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[82] Kirkby to Oldenburg, 13 April 1672, *CHO*, 9:20.

[83] Hecker to Oldenburg, 8 November 1672, *CHO*, 9:314.

[84] Oldenburg to Hevelius, 5 April 1673 (this would be the new style date), *CHO*, 9:541.

[85] In Oldenburg to Hevelius, 21 May 1668, *CHO*, 4:396.

[86] Hevelius to Oldenburg, 29 November 1668, *CHO*, 5:186.

One of the most taxing trials in Hevelius's life came when, upon the publication of the first part of *Machina Coelestis*, Hooke expressed deep concern and criticism of Hevelius's reliance upon naked eye instruments to make his stellar observations that he articulated in his *Animadversions On the first part of the Machina Coelestis of the Honourable, Learned, and deservedly Famous Astronomer Johannes Hevelius Consul of Dantzick* (1674). While superficially praising Hevelius at the beginning of his *Animadversions*, Hooke soon turned sour. Referring to Hevelius, he began "I find then that this excellent Person hath been for the most part exceedingly circumspect, to find out the inconveniences and difficulties that do accrew to the best Observators, even with the best instruments, and has not been less industrious to find out ways to obviate and overcome them."[87] Hooke also recognized that Hevelius spared no expense in trying to improve upon the observations of his predecessors, above all those of Tycho. "But yet if he had prosecuted that way of improving Astronomical instruments, which I long since communicated to him," Hooke maintained "I am of opinion he would have done himself and the learned World a much greater piece of service, by saving himself more then 1/10 of the charge and trouble, and by publishing a Catalogue the times more accurate."[88] Of course Hooke was referring here to Hevelius's denial of telescopic sights when making stellar observations.

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[87] Robert Hooke, *Animadversions On the first part of the Machina Coelestis of the Honourable, Learned, and deservedly Famous Astronomer Johannes Hevelius Consul of Dantzick* (London: Printed by T.R. for John Martyn, 1674), 2.

[88] Hooke, *Animadversions*, 2.

As in the controversy he had with Auzout, however, Hevelius still had his defenders in ranks of the Royal Society. On the use of telescopic sights, Wallis considered Hevelius's sticking with naked-eye observations a noble and admirable thing:

> And we know, yt, in travailing, when a man hath once made a choise of a good Rode, though perhaps not absolutely ye best, he may sooner come to his journies end by keeping steady to that, than by often shifting of Rodes in hope to find a better. And so here; a diligent use of good Instruments, though perhaps not absolutely the best possible, doth more advance ye work, than spending the time in projecting or making better Instruments with making little or no use of them.[89]

Upon thoroughly examining Hooke's *Animadversions*, Wallis opined that it bore "a little too hard upon" Hevelius. And he was embarrassed that Hooke inserted into his caustic treatise a letter from himself. "I should not like the distinguished Hevelius to believe that, because Mr. Hooke inserted my letter into his work, I concur with anything harsh which he [Hooke] may have written against him."[90]

In his response to Hooke's overly critical commentary on his *Machina Coelestis*, Hevelius again felt the need to defend himself. First, he wrote that he abhorred "disputes with others and contentions in mere idle words against a Fellow of the illustrious Royal Society."[91] He saw Hooke's actions as his way of gaining notoriety amongst his fellows. "It almost seems as though he meant in these pages as it were to revenge himself upon me and give vent to his anger because I had not recently included him as an equal among my chief English patrons and friends....no other explanation is left except that by

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[89] Wallis to Oldenburg, 12 January 1673/4, O.S., *CHO*, 10:433.

[90] Wallis to Oldenburg, 11 January 1674/5, *CHO*, 11:154, 157.

[91] Hevelius to Oldenburg, 31 August 1675, *CHO*, 11:458-475, *467*.

reproving and refuting others and extolling himself to the skies he tries to acquire notable glory and fame for himself."[92] Then Hevelius explained his own reasons for practicing the science of the stars. He claimed that he never hoped to place himself "among the chief luminaries of the world," and referring to himself as "scarcely more than a citizen of Danzig," he again hinted to the ever present counsel of Peter Crüger in his mind "for which reason I always comport myself so that I may fulfill my duties to my beloved native city as well as I can, according to my abilities." As for celestial studies, Hevelius said that they were reserved for the free time he had after he completed his civic responsibilities.[93]

As to the credibility of Hevelius's defense, Oldenburg responded to Hevelius that "the Royal Society continues to judge your labours and researches for what they are worth notwithstanding the machinations of some persons, and has it in mind to protect yourself and your reputation from the plots and contrivances of illwishers."[94] Despite the appeasing words of Oldenburg, Hevelius remained hurt by Hooke's words. Renewing the challenge he made to Hooke in 1668, Hevelius wrote Oldenburg, "If anyone of those who absolutely reject plain sights were standing beside me and would thoroughly investigate and strictly test my apparatus, and would observe with me, perhaps he would before long change his mind; the dispute would easily cease and we would soon be of one

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[92] Hevelius to Oldenburg, 31 August 1675, *CHO*, 11:471.

[93] Hevelius to Oldenburg, 31 August 1675, *CHO*, 11:471.

[94] Oldenburg to Hevelius, 15 May 1676, *CHO*, 12:295.

mind."[95] The young stellar enthusiast and rising star of the Royal Society, Edmond Halley responded to the difference between Hevelius and Hooke with the attitude that there might be something to learn from Hevelius after all. In the spring of 1679, Halley traveled to Danzig where he observed stellar positions using a telescope mounted on a small quadrant while Hevelius observed using his large naked-eye instruments, principally the azimuthal quadrant and his large sextant.[96] Halley reported to Flamsteed that Hevelius's observations were just as accurate as the ones he could make with a telescope, "as to the distances measured by the Sextans, I assure you I was surpriz'd to see so near an agreement in them, and had I not seen, I could scarce have credited the Relation of any…so that I dare no more doubt of his Veracitye."[97] Halley's confirmation of Hevelius's accuracy was followed shortly by a terrible ordeal for Hevelius.

After Halley left, Hevelius resumed finishing the printing of the second part of *Machina Coelestis* during the summer of 1679. It was at the end of that summer that his observatory burned down- a trial from which he was never able to recover fully. According to several accounts, on September 26, 1679, Hevelius left his home with his wife to refresh himself outside the city walls of Danzig. Back home, one of his servants left a candle lit in the stable "whether by carelessness as some think, or with intent & of purpose"[98] that started a fire which quickly consumed Hevelius's estate. Not much is

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[95] Hevelius to Oldenburg, 8 December 1677, *CHO*, 12:363.

[96] On this episode, see Alan Cook, *Edmond Halley: Charting the Heavens and the Seas* (Oxford: Clarendon Press, 1998), 89-105.

[97] Halley to Flamsteed, 7 June 1679, O.S. in *Correspondence and Papers of Edmond Halley*, Eugene Fairfield MacPike, ed. (London: Taylor and Francis, 1937), 43.

known about what happened to the servant, who, after the fire started, "passed tiptoe through the front house without saying a single word about it."[99] In the fire, Hevelius lost all of his instruments including the azimuthal quadrant that he inherited from Peter Crüger. Several members of his household, however, had enough presence of mind to throw the majority of the books from his library out of the windows of his home to the ground outside. "From this lamentable fire there was saved , by the grace of God, (1) a good part of the *bound* books together with (2) MSS. [manuscripts] of great importance (1) specially the Catalogue of Fixed Stars, the work of many years, & (2) the new *Globus Cœlestis Correctus & Reformatus*" and other manuscripts including "those which Hevelius in the second part of the *Machina Cœlestis* promised he would publish, (1) *Uranographia* (2) *Prodromus Astronomicus* (3) *Annus Quinquagesimus Observationum Uranicarum*."[100]

The manuscript for *Uranographia*, his star atlas, later turned into Hevelius's most lavishly illustrated book. It is in this book where one can now find what Hevelius was seeking after the skirmish with Hooke and the traumatic experience of having his observatory burn down. The frontispiece to *Uranographia* contains Hevelius's last judgment, in which one may see that Hevelius sought solace and refuge not in the words of members of the Royal Society, but rather in a higher court of astronomers who could

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[98] D. Capellus, *De Incendio Heveliano* (Hamburg: Rebenlin, 1679) as reprinted and translated in Eugene Fairfield MacPike, *Hevelius, Flamsteed and Halley: Three Contemporary Astronomers and Their Mutual Relations* (London: Taylor and Francis, 1937), 105, 108.

[99] Ibid.

[100] Ibid., 107, 110.

appreciate his work in ways that the quarrelsome members of the Royal Society never could.

A Higher Court

The higher court consisted of authorities that Hevelius saw worthy of being his judges. In his posthumously published atlas of stars, we find Hevelius representing himself before the court of Urania bearing gifts [Fig. 15].

Fig. 15 Hevelius's last judgment from *Uranographia*, 1690. Courtesy of L. Tom Perry Special Collections, Harold. B. Lee Library, Brigham Young University, Provo, Utah.

Londa Schiebinger describes the image as follows:

> Urania, the muse of astronomy, is flanked by her male courtiers- Tycho Brahe, Hipparchus, Ptolemy, Copernicus, among others- the greatest astronomers of the past and present. Approaching from Danzig (pictured below the clouds), Hevelius rests his right hand on the Sobieski shield, the symbol of his earthly patron, while paying tribute to Urania, his heavenly patron. Nearby are reminders of Hevelius' achievements: his sextant, his *Catalogus Fixarum*, and his celestial globe.[101]

If we are to accept Schiebinger's argument that the illustration portrays a patron-courtier relationship between Hevelius and Urania, then the "reminders of Hevelius' achievements" are not just mere reminders, but gifts that Hevelius has either discovered or created. The animals to the left represent several new constellations, which Hevelius had formed out of stars whose positions had never before been recorded. At the far left, we see two dogs from the constellation *Canes Venatici* ("Hunting Dogs"). The animal with the bird in its mouth is Hevelius' *Anser et Vulpecula* ("Goose and Fox") and near Hevelius' foot is his *Lacerto* ("Lizard"). Above the hunting dogs, we see Hevelius' *Cerberus* (the Snakes), *Lynx*, and *Leo Minor*, ("Little Lion"). The two most precious gifts, which Hevelius is willing to offer to Urania, are the constellations of the Sextant and the Shield of Sobieski. With these constellations, Hevelius showed Urania that he has sacrificed his earthly existence to the building up of the heavens and the restoration of the stars. The Sextant in Hevelius's left hand symbolized his devotion to observing stellar positions with the naked eye. He wanted to place his legacy of plain-sight observation in the heavens forever. The Sobieski shield in his right hand honored his earthly patron, the King of Poland, it elevated Hevelius, and it became a most precious gift to the court of celestial investigators.

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[101] Londa Schiebinger, *The Mind Has No Sex?: Women in the Origins of Modern Science* (Cambridge, Mass.: Harvard University Press, 1989), 125.

The above analysis follows Schiebinger's patronage explanation for the engraving and augments her argument. Her explanations for the setup of the engraving came as part of a larger historiographical movement in the history of science to find explanatory motives for early modern science in the structures of princely patronage. Probably the most well-known recent history in this genre is Mario Biagioli's *Galileo, Courtier*, in which Galileo is portrayed as a court favorite who exists to perform playful experiments and offer delectable conversation around the breakfast table. There are, however, problems with such a view of Galileo in particular and of early modern experimental philosophy in general. Most of all, the "courtly patronage" view of science ignores other social structures and motivations that drove the work of early moderns like Hevelius. All this is to say that although Schiebinger provides a plausible account of this image as a representation of a patron-courtier relationship, there is an even more convincing explanation for the elements of the engraving.

The image, I argue, is actually a judgment scene in which Urania and the astronomers flanking her are the judges of what Hevelius is presenting to them. The types of judgment with which Hevelius was most familiar as a member of the Danzig Senate were civic judgments and representations of Christ's last judgment. Typical fixtures in the buildings of German Councils were paintings depicting civic judgment and Christ's last judgment. Regarding depictions of the last judgment, Jeffrey Chipps Smith maintains: "The ever-present picture reminded councillors of their solemn obligation to judge impartially, because they too would one day be judged by Christ."[102] Referring to all types of judgment paintings found in German civic halls during the sixteenth and

[102] Smith, *Northern Renaissance*, 78.

seventeenth centuries, Smith continues that such paintings (typically large) recognized the thoughts and deeds of city councilors who tried to judge impartially. The paintings represented upright governance in action.[103]

Danzig also had its share of judgment scenes. Several paintings by Hans Vredeman de Vries (1526-1609) hung in the New Town Hall. One is titled "Justice and Injustice" [Fig. 16] portraying a scene with the figure of Justice allegorically flanked by councilors in the Senate as they judge by the light of Jehova that emanates from above Justice's head. Injustice and those next to her look confused as they sit in darkness, look

Fig. 16 "Justice and Injustice," Hans Vredeman de Vries, 1595. From *Hans Vredeman de Vries und die Renaissance im Norden*, 326.

to each other for answers and throw up their hands.[104] "Justice and Injustice" is the first of a cycle of paintings by de Vries that circle about the great council room in the New

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[103] Ibid., 85.

Town Hall. The last painting in the circle is de Vries's depiction of "The Last Judgment of Christ," and since it completes the circle, it hangs next to "Justice and Injustice."

The "Last Judgment of Christ" features Christ standing on a globe of the earth at the top of the painting with the book of life attached to a pole below [Fig. 17]. To either side of the book of life are those who are judged righteous (on the left) and those who are not (on the right and at the center behind the post).

Fig. 17 "The Last Judgment of Christ," Hans Vredeman de Vries, 1595. From *Hans Vredeman de Vries und die Renaissance im Norden*, 329.

The judgment scenes of de Vries were not the only examples of judgment paintings in Danzig. One need look no further than the central painting of the St Mary's Church, which stood in the heart of Danzig to find the larger-than-life painting of "The

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[104] The open hands of those next to Injustice could be a sign of confusion or a gesture of hands ready to receive gifts and offerings for service rendered. On the latter interpretation, see Heiner Borggrefe, Vera Lüpkes, Paul Huvenne and Ben van Beneden, eds. *Hans Vredeman de Vries und die Renaissance im Norden* (München: Hirmer Verlag, 2002), 324.

Last Judgment" [Fig. 18] by the Flemish artist Hans Memling (d. 1494), whom Erwin Panofsky once characterized as "that very model of a major minor master."[105]

In Memling's striking portrayal of Christ's judgment at the Second Coming, Christ stands in the top center, flanked by his apostles on either side with those who are

Fig. 18 Hans Memling's "The Last Judgment." From McFarlane, *Hans Memling*.

being judged below, all in vivid color and contrast. The New Testament tells us the significance of each participant in the final judgment. First and foremost are the supplicants who will be judged according to their works that are recorded in the "book of

[105] Erwin Panofsky, *Early Netherlandish Painting*, 347 as quoted in K.B. McFarlane, *Hans Memling* (Oxford: Clarendon Press, 1971), 38. There are those who doubt Memling's authorship of "The Last Judgement" scene in St. Mary's Church. See McFarlane, "The Authorship of the Danzig *Last Judgement*" in *Hans Memling*, 16-27.

life" (Revelation 20:12). They will also be judged by their words (Matthew 12:36-37) and their thoughts (Romans 2:15-16). Christ's role in the judgment is to stand as the ultimate arbiter (John 5:22) but his apostles also share a role in the judgment and "shall sit upon twelve thrones, judging the twelve tribes of Israel" (Matthew 19:28; cf. Luke 22:30).

Hevelius's judgment scene bears distinct similarities with those of de Vries and Memling. Urania sits at the top of the Hevelius's "Last Judgment" flanked by astronomers past and present who judge Hevelius. The number of judges differs, however, between the engraving in Hevelius's book and the paintings of de Vries and Memling. In de Vries's "Justice and Injustice," both figures are flanked by six councilors, three on either side. In Memling's painting, Christ appears with his twelve apostles. There are only ten astronomers in Hevelius's "Last Judgment," perhaps to show that his was not a spiritual or civic judgment, but rather a mathematical judgment with ten signifying the favorite number of the Pythagoreans. As to the disposition of the astronomers, they do not appear to be as content as the councilors who surround de Vries's "Justice" but they also do not appear to be as confused or as greedy as those who sit next to de Vries's "Injustice." Rather, they appear to adjudicate in the same manner as the twelve apostles in Memling's "Last Judgment" painting.

Central to the paintings of de Vries and to the engraving in Hevelius's book is the image of a book. The books that appear in de Vries's "Justice and Injustice" and in his "Last Judgment" function differently than the book in Hevelius's engraving. For de Vries, the Ten Commandments tablet and the book of the gospels in "Justice and Injustice" as well as the book of life in the "Last Judgment" are independent guiding

documents for the judgment of those being judged in each scene. In Hevelius's judgment scene, the central book is his catalog of fixed stars, which he lays at the feet of those in the heavenly courts and which literally took most of his adult life to amass. Those who judge Hevelius in the heavenly courts above do so by virtue of the catalog that he has placed before them. In other words, the court of astronomical judges first judge the accuracy of what Hevelius lays before them and then they are equipped to judge him. The judgment of Hevelius is intimately connected to the judgment of his work; it does not stand independent of him. Above the catalog stands an inscription in Latin referring to the observations of the stars he has been able to make. "All granted me by divine benevolence, I bring them before you and commit them to your sublime judgment." More than simply a judgment of Hevelius's star catalog and atlas, this was Hevelius's final judgment in the same sense as Christ's last judgment at the Second Coming.

Conclusion

In Hevelius's judgment scene, the onus of truth-seeking is born both by the judges and by Hevelius, the one being judged. Unlike the members of the Royal Society who passed judgment on Hevelius and his observations without seeing what he saw, Hevelius desired judges who could carry the burden of proof with him. Flanking Urania from left to right in the engraving of Hevelius's judgment are Bernhard Walther (1430-1504), Tycho Brahe, Ulugh Beg, the ancients Timarchus, Hipparchus and Ptolemy, Albategnius or Al-Battani (858-929), Wilhelm IV, Landgrave of Hesse-Cassel (1532-1592), Regiomontanus (1436-1476) and Copernicus. It was this group of individuals with whom Hevelius represented himself as conversing across boundaries of time and culture

and with whom he identified himself as an observer of the stars. And it was this group that could judge him correctly for his experience and the quality of his instruments.

This type of judgment also differed greatly from judgment decided by the weight of balance. Hevelius could have chosen to appeal to a "blind" Urania as did Riccioli in his *Almagestum Novum* (1651) [Fig.19].

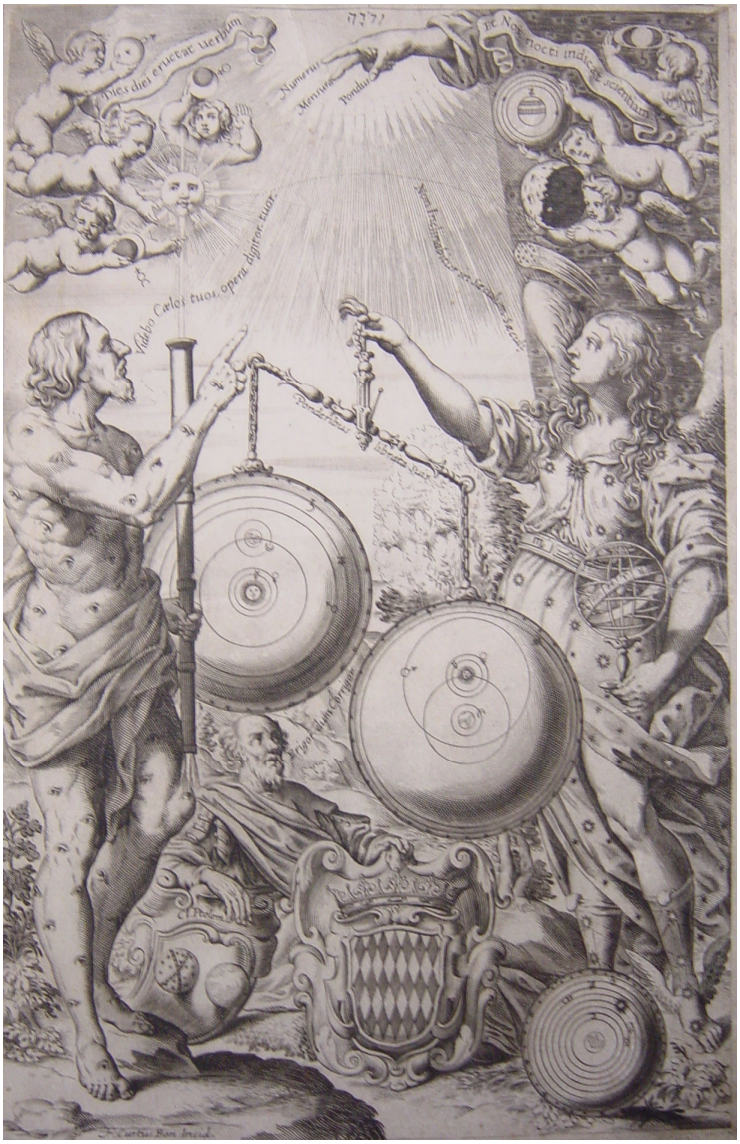

Fig. 19 Frontispiece to Riccioli, *Almagestum Novum*, 1651. Courtesy of L. Tom Perry Special Collections, Harold B. Lee Library, Brigham Young University, Provo, Utah.

In the frontispiece to Riccioli's book, the subject of judgment was a semi-Tychonic world system compared to that of Copernicus. Urania holds the two systems in balance and according to the formula issuing from the hand of God at the top of the frontispiece, Riccioli's Tychonic system outweighs Copernicus's in the scales of evidence according to its heavier "number" (Numerus), "measure" (Mensura) and "weight" (Pondus). And although Urania is not blindfolded as she holds the balance, she also does not look at the systems directly, but rather at the hand of God and the formula issuing from it. Unlike Riccioli's scales of judgment, Hevelius's higher court represented judges that could judge him based on their own direct observational experiences. Hevelius had been judged by the blind members of the Royal Society (who were not able to observe the comets of 1664 and 1665 properly, for example, due to overcast conditions in England) and Robert Hooke. For his final judgment, he chose instead judges who observed the stars, in the past and in his present, in the manner he did.

This chapter has highlighted the struggles Hevelius had with members of the Royal Society and the attempts he made to establish himself as a truth-telling observer. Although Hevelius was considered a participant in the republic of letters and an eminently careful and accurate teller of truth by those in his city and by others in Prussia, his standing amongst the members of the Royal Society suffered because of his observations of the first comet of 1664 and 1665 and his adherence to naked-eye observations. Despite his efforts and hopes to bring fame to Danzig by being a full-fledged member of the Royal Society, in the end he returned to what was most familiar to him in Danzig, namely, judgments similar to those depicted on the walls of the Danzig city hall and St. Mary's church. In his own last judgement, he resorted to representing

himself as subject to the heavenly courts of Urania rather than the living halls of the Royal Society.

Chapter 7

Between Tycho and Hevelius: Andreas Barth's Funeral Sermon

Chapters 5 and 6 showed Hevelius's efforts and struggles in his attempts to bring fame to his hometown of Danzig. Chapter 7 examines the rhetoric of the sermon that Lutheran pastor Andreas Barth gave at Hevelius's funeral in 1687 in which he praised Hevelius's accomplishments as an observational astronomer. Just as civic ideals and judgment models shaped Hevelius's image (as well as Danzig's image) outside of the city walls, they likewise shaped Hevelius's image within the city walls. In his funeral sermon for Hevelius, Barth contrasted the Danziger's life with that of the Danish nobleman Tycho Brahe. It is the argument of this chapter that the city filtered Barth's view of Hevelius and Tycho, sorting the ways in which he could contrast the lives of the two astronomers.[1]

In his sermon, Barth not only commended Hevelius as a "very hard-working man in his art and science, both a sensible and a skilled man," he also emphasized that Hevelius was "a Christian astronomer and heavenly observer."[2] When he called Hevelius a "Christian astronomer," Barth meant that Hevelius differed from other diligent and

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[1] I take the idea of a filter from the discussion of reading practices in Carlo Ginzburg, *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*, trans. John and Anne Tedeschi (New York: Penguin, 1982), 33. Like the Friulian culture of the miller Menocchio that shaped the way he read books, Barth's Danzig culture screened or filtered the way he saw the world and the way he viewed Tycho and Hevelius.

[2] Andreas Barth, *Der auffgehobene Leid und Freuden Wechsel, Welchen Bey ansehnlicher Beerdigung Des WollEdlen/ Besten und Hochweisen Herren Hn. Johannis Hevelii…*(Danzig: Johann Zacharias Stollen, 1688), 36.

industrious observers of the stars like the famed Tycho Brahe in that Hevelius gave no weight to any influences the stars may have had on mankind. In other words, Hevelius did not practice judicial astrology.

Barth compared the work of Hevelius with that of Tycho Brahe. Hevelius was "to be praised more than Tycho, because the latter thought highly of the prophecies made from the motions of the heavens. He [Hevelius] however, did not think anything at all of such prophecies and therefore he never presented himself as a prophet." The stark separation between Tycho and Hevelius that Barth offered at first seems odd because while Hevelius was alive, he did many things to fashion himself after Tycho. Yet Hevelius's imitation of Tycho was not a strict transmission of practices and ideas. He undoubtedly drew upon Tycho's model but then translated it into a city setting.[3] With such close proximity to Hevelius's observatory and with the distance of time and space from Tycho's work, Barth focused on the differences between the two and lost sight of their similarities. It is the purpose of this chapter to describe the tension between Hevelius's own representation of his self as a Tycho of the seventeenth century and

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[3] By referring to the transmission of scientific practices as a "translation" I make an explicit metaphor with the translation and imitation of written texts. As Peter Burke has written in *The Fortunes of the* Courtier: *The European Reception of Castiglione's* Cortegiano (University Park, Penn.: The Pennsylvania State University Press, 1995), translations come in a wide variety from literal translations to what he calls transpositions. The translation of Castiglione's *Courtier* into Polish in 1566 is an example of a transposition "in the sense that the scene was transferred from Urbino to Pradnik, a villa near Cracow" (90). The Polish *Courtier* also played by the rules of Polish values and morals, changing characters, passages and scenes within the text. When it came to Hevelius's translation of Tycho's observatory into the city setting of Danzig, he was both limited by his physical surroundings to duplicate Tycho's practices exactly, but was also freed from limitations that Tycho had. His translation could be considered part of Tycho's diversified legacy that J.R. Christianson speaks of in *On Tycho's Island: Tycho Brahe, Science, and Culture in the Sixteenth Century* (Cambridge: Cambridge University Press, 2003), 237-248.

Barth's presentation of Hevelius as a "Christian astronomer" very different from Tycho Brahe.

Hevelius and Tycho

Hevelius did well in translating closely many of Tycho's practices. The noble Danishman Tycho ran a large complex of astrological, alchemical and astronomical practices. J.R. Christianson in his recent book, *On Tycho's Island*, characterized Tycho's scientific operation as a learned household or *familia* "swarming with young scholars and their mentors."[4] Tycho of course stood at the head of all the activity in his *familia* and took as a direct model Herrevad Abbey where, as Christianson tells us, Tycho "and his uncle, Steen Bille, were establishing a series of interrelated technological and scientific facilities: a papermill, glassworks, instrument manufactory, chemical laboratory, and astronomical observatory."[5] When Tycho was granted the island of Hven in fee by King Frederick II of Denmark in 1576, he began immediately to build a *familia* of his own that would last over twenty years. On Hven, Tycho's *familia* built the castle Uraniborg, a separate observatory Stjerneborg and a papermill directly in the middle of pasture lands.

At the height of his observational life, Hevelius wrote a letter in which we may see many similarities between his practices and experiences and those of Tycho. In this letter Hevelius explained his blossoming observational work and his need to garner able mathematicians to assist him. Dated April 2, 1671, the letter begins, "I continue steadily

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[4] Christianson, *On Tycho's Island*, 74.

[5] Christianson, *On Tycho's Island*, 17.

with the observation of the stars and I pass neither a clear night nor an opportunity to attain from heaven something worthy of observing. The result is that I possess a large store of such observations of the stars and planets from the last 20 to 30 years." Hevelius was following in Tycho's footsteps in his desire to record the positions of the visible stars accurately- a project that typically took a lifetime to complete. Tycho and Hevelius shared a continuous practice of observing and recording star positions using precise naked-eye instruments. A second similarity between the two comes in the next few sentences of Hevelius's letter. He wrote:

> I would like to publish these [meaning his observations of the stars and planets], time permitting for the work. Also, I am preparing the first volume of my *Machina Coelestis*. In order to make it available sooner, I would like to request a superb artist from Holland to come. He shall help me make the figures and type from metal. The expense is great, and because of this he will receive free board and room in my house. In addition, I have requested a mathematician from Leiden to come, so that my entire work will present a better approach. He will undertake with me the typographical corrections, the drawings, and above all certain easy calculations.[6]

In this section of his letter, Hevelius both presented a plan of publication to describe his observations and his instruments and made requests for able assistants. With respect to his plan of publication, he mentions here the star catalogue and *Machina Coelestis*- both of which Hevelius intended as updates to Tycho's work. In his own printing agenda, Tycho planned to publish among other things a volume on his instruments, a new stellar catalog and his theory of lunar motion. Tycho referred to all of his projected works as

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[6] Hevelius to Chapelain, 2 April 1671, in Johannes Hevelke, *Gert Havelke und seine Nachfahren: Geschichte der Familie Hevelke, Hewelke und des Astronomen Johannes Hevelius, 1434-1927* (Danzig: Verlags Gesellschaft P. Rosenberg, 1927), 130.

The Theater of Astronomy.[7] Hevelius's *Selenographia* or study of the moon, his own star catalog and the *Machina Coelestis* all followed Tycho's earlier agenda. Concerning his search for assistants, Hevelius, like Tycho before him, actively recruited assistants. Unlike Tycho, however, Hevelius ran his observatory after the model of other trades in early modern Europe where he was the master and the student would become his apprentice. In return for assistance, Hevelius promised to treat his apprentices well. Hevelius searched for assistants since at least 1657. In that year, he sent letters to professors at the universities of Wittenberg, Jena and Leiden requesting that they send him able students to assist him in making observations and calculations. In his letter of request, Hevelius said he hoped "to be able to give the man [assistant] of myself yearly a large *honorarium*, [and] I will be sure to introduce him to good friends and contacts."[8] Not only would Hevelius help his apprentice make connections, he also hoped that the apprentice would be of such quality that he could someday replace the mathematics professor in the Danziger Gymnasium.[9] Hevelius would be the one who would mentor this new professor in the university, an honor for him and for his apprentice.

A reliable apprentice was hard to come by as evinced by the fact that Hevelius worked with a constant stream of new assistants. One assistant, however, later proved to be an excellent astronomer himself. This was Gottfried Kirch (1639-1710). When Hevelius sent out his letters requesting an able assistant, Gottfried Kirch was studying in Jena under the renowned polyhistorian Erhard Weigel (under whom Leibniz would later

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[7] Christianson, *On Tycho's Island*, 124.

[8] "Form letter," Hevelius, 2 March 1657, in Hevelke, *Gert Havelke*, 132.

[9] At the time this was Lorenz Eichstadt.

study). Weigel recommended Kirch to Hevelius and apparently Kirch served as an apprentice to Hevelius in the years around 1660.[10] Later, Kirch stated that he respected Hevelius both as a person and as an astronomer. He remarked that Hevelius was a "friendly man" and that it was "easy to get along with him, but he never let his assistants celebrate."[11] After his apprenticeship with Hevelius, Kirch still looked to Hevelius as a master of his trade and sought his confirmation on several observations.[12] Kirch also followed Hevelius' method of systematic celestial observation, although he used a telescope whereas Hevelius held to naked-eye observations. Kirch later established himself as a careful observer and when Frederick III of Brandenburg founded the Royal Academy of Sciences in Berlin on July 11, 1700, he made Kirch the first Academy astronomer.[13] Kirch was the type of assistant that Hevelius was always seeking.

In the final sentences of his 1671 letter, Hevelius describes the extent to which his work had grown and that he was involved in other activities apart from observing stars:

> In addition to the Observer [an unnamed assistant], I will, if the Almighty God is willing, maintain another 6 to 7 bookmen and other artisans, like

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[10] Lettie S. Multhauf, "Gottfried Kirch," *DSB*. Sometime after his stay with Hevelius, Kirch ended up in Königsberg where he spent time calculating tables for Danzig. In a letter to his wife, Kirch wrote that he hoped "to receive an honest bit of money from Danzig" for his work. See Detlef Döring, *Der Briefwechsel zwischen Gottfried Kirch und Adam A. Kochanski, 1680-1694: Ein Beitrag zur Astronomiegeschichte in Leipzig und zu den Deutsch- Polnischen Wissenschaftsbeziehungen* (Berlin: Akademie Verlag, 1997), note 10, p. 10.

[11] Kirch to his wife, 26 April 1675, in Döring, *Briefwechsel*, note 13, p. 10.

[12] See Döring, *Briefwechsel*, note 6, p. 51.

[13] Multhauf, "Kirch," *DSB*. For more on Kirch and his second wife Maria Winkelmann, see Londa Schiebinger, "Maria Winkelmann at the Berlin Academy: A Turning Point for Women in Science" *Isis* 78 (1987): 174-200.

> painters, machine builders, iron and wood workers and other frame makers and many people of every practice, whom I must enlist every day. What the costs are and how hard it is to find people who understand anything, you can imagine, let alone the amount of paper and material necessary for the instruments. And finally, not to forget anything – I do not want to boast – but I have a lot to do so that I do not neglect my acquiring of knowledge and let my astronomical studies come to a halt. May the Guide of the World [meaning the star catalogue] be achieved so that all that has been started will be led to a good end.[14]

Much like Tycho's household, Hevelius's observatory was bustling with assistants helping him with his work, allowing him time to pursue his own agenda of studies.

The work of Tycho and Hevelius coincided in other respects. In Tycho's *Astronomiae Instauratae Mechanica* (1598), the "restoration of the stars" is a prominent theme. In the spirit of the renaissance, when individuals were concerned with recovering ancient textual knowledge, Tycho's restoration of the stars referred to reobserving star positions in order to establish a more accurate stellar map in comparison to any observations that had survived from the past. In other words, the Tychonic renaissance of the stars was a redoing of nature. But it also involved more than just observing stars. The work required was also the allegorical fulfillment of worshipping the goddess Urania, the Muse of Astronomy. In poetic form Tycho penned these words as if they came from Urania's immortal mouth:

> But I recall an ancient, worthy time
>
> When I was worshiped, honored here on earth,
>
> And I recall when, in the halls of kings,
>
> Proudly I went forth in glory. Then

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[14] Hevelius to Chapelain, 2 April 1671, in Hevelke, *Gert Havelke*, 130.

No men but kings and those of royal blood

Would dare approach my sacred temple site.[15]

In order to restore Urania's former glory, Tycho praised her by building a castle in her honor. This was the short-lived space of Uraniborg or "Castle of Urania." Christianson tells us that "Tycho Brahe referred to it as his *museum*, using the word [museum] in the literal sense of a 'temple of the Muses'."[16] Tycho's study was a scholar's study. And although Uraniborg became the symbol of Tycho's goal to fuse the study and contemplation of heaven and earth, it was in his observatory where he spent the long hours necessary to restore the heavens. On the grounds of Uraniborg, Tycho built a ground level observatory he named Stjerneborg. Not as majestic as Uraniborg, Stjerneborg still held the connotation that it was to be Tycho's "Castle of the Stars."

Still following in Tycho's proven path, Hevelius named his own observatory "Stellaeburg." But despite adopting the name of Tycho's observatory for his own and despite surrounding himself with able assistants as did Tycho, Hevelius lived and worked in the heart of Danzig, running an urban observatory different in kind from Tycho's lone castle and isolated observatory that stood in the pasture lands of Hven. In an extended account to Oldenburg, Hevelius described how he and his assistants went about making their observations in the city. His report of an observation of a lunar eclipse on November 18, 1668 offers a glimpse of how his observatory ran, as well as how he and his assistants creatively used their urban environment:

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[15] As translated in Christianson, *On Tycho's Island*, 51.

[16] Christianson, *On Tycho's Island*, 38.

> Since searchers of the heavens never falter in striving to observe with special care those eclipses which take place at sunrise or at sunset, and since this one was of that kind, its midpoint or maximum obscuration being actually due to occur at sunset, I was perforce impelled to watch for this ecliptic full moon [Plenilunium Eclipticum], together with certain other lovers of astronomy [referring to his assistants]. I ordered two of these to climb the tower of St. Catherine's Church towards evening, when the sky was cloudless and promising, one [of them] to watch for the rising of the moon in every detail and the other for the setting of the sun.[17]

This public display of observation in the heart of Danzig continued as Hevelius's two assistants climbed the tower of nearby St. Catherine's with one of the assistants announcing the coming of the moon shortly before 4 o'clock. A minute or two passed and a clock chimed 4 o'clock. Shortly thereafter the other assistant hollered that the sun had just hit the horizon.[18] All the time, Hevelius stayed in his booth at the border of his observatory recording the times of the rising moon and setting sun. He reported to Oldenburg that it was necessary to have the two men observe from the height of the towers of St. Catharine's "for I knew that we ourselves, being in my observatory, could not observe this [the exact times of the rising of the moon and the setting of the sun respectively]; in fact, the western hills rising up about a degree [above the horizon] obstructed observation of the setting sun."[19] In all of this it is worth noting that Hevelius used the plural in referring to his observations. Works printed under his name were the

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[17] Johannes Hevelius, "Observation of a Lunar Eclipse," included in his letter to Oldenburg on 20 November 1668, *CHO*, 5:147.

[18] According to Hevelius, the moon rose at exactly 3 hr. 57' 55" and the sun began to set at 4 hr. 1' 41".

[19] Hevelius, "Observation of a Lunar Eclipse."

result of a communal effort, where the community consisted largely of assistants that nevertheless remained invisible or unnamed in his books.

Yet despite Hevelius's reception of Tycho's practices, his observatory could never replicate Tycho's social or cultural norms. Above all, there was the inherent separation between Hevelius's town and Tycho's gown. As much as Hevelius attempted to fashion himself after Tycho, he did not escape city life. In contrast to Tycho's *familia* that included a large group of younger men as assistants, for example, Hevelius ran his observatory with his own family members at the core of the operation. Hevelius's wife Elizabeth was one of a number of German women astronomers, who "came not from the aristocracy but from the workaday world of the artisanal workshop, where women as well as men were active in family business."[20] For the day-to-day workings of his observatory then, Hevelius drew on his experience as a brewing guild master in Danzig rather than turning to the noble Tycho's style as Lord of Uraniborg. In this respect, the differences between the two could not have been greater. Tycho's isolated country life spoke of nobility, whereas Hevelius's public urban work portrayed the life of an artisan and guild master. Though I will not press the point linguistically, Tycho's Uraniborg stood in contrast to Hevelius's Stellaeburg and could serve well as symbols for what separated Tycho and Hevelius.

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[20] Londa Schiebinger, "Scientific Women in the Craft Tradition," *The Mind has no Sex?* (Cambridge, Mass.: Harvard University Press, 1989), 66-101, *66*.

Science of the Stars

Apart from the differences inherent in running an urban observatory as opposed to an august pastoral observatory, Hevelius differed from Tycho in his theoretical allegiance to Copernicus. The starkest separation between the two, however, was in their intellectual engagement with the science of the stars- specifically in their attitudes toward astrological practice. Before discussing their differing attitudes, I will first outline what is meant by the phrase "science of the stars" and what it looked like during Tycho's lifetime.

In the thirteenth century, Campanus of Novara developed a threefold classification of the science of the stars. In his classification, Novara separated the activities of astronomy, which were concerned with the "science of proof", from the activities of astrology, which were concerned with the science of "judgment". Campanus further broke astronomy and astrology down "into theorical and practical parts."[21] Theorical astronomy, for example, was the making of mathematical and physical representations of the heavens to be able to describe the motions of the planets, whereas practical astronomy was publishing tables for astronomical events such as lunar eclipses. Similarly, theorical astrology was the theorizing about the making of prognostications, whereas practical astrology was the issuing of actual predictions and prognostications.

Around 1600 the boundaries between theorical and practical astronomy and astrology were rather fluid. Practitioners of any or all of these could refer to himself as a

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[21] Robert S. Westman, "The Literature of the Heavens and the Science of the Stars: Roots of an Early Modern Classification," paper presented at the conference "Wrestling with Nature: From Omens to Science," Madison, Wisconsin, Apr. 2001. See also, Peter Dear, "What Is the History of Science the History *Of*?: Early Modern Roots of the Ideology of Modern Science," *Isis* 96 (2005): 390-406, *393*.

practitioner of the total complex of the science of the stars. Practitioners could call themselves "mathematicians" "astronomers" or "astrologers" and still be referring to themselves as practitioners of the science of the stars in total. Tycho Brahe is a good example of an investigator of the stars who actively pursued knowledge within the confines of each area of the science of the stars. In theorical astronomy, he developed his unique geo-heliocentric model of the sun and the planets. As for practical astronomy, he was and is well-known for his observations. In theorical astrology, his intentions were to enact reforms but he needed more data from his astronomical observations first. So when it came to astrology, most of his energy was spent in practical astrology, meaning casting horoscopes and issuing prognostications relating to new stars and comets.

At the surface level, it could appear that Hevelius referred to his own activities in the same way as Tycho and others referred to theirs. Hevelius referred to his activities in several different ways. Writing to Henry Oldenburg, Hevelius explained that he was too busy to make telescopic lenses. "At this time I can spare no leisure to this business from my celestial contemplations." In different contexts, he used the phrases: "our divine sidereal science,"[22] "celestial studies"[23] and "celestial animadversions."[24] And he

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[22] "Eclipse Data," 11 January 1675, *CHO*, 11:218, 220

[23] Hevelius to Oldenburg, 31 August 1675, *CHO*, 11:463, 471

[24] Hevelius used the phrase *animadversiones Caelestes*. See Hevelius to Oldenburg, 31 October 1670, *CHO*, 7:210, 213. The phrase "celestial observations" comes from the Latin *observationes coelestes*. Oldenburg often used this phrase. See for example, Oldenburg to Hevelius, 9 August 1668, 22 June 1671, *CHO*, 4:578, 580, 8: 98. See also Flamsteed to Oldenburg, 23 December 1670, *CHO*, 8:319.

referred to the practitioners of sidereal science as "investigators of the stars,"[25] and "searchers of the heavens."[26]

Theorical astronomy apparently belonged to what Hevelius called celestial studies or sidereal science. For in several instances Hevelius showed his interest in theorical astronomy, but at the same time affirmed that he was not best suited to take on fully the problems of theorical astronomy. For example, Hevelius showed that he was familiar with the fact that the magnetic attraction of the earth shifts in position. To explain this phenomenon, Hevelius had written Oldenburg, "As for me, I am almost of the opinion, that this Magnetical Diversity comes from the Motion of the Earth. Doubtless, as there is a certain Libration in the Moon, so 'tis not absurd to me, to hold a kind of Libration in the Earth, from the Annual and Diurnal motion of the same."[27] Hevelius showed here that he fully accepted Copernicus' theory that the Earth had both an annual and daily motion and that this motion might help explain the shift in the magnetic attraction of the earth. He rejected the idea that shifting compass readings had anything to do with the loadstone itself. "For that the cause of this Declination and Variation of the Loadstone is inherent in the Stone itself, or to be ascribed to Æthereal Corpuscles, is not imaginable to me; nor can I yet devise any cause of those Appearances, except we impute them to the Globe of the Earth, and the Variation of the Meridian. But this subtile Question I leave to deeper

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[25] "Eclipse Data," 11 January 1675, *CHO*, 11:218, 220

[26] In the "Observation of a Lunar Eclipse," 18 November 1668, *CHO*, 5:143, 147

[27] Hevelius to Oldenburg, 5 July 1670, *CHO*, 7:49

Wits to discusse."[28] Although he was interested in the subject, he was not going to let it hamper his work in observing the stars.

When it came to theoretical issues that directly impinged upon his work, Hevelius did not simply shrug them off and leave them to "deeper Wits." Hevelius was involved with and interested in *novae stellae* or "new stars" that would appear, become bright, disappear and then sometimes reappear. Referring to a new star, Hevelius wrote:

> Hence it will be worth while … for us to pay careful attention to it in the future: can we devise any firm hypothesis concerning its rising and setting, and its waxing and waning? …will it always appear of the same color and constant magnitude? With God's help I promise my share in this task, and I have no doubt that other lovers of astronomy will do theirs.[29]

In this instance Hevelius showed his eagerness to engage with the theoretical issue of what new stars were, again following in the footsteps of Tycho who observed the new star of 1572 and brought the question of its physical nature to the fore for late sixteenth and seventeenth-century astronomers.

Under celestial studies or sidereal science, Hevelius must have also been referring to practical astronomy, which included making observations. But as for theorical and practical astrology, Hevelius did not leave room under the umbrella of the science of the stars. "Not only did he act as a Christian in this matter," Pastor Barth argued, "but he also followed the example of the famous Gassendi, who, …, did not think anything of

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[28] Ibid. It is interesting to note that Hevelius's cousin Johannes Hecker later wrote Oldenburg with a theory that directly contradicted Hevelius's thought. Hecker suggested that the shift of the earth's magnetic attraction was due to some internal process of the loadstone. "Does the cause of this variation [of the declination] lie in the terrestrial or the celestial globe? It is difficult to decide. I myself consider that it is brought about by its nature [being] inherent in its heavenly self" (*CHO*, 9:114).

[29] Hevelius to Oldenburg, 1 May 1671, *CHO*, 8:7.

judicial astrology."[30] Barth concluded with the sentiments of Pierre Gassendi that judicial astrology had no place in the repertoire of a "Christian astronomer." Gassendi argued this for several reasons, but most importantly he took a strict voluntarist position arguing that God's will is beyond our understanding and that any attempts to penetrate the inner courts of His secrets were unfounded:

> but it is derogatory thereto, to ima[gine] God to have an eye to those ridiculous purposes and [art]s, that men many times foolishly propose to them[selv]es, and so to presume of the certain knowledge of [Hu]man Events, as if they had pried into the secret Coun[sel]s of Providence Divine. We deny not, but *God* [*hat*]*h endowed the Stars*, as all the rest of his Creatures, [*wit*]*h some certain Virtues*; but we question, whether [ast]rologers know what those Virtues are; and whether Faculties, which they ascribe to the Stars, be the [sam]e that God gave them, or others meerly imaginary.[31]

While Barth saw in Hevelius a fellow opponent of all astrology, Hevelius himself showed an ambivalent attitude towards astrology, astrologers and their predictions. Evidence I have examined so far concerning Hevelius's case suggests that although he was not particularly interested in astrology, he felt that practitioners of astrology had their own legitimate space of intellectual activity, but not necessarily a space within what he called celestial studies or sidereal science. While both Barth and Hevelius were Lutherans, their anti and agnostic positions towards astrology were not standard Lutheran stances. As Robin Bruce Barnes has shown, the wide practice of prognostication in Germany during

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[30] Barth, *Der auffgehobene Leid*, 38.

[31] Gassendi, *The Vanity of Judiciary Astrology*. Translated by "a Person of Quality" (London: Printed for Humphrey Moseley, 1659), 77

the sixteenth and seventeenth centuries owed much of its sustained existence to the Lutheran Reformation.[32]

In turn, Lutheran leanings towards prophecy and prognostication owed much to the teachings of Philip Melanchthon. On the relationship of the study of the stars to God, Melanchthon taught that astronomy and astrology edified mankind by relaying knowledge about the stars, which were signs from God. The study of the stars was the study of God.[33] On natural philosophy in relationship to astrology and natural philosophers in relationship to astrologers, Sachiko Kusukawa has summarized Melanchthon's position that natural philosophy actually subserves astrology "because the latter investigates more general causes from which causes of the former can be deduced."[34] There were those in Danzig who followed Melanchthon's rather positive attitude towards astrological knowledge. Among those who were more amenable to reading influences into the stars were Barth's predecessors as Lutheran clergymen in Danzig. One of them, Pastor Stolsius (d. 1642?), held a position at St. Bartholomew's near the Hevelius house. Of Stolsius it is said that he pronounced Hevelius's entire fate in advance, presumably in the form of a horoscope he must have cast for Hevelius.[35]

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[32] Barnes, *Prophecy and Gnosis*.

[33] Kusukawa, *The Transformation of Natural Philosophy*, 144.

[34] Ibid., 147.

[35] Löschin, *Geschichte Danzigs*, 1:383. Löschin recorded that other preachers joined in the act of prognosticating including one Fehlau of St. Mary's who gave a sermon upon the appearance of the comet of 1653 and followed the "threatening prophets of disaster" with his "Star sermon concerning the star of grief, the comet."

But Hevelius's interests in astrological activities remained minimal at best, as attested to in a critical letter he wrote concerning professors of mathematics who were involved with astrology. For these professors and for those in general who practiced astrology, Hevelius left no room under the umbrella of celestial studies or sidereal science. "These gentlemen seem to watch the sky and its stars rarely. If they do anything at all, they turn the pages of their almanacs, and enjoy themselves with their astrological predictions. Nobody cares whether these come true or not. They fail to look at the latest celestial phenomena which are of such interest to astronomy."[36] In this letter, it is not the developments within astronomy that are ousting astrology from the science of the stars or what Hevelius calls celestial studies. Rather it is the astrological practitioner who cuts himself off from the firm foundations of astronomical knowledge. In Hevelius's world, therefore, an individual who is solely concerned with astrological practices and/or theory was not a practitioner of the divine sidereal science that Hevelius praised. That individual and his arts were divorced from astronomy.

Others recognized Hevelius as one not given to astrological speculation. One of his correspondents, Samuel Hartlib, for example, also held extended correspondence with the one-time master of Jesus College at Cambridge, John Worthington (1618-1671) in which they discussed among other things ominous appearances as well as Hevelius's attitude towards them. In response to what Hartlib either told him or wrote him in the spring of 1661, Worthington replied "That from Dantzig seems strange, that Hebrew and

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[36] Hevelius to Rabener, 5 July 1661, in H. Lambrecht, preface to *Selenographia: Facsimile Reprint of the Original Edition of 1647*, by Johannes Hevelius (New York: Johnson Reprint, 1967), vii.

Greek letters should be seen upon the pikes. Did they appear so near, as that they could discern each letter? And if they knew them to be Hebrew and Greek letters, could they not tell the sense and import of them? If that be true of such a letter, or patent, left upon Hevelius's Table, are not the contents known? Surely much enquiring would be upon such an occasion."[37] Of the letters and the patent, Hartlib did not know, but in answer to Worthington's letter, he relayed what he must have learned in a compilation of "Prodigies and Wonders" in which an anonymous Englishman recorded an "extract of a letter written" from Danzig "by a Person of Quality and Ingenuity to a Merchant of good note."[38] In vivid detail, the Danziger described seven mock suns or parhelia he observed during the morning of February 20, 1660. "Yea if I had somewhat sooner observed their Phenomenon," he reported, "that might have been seen nine Suns together, for I could well discern the foot-steps of two more."[39] Such a wondrous scene over the Baltic sky must have invited speculation as to what the mock suns would portend. However, even though Hartlib knew that Hevelius likewise observed the 7 mock suns in Danzig, he also knew that Hevelius would not attach any astrological significance to them. "But there

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[37] Worthington to Hartlib, 1 April 1661, in *The Diary and Correspondence of Dr. John Worthington*, 281.

[38] *ΕΝΙΑΥΤΟΣ ΤΕΡΑΣΤΙΟΣ, Mirabilis Annus: Or The year of Prodigies and Wonders, being a faithful and impartial Collection of several Signs that have been seen in the Heavens, in the Earth, and in the Waters; together with many remarkable Accidents and Judgments befalling divers Persons, according as they have been testified by very credible hands; all which have happened within the space of one year last past, and are now made publick for a seasonable Warning to the People of these three Kingdoms speedily to repent and turn to the Lord, whose hand is lifted up amongst us* (N.p.: n.p., 1661), 36.

[39] *Mirabilis Annus*, 37-38; also quoted in *The Diary and Correspondence of Dr. John Worthington*, note to 290-291.

being something foretold concerning the city of Dantzick I believe he is not very forward to spread such news."[40] However far they were removed from Hevelius, correspondents like Hartlib saw in him the cool attitude he held towards astrological prophecy.

The picture I have painted so far of Hevelius's attitude towards astrological speculation conflicts somewhat with a couple of incidents from the decade of the 1660s in which he showed that he believed at least in the possibility of heavenly influence on earth. During his dispute with Adrien Auzout discussed in chapter 6, the Royal Society of London took the liberty of publishing a summary of Hevelius's *Prodromus Cometicus*. "As to *Prognostication*, he somewhat complains," the article stated, "That Men do more inquire what Comets *signifie*, then what they *are*, or how they are generated and moved; professing himself to be of the minde of those that would have Comets rather *admired* then *feared*; there appearing indeed no cogent reason, why the Author of Nature may not intend them rather as Monitors of his *Glory* and *Greatness*, then of his *Anger* and *Displeasure*."[41] It is still clear here that Hevelius would rather have comets explained as to their physical constitution and admired as works of God rather than have time wasted on fumbling around for prognostications that could be given upon the appearance of a comet. Nevertheless, there is a hint here that he did not rule out astrological speculation altogether. If there was to be any speculation, then it should concentrate on the positive effects that comets could have on earthly affairs. Hevelius also showed some apparent

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[40] Worthington to Hartlib, 2 April 1661, in *The Diary and Correspondence of Dr. John Worthington*, 290-291.

[41] "Account of *Hevelius* his *Prodromus Cometicus*," 107.

interest in astrology, when he sent to his friend the French natural philosopher Ismaël Boulliau, the time of his second daughter's birth on August 25, 1668 requesting her nativity. Although he could not establish the exact time, Hevelius told Boulliau that his daughter Juliane Renata was born around twenty after ten.[42] In his reply to Hevelius's request, Boulliau gave his prognostication for Juliane and wrote, "The nativity (*Thema naturalium*) of your dear little daughter, I have enclosed for you here. I could have determined it sooner, if my business [concerns] had given me [more] time."[43] Hevelius's interests in astrology in this instance were minimal and it should be stressed here that he let others be the practitioners of astrology.

A final example relaying Hevelius's attitude towards astrology serves to show his explicit separation from astrological activity. The example comes from a letter he wrote concerning a rare scene he witnessed when the sun set with light shooting up high into the sky on February 5, 1674 [Fig. 20]. In a way, the sun looked like a large comet setting in the West. This scene was so remarkable that Oldenburg published it in the Royal Society's *Philosophical Transactions*. Hevelius wrote about the effects of the phenomenon on Danzig:

> Upon this appearance there soon follow'd an exceedingly intense and bitter Frost, whereby the whole Sinus Puzenis was frozen up from this Town of Dantzick, as far as Hela in the Baltique Sea, which lasted unto the 25th of March; and the Bay was frozen so hard, that with great safety people run out into it with Sleds and Horses, for several of our Miles. Whether the recited Phaenomenon have had any influence for this extream Cold, I know not, but leave it for Astrologers to examine.[44]

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[42] Hevelius to Boulliau, 8 September 1668, in Hevelke, *Gert Havelke*, 118-119.

[43] Boulliau to Hevelius, 12 April 1669, in Hevelke, *Gert Havelke*, 119.

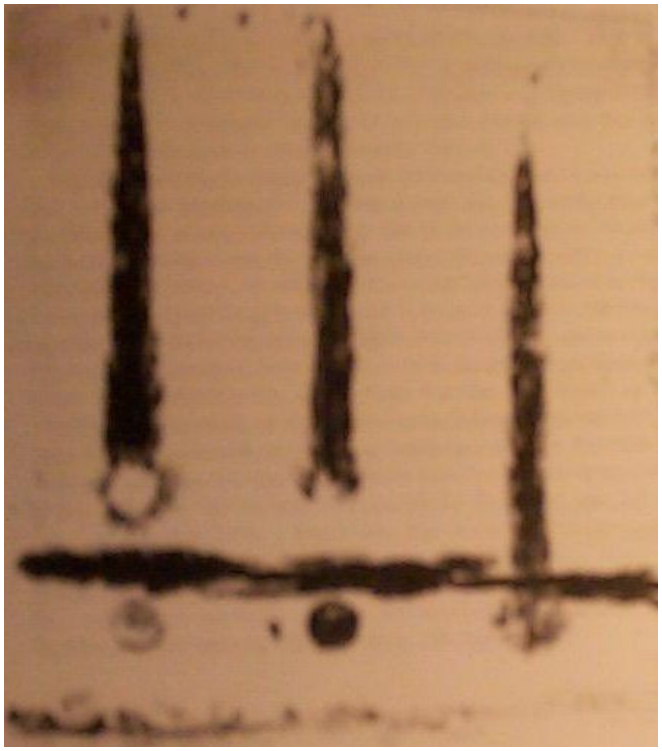

Fig. 20 Appearance of the sun setting from Danzig, February 5, 1674. From *Philosophical Transactions*. Courtesy of L. Tom Perry Special Collections, Harold B. Lee Library, Brigham Young University, Provo, Utah.

In short Hevelius did not bother trying to find possible connections between sidereal influences and earthly weather. He was not about to concern himself with such phenomena. When it came to possible astrological effects, he was an observer and spectator, not a practitioner.

So where did Hevelius get his ambivalent and at times critical attitude toward astrological practices, an attitude that differed extremely from Tycho's? First, the possibility that there was something intellectually unsatisfying about astrological practices must have been a factor for Hevelius. He most likely gleaned some of

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[44] Hevelius to Oldenburg, 7 April 1674, *CHO*, 10:546. Hevelius' letter was reprinted in the *Philosophical Transactions*, no. 102 (27 April 1674): 26-27.

sentiments from Peter Crüger. Crüger himself had an ambivalent attitude toward astrological practices specifically toward the practice of issuing annual astrological prognostications.[45] He issued what he called prognostications every year, but these prognostications were not typical listings of astronomical events followed by prophecies for the future. Instead they were often filled with short essays on astronomical subjects, and many of these essays were very critical of the whole enterprise of issuing astrological prognostications. By all means, Crüger was not a typical prognosticator and did not want to classify himself as such. The title page of his book *Cupediae Astrosophicae Crügerianae* (a compilation of extracts from Crüger's prognostications that he issued between the years 1615-1631) presented Crüger as a mathematics professor.[46] In his "prognostication" for 1622, Crüger described the relationships between the separate disciplines of mathematics, astronomy and astrology and discussed whether a

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[45] Prognostications were a literary genre that appeared around the time of the invention of the printing press in the fifteenth century. They were often short pamphlets (meaning about 8 pages) that included a listing of astronomical events that were to take place in the coming year (things like eclipses, conjunctions of planets, etc) followed by predictions from the prognosticator about things that would befall men and changes in the weather resulting from astronomical events. The prognosticators themselves were usually mathematics teachers (an example would be Johannes Kepler in late sixteenth-century Graz) or professors whose job duties included issuing an annual prognostication. On prognostications and prognosticators, see Robert S. Westman, *The Copernican Question: Prognostication, Scepticism and Celestial Order* (under consideration), chs. 1 and 2.

[46] Crüger holds a place in the history of mathematics as a mediator of Napier's logarithmic tables. In his *Geschichte der Mathematik in Deutschland* (Munich: R. Oldenbourg, 1877) Karl Immanuel Gerhardt argued that Crüger finished what Napier had begun with the propagation of tables (122). Gerhardt summarized Crüger's *Praxis Trigonometriae Logarithmicae* (Danzig: Hünefeld, 1634), which began "with instructions for the use of logarithms in trigonometric calculations" and then included reproductions of Napier's tables for logarithms (123).

mathematician, astrologer, astronomer, calendar writer, and horoscope caster were all one and the same thing. He insisted that they were not. Mathematics as a discipline reigned supreme and astronomy was a part of mathematics. As far as astrologers and horoscope casters were concerned, Crüger devalued their position and did not allow them even a part in the discipline of mathematics, for "they are as familiar with astronomy as I am with America."[47]

According to Crüger, a stark distinction between astronomy and astrology was universally accepted early in the seventeenth century. He was aware of the fact that for the ancients there was no definite distinction between astronomy and astrology. What the ancients called "the investigation and calculation of the motion of the Heavens" was for them both astronomy and astrology. But Crüger argued for a stark disciplinary distinction between astronomy and astrology. He followed Ptolemy's distinction that astronomy dealt with the calculation of the motion of the heavens whereas astrology concerned itself with "the prophesying of future states of the weather and other matters." According to Crüger, this stark distinction was universally accepted early in the seventeenth century. In 1617, he wrote "At this time however all philosophers call the first astronomy and the other astrology."[48] Hevelius would have no doubt encountered this attitude during his interactions with Crüger as his student during the 1620s.

Hevelius may have also appropriated the attitudes of one of his close correspondents, Pierre Gassendi, who attacked astrology largely for theological reasons

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[47] Crüger, *Cupediae Astrosophicae*, 1622: I.

[48] All quotes from Crüger, *Cupediae Astrosophicae*, 1617: XII.

as noted earlier. Like Hevelius, Gassendi wrote in his book translated under the title *The Vanity of Judiciary Astrology* that most astrologers did not even care about the fundamentals of astronomy. He notes the exception of Kepler, but in this exception Gassendi portrays a Kepler who is only interested in astrology because it gives him the means and the excuse to do what he really wants to do- namely, astronomy. "And thus did that brave Man, *Keppler*, who said, that *Foolish Daughter was not to be despised, if by her gains maintained her Mother*: intimating that Astro[log]y, though degenerous, was not to be turned out of [do]ors, because without her the Mother, Astronomy, [wo]uld have fewer Favourers and supporters."[49] In other words, without the support that his astrological practices brought him, Kepler would not have been able to do astronomy.

Probably the most important cause for the falling out of astrology between Tycho and Hevelius was the shifting motive for observing stars in the first place. Tycho noted that in his youth he was "more interested in this foretelling part of Astronomy that deals with prophesying and builds on conjectures. I later on, feeling that the courses of the stars upon which it builds were insufficiently known, put aside until I should have remedied this want."[50] One of Tycho's motivations to map accurately the star positions then was to build the foundations of astronomy in order to seek a better astrological method later. After over 20 years of observations Tycho hints that he had come to a

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[49] Gassendi, *The Vanity of Judiciary Astrology*, 73.

[50] Tycho Brahe, *Astronomiae Instauratae Mechanica* (Wandesburgi: 1598), translated by Hans Raeder, Elis Strömgren and Bengt Strömgren, (Copenhagen: Ejnar Munksgaard, 1946), 117.

better astrological method but did not say what it was (at least not in the *Astronomiae Instauratae Mechanicae*).

Whereas the motivations of earlier astronomers (like Tycho) for making better astronomical observations were intertwined with the concerns of practicing astrology, Hevelius's motivations for making accurate observations and predictions were to help improve "astronomy, geography, and navigation."[51] In the field of navigation, Hevelius was concerned with the problem of finding longitude at sea and he explored several methods for finding longitude emphasizing the possibility of using regular motions of the moon as a clock. While I have not explored in depth Hevelius's motivations for finding longitude at sea, there may be a connection with the solving of this problem and the interests of Danzig civic life, which depended heavily on the Baltic sea-faring trade.

There is still the problem of Hevelius's self-representation as an astronomer who belonged in the same group as Tycho. In the first illustration to his posthumously published *Atlas of the Stars* (1690) there are two groups of individuals at work, one discusses matters around a table within a building labeled the *Synod of Astronomy* and the other group is on the roof of the *Synod* making observations of the heavens [Fig. 21]. Hevelius represents himself in both groups, but his role in each differs. In one group, he represents himself in his local observatory on the roof of the *Synod* and in the other he is conversing across the centuries with other star observers around a table within the *Synod*. On the roof, Hevelius stands to the far right at the head of his observatory. To his left are two assistants, one making observations and the other looking out at the illustrator.

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[51] Astrological motivation in astronomical work during the sixteenth and seventeenth centuries is a major theme in Westman, *Copernican Question*. Quote from Hevelius to Oldenburg, 10 September 1664, *CHO*, 2:220.

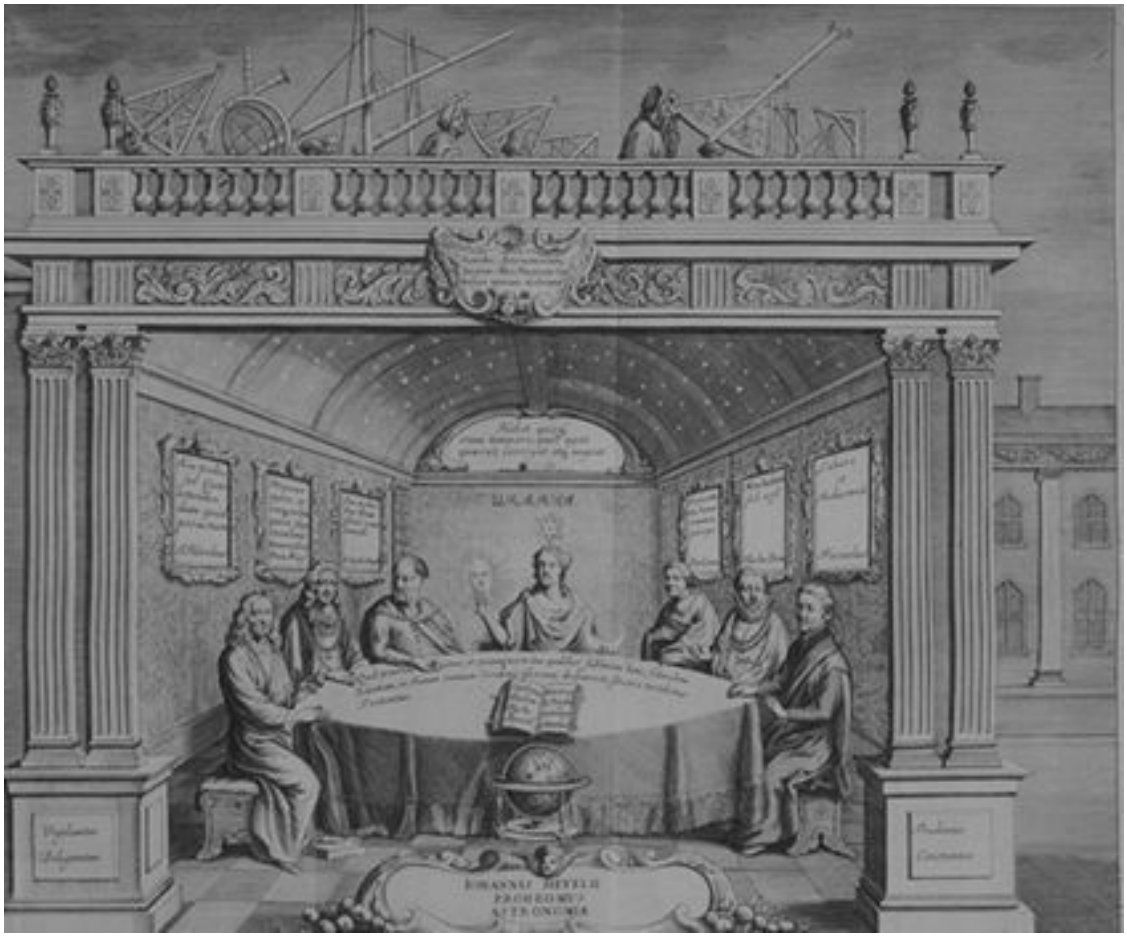

Fig. 21 From *Uranographia*. Courtesy of L. Tom Perry Special Collections, Harold B. Lee Library, Brigham Young University, Provo, Utah

Finally, at the far left, Elisabeth as matriarch completes the operating group.[52]

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[52] In her *The Mind Has No Sex*, Londa Schiebinger touches on the role of women in early modern scientific illustrations. As far as women working with other male scientists, Schiebinger argues that Maria Cunitz and Emilie du Châtelet "placed themselves (or were placed by the artist) among the muses and not among the historically real male scientists" (145-146). Schiebinger does reproduce an image of Elisabeth Hevelius assisting her husband from *Machina Coelestis*, but only remarks that "Like Gottfried Kirch and Maria Winkelmann, Elisabetha and Johannes Hevelius collaborated in astronomical work. This illustration from Hevelius's *Machinae coelestis* shows them working together with the sextant." (83) In the illustration I have described above, Elisabeth is more than a collaborator within a partnership or companionship. She is incorporated as an integral part of a group working in an astronomical observatory with other males.

Within the *Synod*, Hevelius sits among equals. Here he is the representative of his observatory as displayed on the roof, and he brings decades of celestial observations to the round table below. In the actual printed star positions in his *Catalogus Stellarum Fixarum*, which was often bound with his *Atlas of the Stars*, Hevelius included the positions of each star from each observer seated at the table. Seated from left to right are Hevelius, Wilhelm of Hesse-Cassel (1532-1592), Ulugh Beg, Ptolemy, Tycho Brahe (1546-1601) and Hevelius's contemporary Giovanni Riccioli (1598-1671). Their combined grand achievement was their extended celestial observations.

In this engraving it is abundantly clear that Tycho and Hevelius belonged in the same group because they both invested lifetimes into observational astronomy, as did all the astronomers sitting around the table with them. This particular engraving was specifically drawn for Hevelius's star catalogue in which Hevelius printed his records of observations alongside the recording of star positions by each of the individuals seated at the table. So it is almost too obvious that Hevelius would have identified himself with this particular group of astronomers.

Nevertheless, if we look at the engraving of Hevelius's "Last Judgment" again [Fig. 14], I would still make the same argument that the reason why these individuals are here flanking the goddess Urania is because they all are important in theoretical and practical astronomy. No one in the image was solely concerned with astrological issues. In one way or another, they were all important for their additions to astronomical knowledge. So when Hevelius modeled himself after Tycho, he did so only in those areas where Tycho was practicing the arts of astronomy. He was continuing the Tychonic tradition of astronomy, but in a restricted way.

Conclusion

Despite Hevelius's embracing of Tycho's astronomical practices, Andreas Barth could still not get over the fact that Tycho had a fascination with astrological knowledge. Referring to this fascination with the study of astrology, Barth reasoned, "If Tycho had not been so forward in the study of his unhappiness, then maybe half his nose wouldn't have been killed."[53] Here Barth literally attributed the demise of Tycho's nose to his fascination with astrology.[54] Such an attribution was not uncommon. Tycho's fascination with astrology was an easy scapegoat for those attempting to assign a cause to Tycho's varied misfortunes. During one of his travels, Peter Mundy passed by the isle of Hven and recorded in his diary that "The late famous Astro[no]mer Ticho Brahe had heere residence, butt for his Judiciall Astrologie was banished by the king."[55] For Mundy, Tycho's sad departure from the isle of Hven was precipitated by his dealings in astrology. In Barth's estimation, Hevelius was smarter than to stick his nose into other's business or to tamper with the foreknowledge of God. His anti-Philipist statement lauded Hevelius. "Our smart Herr Hevelius knew well enough that man indeed was commanded to learn about the works of the Most High, His wisdom and His power, but that he was not at all allowed to see the inner chambers of God's omniscience. For this reason,

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[53] Barth, *Der auffgehobene Leid*, 36.

[54] As a student, Tycho lost half his nose in a youthful duel.

[55] *Travels of Peter Mundy*, 4:220-221.

Hevelius went, so far as God's word led him, among others in imagination, *Sapiens dominabitur Astris*, a thinker will rule the stars; and leads well thereby.[56]

In Barth's sermon there is no indication that he recognized Hevelius's observatory and astronomical endeavors as a transposition or translation of Tycho's model into an urban environment. All he saw were the disparaging differences between Hevelius's cool attitude towards astrology and Tycho's enthusiasm to practice and perfect astrological arts. In a way, the city served to mask Hevelius's imitation of Tychonic practices, transforming them into something unrecognizable to Barth.

[56] Barth, *Der auffgehobene Leid*, 36.

Conclusion

One reason why recent accounts of the cultural settings for early modern European thought are sometimes lacking is because they often assume that the motivations for practicing astronomy, astrology or a host of other arts and sciences are connected with monetary gain and social status. The example of Danzig serves to show that there were other reasons, just as powerful as pecuniary reward and prestige that pulled individuals to practice the science of the stars. In Peter Crüger's case, issuing annual prognostications was part of his duties as a professor of mathematics in the Gymnasium. While not shirking that responsibility, Crüger nevertheless modified his own prognostications and made them tools of pedagogy as well as critical self-evaluations of astrological arts. In the city, Crüger did not have a royal patron for whom he acted as counselor nor did he wield his prognosticating practice to offer prognoses for medical purposes. He had the freedom to contemplate, philosophize and criticize as long as he performed the basic duty of offering a listing of astronomical events that were to take place in the upcoming year, along with commentary about what those events might mean.

Hevelius's case provides an even better example. Unlike Rheticus, whose "Praise of Prussia" appears to have been an attempt to garner financial patronage from Danzig city officials, Hevelius's praise of his city served the more altruistic function of advancing the city's reputation. His situation was undoubtedly unique in that he was already independently wealthy because of his brewing business. And although patronage from Louis XIV and from King Sobieski of Poland followed his publications, Hevelius's

primary purposes for undertaking astronomical work seemed to have followed Crüger's injunction to bring fame to Danzig. What was the motivation for Hevelius and others to praise their city? It might have had something to do with honor, but not the type of honor or recognition one received at a princely court. Honor was bound to the city. As Christopher Celenza summarizes the motivations of humanists in the renaissance: "If you are a chancellor of the city of Florence, you are pleased that the city's oligarchs hold you in high esteem, and a part of your honor rests in the honor of your city and the form of its politics."[1]

The period covered in this dissertation covers the same time period that authors have often labeled the Scientific Revolution. While the idea of a Scientific Revolution has come under attack from different camps, I would like to suggest a couple of ways in which we can continue to look at the period between 1543 and 1687 as a coherent period. To begin with, until histories examine the work of more thinkers and practitioners regardless of whether or not they were gentlemen, courtiers or nobles, we will perpetuate the view of a Scientific Revolution led by only a handful of individuals, when revolutions are often fought by masses with only a handful of individuals getting the credit. Steven Shapin has written that the only way to have a revolution in science was to have a swift replacement of natural philosophy at large and there was nothing like this forthcoming in the seventeenth century. He points out that the "very identity and practice of early modern astronomy depended utterly on the observational data compiled by the ancients: there was no way that sixteenth- and seventeenth-century practitioners, however

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[1] Christopher Celenza, *The Lost Italian Renaissance: Humanists, Historians, and Latins' Legacy* (Baltimore and London: The Johns Hopkins University Press, 2004), 119.

'revolutionary' minded, could set aside that legacy."[2] What Shapin does not point out is that behind the small group of men theorizing about old data, there was a larger group of individuals throughout the sixteenth and seventeenth centuries, who were largely concerned with making new observations and more accurate measurements. Like Descartes' new natural philosophy, these observers (Tycho and Hevelius among them) were working at replacing ancient astronomy from the ground up. Observers and measurers deserve more detailed study collectively, for they had the unified aim of correcting the philosophies of the ancients first through observations.

In the larger picture of early modern scientific activity, this city history of astronomy provides at least one building block that also answers the concerns of recent historians to integrate the study of multiple historical factors in order to explain what was going on in the Scientific Revolution. In one concise study of this period, John Henry concludes "that if we wish to achieve as full an understanding as possible of the Scientific Revolution we need to consider not only the role of religion, theology, politics, economics, metaphysics, methodology, and technical issues but also the complex interplay between all these factors."[3] While such an ambitious project would be virtually impossible if one took into account all of these factors as they manifested themselves in different ways across Europe, by looking at these factors in specific cities and other areas

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[2] Steven Shapin, *The Scientific Revolution* (Chicago and London: The University of Chicago Press, 1996), 67.

[3] John Henry, *The Scientific Revolution and the Origins of Modern Science* (New York: St. Martin's Press, 1997), 93.

of scientific activity first, historians would then have the building blocks to build a grander narrative.

This dissertation has attempted to answer John Henry's call by considering the interplay of patronage (both private and public), religion, education, linguistics and scientific sensibilities in Danzig during the sixteenth and seventeenth centuries. Chapter 2, for example, used the mix of Crüger's Lutheran religious sentiment combined with his position in the Danzig Gymnasium to explain his position vis-à-vis Nagel. In the analysis of Abraham von Franckenberg's *Oculus sidereus* in chapter 4, both private patronage in Danzig (restrictive in Franckenberg's view) and Franckenberg's decision to write in German (as opposed to writing in Latin) played roles in determining the final form of his text and its poor reception. In Hevelius's case, his connection to his teacher Peter Crüger, his position as a Danizg senator, his Lutheran faith, his experiences as an artisan brewer and a host of other factors connecting him to the fabric of Danzig daily life all shaped the objects of nature he decided to observe, the way he made his observations and the manner in which he presented his observations in printed form. The main difficulty in pursuing such an approach of assessing the outcomes of scientific representations by examining a compound of motivating factors has been the lack of precedent in using such an approach. At times the only unifying factor in this study was the city itself. Nevertheless, the city provides the ideal subject of study to answer John Henry's call and this dissertation has been a first attempt in that direction.

Of course this dissertation does not make grand narrative claims. It has stood by the threads of life and activity that interact with each other in several ways to create the fabric of a city. Michel de Certeau once described the city as "a flexible mass, woven

tight like a fabric with neither rips nor darned patches, a multitude of quantified heroes who lose names and faces as they become the ciphered river of the streets, a mobile language of computations and rationalities that belong to no one."[4] Even as a potential building block, this dissertation was still only able to offer a fragmented view of the fabric of Danzig. Nevertheless, it has recovered some of the lost names and faces of those who lived in the city and thereby presents a picture of the fabric of Danzig that could alter current understandings of early modern practitioners of the science of the stars and the settings within which they labored.

Both chapters 5 and 7 dealt with the under-explored relationship between art and astronomy during the seventeenth century, an area ripe for further investigation. One thing this dissertation has attempted to do is to examine the artistic culture and paintings in public places that existed in Danzig during the early modern period in order to begin an understanding of the context for the creation of the images in Hevelius's heavily illustrated books. Danzig artworks, however, were undoubtedly not the only sources of inspiration for Hevelius and his assistants. A further step and potential area of research, then, would be to uncover a broader framework for the understanding of Hevelius's images. On a broader scale, the art community in Danzig drew heavily upon the talents and examples of artists from the Low Countries. How do Hevelian images fit into the larger context of northern Baroque art? An even more intriguing, yet more difficult-to-answer question is how do the philosophies of northern artists compare to Hevelius's philosophy in using detailed, allegorical and aesthetically pleasing engravings in his

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[4] Michel de Certeau, "To the ordinary man" in the front matter of *The Practice of EverydayLife*, Steven F. Rendall, trans. (Berkeley: University of California Press, 1984).

books? Further research could also be conducted on the sensibilities of Hevelius and his contemporaries who used instruments that were not only functional but works of art themselves, decorated with ornamentations and figures. Why such concern to make beautiful instruments as well as beautiful books? Finally, Hevelius completed other works not discussed at length in this dissertation which contained extensive numbers of engravings. What was he trying to accomplish in those books?

While this project has not looked broadly enough to make deep claims about the uniqueness or normalcy of Danzig and the individuals who lived there, it can begin to make partial judgments based upon the fruits of the writings and art that dealt with the science of the stars. Many of the texts discussed throughout this dissertation were unique and often did not have antecedents or rivals. Rheticus's *Narratio prima*, for example was in some ways even more unusual than Copernicus's *De revolutionibus*, for it was less a fully substantiated mathematical treatise than it was a synopsis and news brief of a yet-unpublished idea. Keckermann's texts that outlined his systems of knowledge were novel at the beginning of the seventeenth century. And I have yet to find an antecedent to Peter Crüger's book *Cupediae Astrosophicae Crügerianae*, a compilation of questions and answers concerning the practice of prognostication he addressed throughout two decades. The only other book of comparable breadth and concern I have seen is Albert Linemann's *Deliciae calendario-graphicae* (1654), which was most likely based on the format of Crüger's book and which was dedicated to Hevelius. Andreas Gryphius's poetry and Abraham von Franckenberg's *Oculus Sidereus* also offer unique examples of heavenly poetry and a synopsis of Giordano Bruno's ideas concerning the plurality of worlds in German literature. Finally, Hevelius's books with their lavish and detailed

illustrations starting with the *Selenographia* in 1647 found few equals in mid-seventeenth century Europe. Visuals became increasingly vital to practitioners of the sciences and arts from the mid-seventeenth century to our own time, for they offered a "virtual" means of replicating what the original practitioner saw and they acted as stable witnesses.[5] Still underexplored within the larger narrative of the Scientific Revolution, then, is Hevelius's silent revolution of emphasizing images over text.[6]

It has been claimed that Hevelius's observatory was one of the finest in Europe during the seventeenth century.[7] With the support he had in his city and the desires he had to praise his city through his work, there should be no wonder that his observatory existed in the condition it did and that it was as well-known at the time as it was. There may have been motivations for Hevelius to practice the science of the stars beyond a desire to glorify Danzig and to achieve intellectual satisfaction. To persevere through cold and damp Baltic nights with arthritis burdening him, Hevelius exhibited a determination that demanded much of him physically.[8] Again, to recover from the fire

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[5] On the importance of visuals for scientific activity in a slightly later period, see Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N.J.: Princeton University Press, 1985), 60-65; and Steven Shapin, "Pump and Circumstance: Robert Boyle's Literary Technology," *Social Studies of Science* 14 (1984): 481-520.

[6] On this point see Winkler and Van Helden, "Johannes Hevelius and the Visual Language of Astronomy."

[7] Volkoff, et al. *Hevelius and His Catalog of Stars*, 23.

[8] A recent examination of Hevelius's skeleton confirmed that Hevelius suffered from arthritis. See Judyta Gładykowska-Rzeczycka, "An Anthropological Analysis of the Skeleton of Johannes Hevelius the Gdańsk Astronomer of the Seventeenth Century (1611-1687)," in *On the 300th Anniversary of the Death of Johannes Hevelius*, eds. Robert Głębocki and Andrzej Zbierski (Wrocław: Ossolineum, The Polish Academy of

that burned down his observatory and have the fortitude to continue with his observations shows a man that withstood unique trials in order to continue work he must have felt was extremely important. Hevelius and his city pushed the limits of the norms of practices, practitioners and places concerned with the science of the stars.

Sciences, 1992), 93-127. In a letter written in Latin in 1680, Elizabeth Hevelius petitioned for a remedy for arthritis, presumably to help her husband. Her letter is addressed to a recent visitor to her house, who had mentioned a remedy for arthritis:

> I remember you, Sir, mentioned a certain man, a doctor of medicine, who after suffering acutely for some years from arthritis, tried a Milk cure and by that cure had happily recovered from the disease…. My purpose is to write to him and enquire of him what that complaint was and what method and diet he observed in the use of the milk, also whether he was completely restored to health and if any other things necessary for me to know will have to be gone into.

As translated and quoted in MacPike, *Hevelius, Flamsteed and Halley*, 5-6. The original of this letter is now in the L. Tom Perry Special Collections at Brigham Young University under the call number Vault MSS 817.

Bibliography

Åkerman, Susanna. *Rose Cross Over the Baltic: The Spread of Rosicrucianism in Northern Europe*. Leiden: Brill, 1998.

_____. "The Rosicrucians and Great Conjunctions." *Continental Millenarians: Protestants, Catholics, Heretics*, eds. John Christian Laursen and Richard H. Popkin, 1-8 . Dordrecht, Boston, London: Kluwer Academic Publishers, 2001.

Allgemeine Deutsche Biographie. ed. R. v. Liliencron. Leipzig: Duncker & Humblot, 1875-1912.

Altpreußische Biographie. ed. Christian Krollman. Königsberg, 1936, 1941.

"An Account of *Hevelius* His *Prodromus Cometicus*, Together With Some Animadversions Made Upon It by a *French* Philosopher." *Philosophical Transactions* (1665): 104-8.

Applebaum, Wilbur. "Keplerian Astronomy After Kepler." *History of Science* 34 (December 1996): 451-504.

Arnoldi, Philipp. *Antinagelius: Das Ist, Gründlicher Beweiß, Daß Nach Dieser Welt Zustandt Nicht Ein Tertium Seculum Oder Dritte Jrrdische Zeit, in Welcher Die Heiligen Allein Mit Christo Dem Herrn Nach Allhie Gantzer Tausendt Apocalyptischer Jahre, in Gorssen Frewden Herrschen Solten, Zu Hoffensey Zu Behauptung Seines Schwarnis, Dass Anno 1624 Noch Ein Guldenes Seculum Auff Erden Solte Angeben. Aus Dem Propheten Daniel, Der Geheimen Offenbarung Johannis Und Des Himmels Constellation Irdichter, Entgegengesezt Und Dem Gemeinen Mann Zur Nachricht Einfältig Gestellen*. Königsberg in Preussen: Segebade, 1621.

Ashworth, Jr. William B. "Light of Reason, Light of Nature: Catholic and Protestant Metaphors of Scientific Knowledge." *Science in Context* 3 (1989): 89-107.

Bailey, Margaret Lewis. *Milton and Jakob Boehme: A Study of German Mysticism in Seventeenth-Century England*. New York: Haskell House, 1964.

Barker, Peter and Bernard Goldstein. "Patronage and the Production of *De Revolutionibus*." *Journal for the History of Astronomy* 34 (2003): 345-68.

Barker, Peter and Bernard R. Goldstein. "Theological Foundations of Kepler's Astronomy." *Science in Theistic Contexts: Cognitive Dimensions*, eds. John Hedley Brooke, Margaret J. Osler, and Jitse M. van der Meer, *Osiris* (2001): 88-113.

Barlow, Richard G. "Worlds: Robert Burton's Cosmic Voyage." *Journal of the History of*

Ideas 34 (1973): 291-302.

Barnes, Robin Bruce. "Astrology and the Confessions in the Empire, C. 1550-1620." *Confessionalization in Europe, 1555-1700: Essays in Honor and Memory of Bodo Nischan*, eds. John M. Headley, Hans. J. Hillerbrand, and Anthony J. Papalas. Aldershot, England; Burlington, Vt.: Ashgate, 2004.

_____. *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation*. Stanford, California: Stanford University Press, 1988.

Barth, Andreas. *Der Auffgehobene Leid Und Freuden Wechsel, Welchen Bey Ansehnlicher Beerdigung Des WollEdlen/ Besten Und Hochweisen Herren Hn. Johannis Hevelii*. Danzig: Johann Zacharias Stollen, 1688.

Bernhardi, Georg. *Kürze Und Einfältige Jedoch Eigentliche Und Gründliche Beschreibung Von Dem Ursprung Und Erster Erbawung Der Hoch- Und Weitberümten Königl. Kauff-See Und Handel Stadt Danzigk*. Halberstadt: 1641.

Biagioli, Mario. *Galileo, Courtier: The Practice of Science in the Culture of Absolutism*. Chicago: University of Chicago Press, 1993.

Bieńkowska, Barbara. "From Negation to Acceptance (The Reception of the Heliocentric Theory in Polish Schools in the 17th and 18th Centuries)." *The Reception of Copernicus' Heliocentric Theory*, ed. Jerzy Dobrzycki, 79-116. Dordrecht, Holland; Boston, Mass.: D. Reidel, 1972.

Birch, Thomas. *The History of the Royal Society of London for Improving of Natural Knowledge, From Its First Rise*. 4 vols. London: Millar, 1756-1957.

Biskup, Marian. "Royal Prussia in the Times of Copernicus." *Poland: The Land of Copernicus*, ed. Bogdan Suchodolski, 41-53. Wrocław, Warszawa, Kraków, Gdańsk: Ossolineum, The Polish Academy of Sciences Press, 1973.

Bogucka, Maria. *Baltic Commerce and Urban Society, 1500-1700: Gdańsk/Danzig and Its Polish Context*. Aldershot, England; Burlington, Vt.: Ashgate, 2003.

_____. *Das Alte Danzig: Alltagsleben Vom 15. Bis 17. Jahrhundert*. Leipzig: Koehler & Amelang, 1967.

_____. "Health Care and Poor Relief in Danzig (Gdansk): The Sixteenth- and First Half of the Seventeenth Century." *Health Care and Poor Relief in Protestant Europe, 1500-1700*, eds. Ole Peter Grell and Andrew Cunningham, 204-19. London and New York: Routledge, 1997.

_____. "The Towns of East-Central Europe From the XIVth To the XVIIth Century." *East-Central Europe in Transition*, eds. A. Maczak, H. Samsonowicz, and P. Burke, 97-108. Cambridge: 1985.

Bono, James J. *The Word of God and the Languages of Man: Interpreting Nature in Early Modern Science and Medicine*. Madison, Wisc.: The University of Wisconsin Press, 1995.

Borda, Lajos, "Ein unbekannter Hamburger Druck. Der Almanach von Johannes Carion (1537)," *Gutenberg-Jahrbuch* (2004): 183-186.

Borggrefe, Heiner, Vera Lüpkes, Paul Huvenne and Ben van Beneden, eds. *Hans Vredeman de Vries und die Renaissance im Norden*. München: Hirmer Verlag, 2002.

Brahe, Tycho. *Astronomiae Instauratae Mechanica* (Wandesburgi: 1598). trans. Hans Raeder , Elis Strömgren, and Bengt Strömgren. Copenhagen: Ejnar Munksgaard, 1946.

Brandstäter, Franz August. *Johannes Hevelius, Der Berühmte Danziger Astronom: Sein Leben Und Seine Bedeutsamkeit*. Danzig: Edwin Groening, 1861.

Braudel, Fernand. *The Mediterranean*. trans. Siân Reynolds, 2 vols. New York: Harper and Row, 1972.

Broecke, Steven Vanden. *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology*. Leiden and Boston: Brill, 2003.

Burke, Peter. *The Fortunes of the* Courtier: *The European Reception of Castiglione's* Cortegiano. University Park, Penn.: The Pennsylvania State University Press, 1996.

Burmeister, Karl Heinz. *Georg Joachim Rhetikus, 1514-1574: Eine Bio-Bibliographie*. 3 vols. Wiesbaden: Pressler-Verlag, 1967-1968.

Calepinus, Ambrosius. *Ambrosii Calepini dictionarivm*. Venice: Paulus Manutius, 1558.

Campbell, Mary Baine Campbell. *Wonder & Science: Imagining Worlds in Early Modern Europe*. Ithaca, N.Y.; and London: Cornell University Press, 1999.

Capellus, D. *De Incendio Heveliano*. Hamburg: Rebenlin, 1679.

Caspar, Max. *Kepler*. trans. C. Doris Hellman. New York: Dover, 1993.

Celenza, Christopher. *The Lost Italian Renaissance: Humanists, Historians, and Latins' Legacy*. Baltimore and London: The Johns Hopkins University Press, 2004.

Chapman, Allan. "Tycho Brahe- Instrument Designer, Observer and Mechanician." *Journal of the British Astronomical Association* 99 (1989): 70-77.

_____. "'A World in the Moon': John Wilkins and His Lunar Voyage of 1640."

Quarterly Journal of the Royal Astronomical Society 32 (1991): 121-32.

Chartier, Roger. *Cultural History: Between Practice and Representation*. Trans. Lydia G. Cochrane. Cambridge: Polity Press, 1988.

Christianson, J. R. *On Tycho's Island: Tycho Brahe, Science, and Culture in the Sixteenth Century* . Cambridge: Cambridge University Press, 2003.

_____. "Tycho Brahe's German Treatise on the Comet of 1577: A Study in Science and Politics." *Isis* 70 (1979): 110-140.

Cieślak, Edmund and Czesław Biernat. *History of Gdańsk*. trans. Bożenna Blaim and George M. Hyde. Gdansk, Poland: Wydawnictwo, 1988.

Cook, Alan. *Edmond Halley: Charting the Heavens and the Seas*. Oxford: Clarendon Press, 1998.

Copernicus, Nicholas. *Briefe: Texte Und Ubersetzungen*. eds. H.M. Nobis and Menso Folkerts. *Nicolaus Copernicus Gesamtausgabe*, VI/I. Berlin: Akademie Verlag, 1994.

_____. *De Revolutionibus*. [*On the Revolutions*]. trans. Edward Rosen. Baltimore and London: The Johns Hopkins University Press, 1992.

Correspondence and Papers of Edmond Halley. ed. Eugene Fairfield MacPike. London: Taylor and Francis, 1937.

Costello, William. *The Scholastic Curriculum at Early Seventeenth-Century Cambridge*. Cambridge: Harvard University Press, 1958.

Crowe, Michael J. *The Extraterrestrial Life Debate, 1759-1900: The Idea of a Plurality of Worlds From Kant to Lowell*. Cambridge: Cambridge University Press, 1986.

Crüger, Peter. *Apologeticum oder verthedigung Seines auffs 1609 Jahr publicirten Calenders Wieder den unhöfflichen M. Michaelem Hermetem Ratzkt von Radtkowitz*. Dantzig: Andreas Hünefeldt, 1610.

_____. *Cupediae Astrosophicae Crügerianae*. Breslaw: Georg Baumann, 1631.

_____. *An Den Achtbaren Und Wolgelahrten Herren M. Paulium Nagelium Weitberühmten Theologastronomum Cabalapocalypticum in Meissen/ Ein Sendbrieff M. Petri Crügeri, Der Stadt Danzigk Mathematici*. Danzig: Andreas Hünefeldt, 1621.

_____. *Doctrina Astronomiae Sphaerica*. Danzig: Hünefeld, 1635.

_____. *Kurtzer Bericht Von Dem Grossen Noch Zur Zeit Scheinenden Cometen*.

Danzig: Hünefeld, 1618.

_____. *Newer und Alter Schreib Calender auff das Jahr nach der gnadenreichen geburt unsers Herren Jesu Christi M.DC.XXVIII*. Danzig: Hünefeld, 1627.

_____. *Praxis Trigonometriae Logarithmicae*. Danzig: Hünefeld, 1634.

_____. *Schertz Und Ernst*. Danzig: 1625.

_____. *Synopsis Trigonometriae* S. *Doctrinae Triangulorum*. Danzig: Hünefeld, 1612.

_____. *Uranodromus Cometicus*. Danzig: Andreas Hünefeldt, 1619.

Crüger, Peter and Jacob Gerhard. *De Hypothetico Systemate Coeli Disputatio Publica Ordinaria*. Danzig: Hünefeld, 1615.

Curicke, Reinhold. *Der Stadt Danzigs Historische Beschreibung*. Amsterdam and Danzig: Johan and Gillis Janssons von Waesberge, 1687.

Cynarski, Stanisław. *Reception of the Copernican Theory in Poland in the Seventeenth and Eighteenth Centuries*. trans. Elżbieta Tabakowska. Cracow: Jagellonian University, 1973.

Daston, Lorraine. "The Ideal and Reality of the Republic of Letters in the Enlightenment." *Science in Context* 4 (1991): 367-386.

de Certeau, Michel. *The Practice of Everyday Life*. trans. Steven Rendall. Berkeley, Los Angeles and London: University of California Press, 1988.

de Montaigne, Michel. *The Essays of Michel De Montaigne*. ed. M.A. Screech. New York: Penguin, 1991.

Dear, Peter. *Discipline and Experience: The Mathematical Way in the Scientific Revolution*. Chicago: University of Chicago Press, 1995.

_____. "*Totius in Verba*: Theoric and Authority in the Early Royal Society." *Isis* 76 (1985): 145-61.

_____. "What Is the History of Science the History *Of*?: Early Modern Roots of the Ideology of Modern Science." *Isis* 96 (2005): 390-406.

Deason, Gary B. "John Wilkins and Galileo Galilei: Copernicanism and Biblical Interpretation in the Protestant and Catholic Traditions." *Probing the Reformed Tradition: Historical Studies in Honor of Edward A. Dowey, Jr.*, eds. Elsie Anne McKee and Brian G. Armstrong, 313-38. Louisville, Kentucky: Westminster/John Knox Press, 1989.

The Diary and Correspondence of Dr. John Worthington. ed. James Crossley. Manchester: Printed for the Chetham Society, 1947.

Dick, Steven J. *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate From Democritus to Kant*. Cambridge: Cambridge University Press, 1982.

Dickson, Donald R. *The Tessera of Antilia: Utopian Brotherhoods & Secret Societies in the Early Seventeenth Century*. Leiden, Boston, Köln: Brill, 1998.

Dictionary of Scientific Biography. ed. Charles Coulston Gillispie. 18 vols. New York: Scribner, 1970-1980.

Dilger, Daniel. *Christliche Leich-Predigt: Bey dem Begräbnüß des Ehrenvesten, Achtbaren und hochgelahrten Herrn M. Petri Crügeri, Der Stadt Dantzigk wolbestalten Mathematici. Welcher den 6. Junii dieses 1639. Jahres Gottselig von dieser Welt abgeschieden und den 8. Junij darauff in der Kirchen der H. Dreyfaltigkeit daselbst Christlich und Ehrlich zur Erden bestattet*. Danzig?, 1639?

Dommer, A v. *Die Aeltesten Drucke Aus Marburg in Hessen, 1527-1566*. Marburg: 1892.

Donahue, William H. "The Solid Planetary Spheres in Post-Copernican Natural Philosophy." *The Copernican Achievement*, ed. Robert Westman, 244-75. Berkeley, Los Angeles and London: University of California Press, 1975.

Du Bellay, Joachim. "Pour Mettre En Vous Sa Plus Grande Beauté." *L'Olive*, trans. Norman R. Shapiro. *Lyrics of the French Renaissance: Marot, Du Bellay, Ronsard*. New Haven and London: Yale University Press, 2002.

Döling, Johannes. *Eignedliche,* [Sic] *Gründliche, Und Volkommene Beschreibung Deß Newen Selzamen Und Wunderbarlichen Sterns Oder Cometen*. Greiffswaldt: Hans Witten, 1618.

Döring. Detlef. *Der Briefwechsel Zwischen Gottfried Kirch Und Adam A. Kochanski, 1680-1694: Ein Beitrag Zur Astronomiegeschichte in Leipzig Und Zu Den Deutsch- Polnischen Wissenschaftsbeziehungen*. Berlin: Akademie Verlag, 1997.

Eskildsen, Kasper Risbjerg. "How Germany Left the Republic of Letters." *Journal of the History of Ideas* 65 (July 2004): 421-432.

Extract Der Prophezeyhung auß Doct. Wilhelmi Misocaci, Physici und Astronomi der önigl. Stadt Dantzig. Prognostico, auffs 1583ste Jahr von der grossen Conjunction Saturni und Jovis, in den Himlischen Zeichen der Fischen. Danzig, 1631.

Febvre, Lucien and Henri-Jean Martin. *The Coming of the Book: The Impact of Printing 1450-1800*. Translated by David Gerard. London and New York: Verso, 1997.

Field, J. V. "A Lutheran Astrologer: Johannes Kepler." *Archive for History of Exact Sciences* 31 (1984): 190-272.

Feingold, Mordechai, ed. *Jesuit Science and the Republic of Letters*. Cambridge, Mass. and London: The MIT Press, 2003.

Finocchiaro, Maurice A., ed. *The Galileo Affair: A Documentary History*. Berkeley, Los Angeles and London: University of California Press, 1989.

Fleck, Ludwig. *Genesis and Development of a Scientific Fact*. Trans. Fred Bradley and Thaddeus J. Trenn. Chicago: University of Chicago Press, 1979.

Foltz, Max. *Geschichte Des Danziger Stadthaushalts*. Danzig: A.W. Kafemann, 1912.

François, Étienne. "The German Urban Network between the Sixteenth and Eighteenth Centuries: Cultural and Demographic Indicators." *Urbanization in History: A Process of Dynamic Interactions*, eds. Ad van der Woude, Akira Hayami and Jan de Vries, 84-100. Oxford: Clarendon Press, 1990.

Freedman, Joseph S. *Archiv Für Begriffsgeschichte* 37 (1994): 212-56.

_____. "The Career and Writings of Bartholomew Keckermann (d. 1609)." *Proceedings of the American Philosophical Society* 141 (September 1997): 305-64.

Friedensburg, Walter. *Geschichte Der Universität Wittenberg* . Halle: Max Niemeyer, 1917.

Fumaroli, Marc. "The Republic of Letters." *Diogenes* 143 (1988): 129-154.

Fürstenwald, Maria. *Andreas Gryphius, Dissertationes Funebres: Studien Zur Didaktik Der Leichabdankungen*. Bonn: Bouvier, 1967.

Galilei, Galileo. *Opere*. ed. Antonio Favaro, 20 vols. Florence: Barbera, 1890-1909.

_____. *Sidereus Nuncius*. trans. Albert Van Helden. Chicago and London: The University of Chicago Press, 1989.

Gallagher, Catherine and Stephen Greenblatt. *Practicing New Historicism*. Chicago and London: The University of Chicago Press, 2000.

Gassendi, Pierre. *The Mirrour of True Nobility & Gentility: Being the Life of the Renowned Nicolaus Claudius Fabricius, Lord of Pieresk, Senator of the Parliament at Aix* . trans. W. Rand. London: Printed by J. Streater for Humphrey Moseley, 1657.

_____. *The Vanity of Judiciary Astrology*. trans. "a Person of Quality". London:

Printed for Humphrey Moseley, 1659.

_____. *Viri Illustris Nicolai Claudii Fabricii De Peiresc*. Hagae Comitis: Sumptibus Adriani Vlacq, 1651.

Gerhardt, Karl Immanuel. *Geschichte Der Mathematik in Deutschland*. Munich: R. Oldenbourg, 1877.

Gilly, Carlos. *Adam Haslmayr: Der Erste Verkünder Der Manifeste Der Rosenkreuzer* . Amsterdam: In de Pelikaan, 1994.

Gingerich, Owen. *An Annotated Census of Copernicus'* De Revolutionibus *(Nuremberg, 1543 and Basel, 1566)*. Leiden, Boston, Köln: Brill, 2002.

_____. "Johannes Kepler and the *Rudolphine Tables*." *The Great Copernicus Chase and Other Adventures in Astronomical History*, 123-31. Cambridge, Mass. Sky Publishing Corporation; Cambridge: Cambridge University Press.

Ginzburg, Carlo. *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*. Trans. John and Anne Tedeschi. New York: Penguin, 1982.

Golinski, Jan. *Making Natural Knowledge: Constructivism and the History of Science*. Cambridge: Cambridge University Press, 1998.

Grafton, Anthony. *Cardano's Cosmos: The Worlds and Works of a Renaissance Astrologer*. London and Cambridge, Mass.: Harvard University Press, 1999.

_____. "From Apotheosis to Analysis: Some Late Renaissance Histories of Classical Astronomy." *History and the Disciplines: The Reclassification of Knowledge in Early Modern Europe*, ed. Donald R. Kelley, 261-76. Rochester, N.Y.: Rochester University Press, 1997.

_____. *Joseph Scaliger: A Study in the History of Classical Scholarship*. 2 vols. Oxford: 1983.

Greenblatt, Stephen. *Renaissance Self-Fashioning From More to Shakespeare*. Chicago and London: University of Chicago Press, 1980.

Greflinger, Georg. *Das Blühende Danzig*. Regensburg: 1646.

Gryphius, Andreas. "All is Vanity," trans. George C. Schoolfield, *The German Quarterly* 24 (1951): 22.

_____. *Deutscher Gedichte*. Breslau: Johann Lischkens, 1657.

_____. *Dissertationes Funebres, Oder, Leich Abdankungen, Bey Unterschiedlichen Hoch- Und Ansehnlichen Leich-Begängnüssen Gehalten*. Leipzig: Christian

Scholvien, 1683.

_____. *Epigrammata*. Leyden: 1643.

_____. *Gesamtausgabe Der Deutschsprachigen Werke*. eds. Marian Szyrocki and Hugh Powell, 8 vols. Tübingen: Max Niemeyer Verlag, 1963-1972.

_____. *Sonnete*. Polnischen Lissa: Wigandum Funck. o. J., 1637.

_____. *Sonnete*. Leiden: 1643.

_____. *Teutsche Reim-Gedichte*. Frankfurt am Main: Johann Hüttnern, 1650.

Guericke, Otto von. *Experimenta Nova (Ut Vocantur) Magdeburgica* (Amsterdam: Johannes Jansson of Waesberg, 1672). [*The New (So-Called) Magdeburg Experiments of Otto Von Guericke*]. trans. Margaret Glover Foley Ames. Dordrecht, Boston and London: Kluwer, 1994.

Guthke, Karl. *The Last Frontier: Imagining Other Worlds, From the Copernican Revolution to Modern Science Fiction*. trans. Helen Atkins. Ithaca, N.Y.: Cornell University Press, 1990.

Habrecht, Isaac. *Kurze Und Gründliche Beschreibung/ Eines Newen Ungewohnlichen Sterns/ Oder Cometen*. Straßburg: bey Johann Carolo, 1618.

Hallyn, Fernand. *The Poetic Structure of the World: Copernicus and Kepler*. Trans. Donald M. Leslie. New York: Zone Books, 1990.

Halsted, David G. *Poetry and Politics in the Silesian Baroque: Neo-Stoicism in the Work of Christophorus Colerus and his Circle*. Wiesbaden : Harrassowitz, 1996.

Haskell, Yasmin. "All the Heavens, Truthfully Represented, It Can Enclose With Its Verses." *Studies in the History and Philosophy of Science* 28 (1997): 681-97.

Hasty, Will. "The Order of Chaos: On *Vanitas* in the Work of Andreas Gryphius." *Daphnis: Zeitschrift für Mittlere Deutsche Literatur* 18 (1989): 145-157.

Hatch, Robert A. *The Collection Boulliau (BN, FF. 13019-13059): An Inventory*. Philadelphia, Penn.: The American Philosophical Society, 1982.

Heilbron, J.L. "Some Uses for Catalogues of Old Scientific Instruments." *Making Instruments Count: Essays on Historical Scientific Instruments presented to Gerard L'Estrange Turner*, eds. R.G.W. Anderson, J.A. Bennett and W.F. Ryan, 1-16. Aldershot, Hampshire; Brookfield, Vermont: Variorum, 1993.

Herlitz, David. *Epistola, oder Sendebrieff, Doctoris Davidis Herlicij*. Alten Stettin: Jochim Rhete, 1608.

_____. *Groß Prognosticon vnd Practica des 1610. Jahrs/ nach Christi vnsers Herrn vnd Heylandes Geburt/ auff den Lübischen Meridianum gerichtet*. Stettin: Rhete, 1609.

_____. *Kuertzer DISCVRS Vom Cometen/ Unnd Dreyen Sonnen/ So Am Ende Des 1618. Jahrs Erschienen Sind*. Alten Stettin: In der Rhetischen Druckerey durch Johan Christoff Landtriachtingern, 1619.

_____. *Prodromus Und Erster Vortrab/ Oder Kurtze Und Einfeltige Erklerung/ Des Cometen/ Oder Beschwänzten Sterns/ So Sich Im November Des 1618. Jahres Hat Sehen Lassen*. Danzig: Andreas Hünefeldt, 1619.

Hertel, Herbert. "Die Danziger Gelegenheitsdichtung Der Barockzeit." *Danziger Barockdichtung*, ed. Heinz Kindermann, 165-230. Leipzig: Philipp Reclam, 1939.

Hevelius, Johannes. *Machina Coelestis Pars Prior*. Danzig: 1673 .

_____. *Selenographia: Sive, Lunae Descriptio*. Danzig: Andreas Hünefeld, 1647.

_____. *Selenographia: Facsimile Reprint of the Original Edition of 1647*. With a preface by H. Lambrecht. New York: Johnson Reprint, 1967.

_____. [*The Star Atlas*]. ed. V.P. Sheglov. Tashkent: Fan Press, 1968.

Hevelke, Johannes. *Gert Hevelke Und Seine Nachfahren: Geschichte Der Familie Hevelke, Hewelke Und Des Astronomen Johannes Hevelius, 1434-1927*. Danzig: Verlags Gesellschaft P. Rosenberg, 1927.

Hirsch, Theodor. *Geschichte Des Academischen Gymnasiums in Danzig*. Danzig: Gedruckt in der Wedelschen Hofbuchdruckerei, 1837.

Hooke, Robert. *Animadversions On the first part of the Machina Coelestis of the Honourable, Learned, and deservedly Famous Astronomer Johannes Hevelius Consul of Dantzick*. London: Printed by T.R. for John Martyn, 1674.

Hotson, Howard. *Johann Heinrich Alsted, 1588-1638: Between Renaissance, Reformation, and Universal Reform*. Oxford: Clarendon Press, 2000.

Howell, Kenneth J. *God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science*. Notre Dame, Indiana: University of Notre Dame Press, 2002.

Jaeger, C. Stephen. "Johannes Kepler: Poetic Inspiration and Scientific Discovery." *Knowledge, Science and Literature in Early Modern Germany*, eds. Gerhild Scholz Williams and Stephen K. Schindler, 117-30. Chapel Hill and London: The University of North Carolina Press, 1996.

Januszajtis, Andrzej. "Peter Krüger (1580-1639): Gdańsk Scientist, Professor of the Academic Gymnasium." *Task Quarterly* 1 (1997): 127-30.

Jardine, Nicholas. *The Birth of History and Philosophy of Science: Kepler's* A Defence of Tycho Against Ursus *With Essays on Its Provenance and Significance*. Cambridge: Cambridge University Press, 1984.

Johannes Kepler. *Gesammelte Werke*. eds. Max Caspar and Walther von Dyck. München: C.H. Beck, 1937-.

Johns, Adrian. *The Nature of the Book: Print and Knowledge in the Making*. Chicago: University of Chicago Press, 1998.

Kayser, Werner and Claus Dehn. *Bibliographie Der Hamburger Drucke Des 16. Jahrhunderts*. Hamburg: Dr. Ernst Hauswedell & Co., 1968.

Keckermann, Bartholomew. *Disputationes Philosophiae, Praesertim Quae in Gymnasio Dantiscano*. Hanau: Apud Guilelmum Antonium, 1606.

_____. *Opera Omnia*. 2 vols. Geneva: Peter Aubert, 1614.

Keckermann, Bartholomew and Peter Crüger. *Theoremata Exegetica: De Cometis, Tam in Genere. Quam in Specie De Tribus*. Danzig: Guilhelm Guilmothan, 1605.

Kepler, Johannes. *Ausführlicher Bericht*.

_____. *Epitome Astronomiae*. [*Epitome of Copernican Astronomy*]. trans. Charles Glenn Wallis. Amherst, New York: Prometheus Books, 1995.

_____. *Johannes Kepler in Seinen Briefen*. eds. and trans. Max Caspar and Walther von Dyck. München and Berlin: R. Oldenbourg, 1930.

_____. *Tertius Interveniens: Das Ist Warnung an D. Philippum Feselium Und Etliche Mehr Philosophos, Medicos Und Theologos: Daß Sie Den Verwerffung Der Astrologiae Nicht Das Kindt Mit Dem Bad Außschütten*. Franckfurt am Mayn: Tampach, 1610.

Kircher, Athanasius. *Kircheri E Soc. Iesv Itinerarivm Exstaticum*. Rome: Vitalis Mascardi, 1656.

_____. *R.P. Athanasii Kircheri E Societate Jesu, Iter Extaticum Coeleste*. Herbipoli: Joh. Andr. & Wolffg. Jun. Endterorum hæredibus, Prostat Norimberg æ apud eosdem, 1660.

Kordel, Jan. "Scientific Session Devoted to the Quincentenary of Printing in Poland." *Libri Gedanenses* VIII (1974): 277-86.

Krafft, Fritz. "*Tertius Interveniens*: Johannes Keplers Bemühungen Um Eine Reform Der Astrologie." *Die Okkulten Wissenschaften in Der Renaissance*, ed. August Buck. Wiesbaden: Otto Harrassowitz, 1992.

Kranhold, Karl Heinz. *Frühgeschichte Der Danziger Presse*. Münster: C.J. Fahle, 1967.

Kühlmann, Wilhelm. "Neuzeitliche Wissenschaft in der Lyrik des 17. Jahrhunderts: Die Kopernikus-Gedichte des Andreas Gryphius und Caspar Barlaeus im Argumentationszusammenhang des frühbarocken Modernismus." *Jahrbuch der Deutschen Schillergesellschaft* 23 (1979): 124-153.

Kusukawa, Sachiko. *The Transformation of Natural Philosophy: The Case of Philip Melanchthon*. Cambridge: Cambridge University Press, 1995.

Lammens, Cindy. "Sic Patet Iter Ad Astra: A Critical Examination of Gemma Frisius's Annotations in Copernicus' De Revolutionibus and His Qualified Appraisal of the Copernican Theory." PhD diss., Universiteit Ghent, 2002.

Lemke, Gerhard H. *Sonne, Mond Und Sterne in Der Deutschen Literatur Seit Dem Mittelalter: Ein Bildkomplex Im Spannungsfeld Gesellschaftlichen Wandels*. Bern, Frankfurt am Main, Las Vegas: Peter Lang, 1981.

Leppin, Volker. *Antichrist Und Jüngster Tag: Das Profil Apokalyptischer Flugschriftenpublizistik Im Deutschen Luthertum 1548-1619*. Gütersloh: Gütersloher Verlagshaus, 1999.

Linemann, Albert. *Deliciæ Calendario-Graphicæ: Das Ist, Die Sinnreichsten Und Allerkünstlichsten Fragen Und Antwort. Darinnen Die Edelsten Geheimnüsse Der Physic, Astronomi, Astrologi, Geographi*. Königsberg: Pasche Mensen, 1654.

Loew, Peter Oliver. "Danzig Und Venedig, in Trauer Vereint: Ein Stadtvergleich Als Beitrag Zur Lokalen Mentalitätsgeschichte (16. Bis 20. Jahrhundert)." *Zeitschrift Für Ostmitteleuropa-Forschung* 51 (2002): 159-87.

Löschin, Gotthilf. *Geschichte Danzigs Von Der Ältesten Bis Zur Neuesten Zeit*. 2 vols. Danzig: F.W. Ewert, 1823.

Lubieniecki, Stanislaw. *Theatrum Cometicum*. 3 vols. Amsterdam: Typis Danielis Baccamude, Apud Franciscum Cuperum, bibliopolam, 1668.

Lux, David S. and Harold J. Cook. "Closed Circles or Open Networks?: Communicating at a Distance during the Scientific Revolution." *History of Science* 36 (1998): 180-211.

MacPike, Eugene Fairfield. *Hevelius, Flamsteed and Halley: Three Contemporary Astronomers and Their Mutual Relations*. London: Taylor and Francis, 1937.

Magnus, Olaus. *Historia De Gentibus Septentrionalibus* (Rome, 1555). [*Description of the Northern Peoples*]. trans. Peter Fisher and Humphrey Higgins., Second Series, nos. 182, 187, 188. London: The Hakluyt Society, 1996-1998.

Mannack, Eberhard. *Andreas Gryphius*. Stuttgart: J.B. Metzlersche Verlagsbuchhandlung, 1968.

Martini, Jakob. *De Communicatione Proprii Contra Barth. Keckermannum*.1609.

_____. *Themata Decem Contra Systema Logicum Keckermannianum*.1610.

Mauser, Wolfram. *Dichtung, Religion Und Gesellschaft Im 17. Jahrhundert: Die <Sonnete> Des Andreas Gryphius*. München: Wilhelm Fink Verlag, 1976.

Mayhew, Robert. "British Geography's Republic of Letters: Mapping an Imagined Community, 1600-1800." *Journal of the History of Ideas* 65 (April 2004): 251 276.

McFarlane, K. B. "The Authorship of the Danzig *Last Judgement*." *Hans Memling*, 16-27. Oxford: Clarendon Press, 1971.

_____. *Hans Memling*. Oxford: Clarendon Press, 1971.

Meine, Matthias. *Von aller geschlecht der Cometen jeder zeit, wan die erscheine zugebrauchen und von dessen wirckungen der uns zu Dantzigk den 12. Nouembris dieses 1577. Jar erschienen ist*. Danzig: Jacob Rhode, 1578.

Melanchthon, Philip. *Orations on Philosophy and Education*. Ed. Sachiko Kusukawa, trans. Christine F. Salazar. Cambridge: Cambridge University Press, 1999.

Merrill, Brian L. *Athanasius Kircher (1602-1680), Jesuit Scholar: An Exhibition of His Works in the Harold B. Lee Library Collections at Brigham Young University*. Provo, Ut.: Friends of the Brigham Young University Library, 1989.

Metzger, Erika and Michael Metzger. *Reading Andreas Gryphius: Critical Trends 1664-1993*. Columbia, S.C.: Camden House, 1994.

Michalski, Sergiusz. "Gdańsk Als Auserwählte Christengemeinschaft." *Ars Auro Prior: Studia Ioanni Białostocki Sexagenario Dicata*, 509-16. Warsaw: Państwowe Wydawnictwo Naukowe, 1981.

Miller, Peter N. *Peiresc's Europe: Learning and Virtue in the Seventeenth Century*. New Haven and London: Yale University Press, 2000.

Mirabilis Annus: Or The Year of Prodigies and Wonders, 1661.

Misocacus, Wilhelm. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1577*. Danzig: Jacob Rhode, 1576.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1578*. Danzig: Jacob Rhode, 1577.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1579*. Danzig: Jacob Rhode, 1578.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1584*. Danzig: Jacob Rhode, 1583.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1588*. Danzig: Jacob Rhode, 1587.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1589*. Danzig: Jacob Rhode, 1588.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1590*. Danzig: Jacob Rhode, 1589.

_____. *Prognosticvm, Oder Practica auffs Jar nach der geburt unsers HERRN und Seligmachers Jesu Christi, 1594*. Danzig: Jacob Rhode, 1593.

Moesgaard, Kristian Peder. "How Copernicanism took root in Denmark and Norway." *The Reception of Copernicus' Heliocentric Theory*, ed. Jerzy Dobrzycki, 117-151. Dordrecht, Holland; Boston, Mass.: D. Reidel, 1972.

Montgomery, Scott L. *The Moon and the Western Imagination*. Tucson, Az.: The University of Arizona Press, 1999.

Morison, Samuel Eliot. *Harvard in the Seventeenth Century*. 2 vols. Cambridge, Mass.: Harvard University Press, 1936.

Mundy, Peter. *Travels of Peter Mundy in Europe and Asia, 1608-1667*. ed. Richard Carnac Temple, 5 vols. London: Printed for the Hakluyt Society, 1907-1936.

Müller, Michael G. "Science and Religion in Royal Prussia Around 1600." *Religious Confessions and the Sciences in the Sixteenth Century*, eds. Jürgen Helm and Annette Winkelmann, 35-43. Leiden, Boston, Köln: Brill, 2001.

_____. *Zweite Reformation Und Städtische Autonomie Im Königlichen Preußen: Danzig, Elbing Und Thorn in Der Epoche Der Konfessionalisierung (1557-1660)*. Berlin: Akademie Verlag, 1997.

Nagel, Paul. *Complementum Astronomiae Und Aussführliche Erklerung Des*

Fünffjährigen Prognostici 1619. Zu Hall Gedruckt. Halle: Christoph Bizmarcks?, 1620.

_____. *Cursus Quinquenali Mundi Oder Wundergeheime Offenbarung*. Halle: 1620.

_____. *M. Pauli Nagelii Deutzsche Astrologische Practica, Oder Prognosticum Auff Des Jahr 1622. Aus Dem Liechte Göttlicher Und Natürlicher Weißheit Hergenommen, Und Nicht Weniger Den Preußischen Als Anderen Landen Zum Besten ... in Offenen Druck Gegeben*. Leipzig: durch Andream Oßwald, In verlegung Johann Krausen Buchhändlers in Danizg, 1621.

_____. *Prognosticon Astrologo-Cabalisticum*.1619.

Nowak, Zbigniew. "In Search of the Origins of Gdańsk's Printing." *Libri Gedanenses* XV/XVI (1997): 145-56.

_____. "The Production of Books in Gdańsk to the Close of XVIII Century." *Libri Gedanenses* XV/XVI (1997): 9-40.

Oberman, Heiko A. "Reformation and Revolution: Copernicus' Discovery in an Era of Change." *The Nature of Scientific Discovery: A Symposium Commemorating the 500th Anniversary of the Birth of Nicolaus Copernicus*. Ed. Owen Gingerich, 134 169. Washington, D.C.: Smithsonian Institution Press, 1975.

Ogier, Charles. *Dziennik Podrózy Do Polski 1635-36*. Gdańsk: 1950-1953.

_____. "Ogier's Bericht." *Beiträge Zur Geschichte Danzigs Und Seiner Umgebung* Gotthilf Löschin. Danzig: 1837.

Oldenburg, Henry. *The Correspondence of Henry Oldenburg*. Eds. A. Rupert Hall and Marie Boas Hall, 13 vols. .Madison: University of Wisconsin Press; London: Mansell; London: Taylor and Francis, 1965-1986.

On the 300th Anniversary of the Death of Johannes Hevelius. Eds. Robert Głębocki and Andrzej Zbierski. Wrocław: Ossolineum, The Polish Academy of Sciences, 1992.

Ozment, Steven. *Flesh and Spirit: Private Life in Early Modern Germany*. New York: Penguin, 2001.

Pantin, Isabelle. *La Poésie Du Ciel En France: Dans La Seconde Moitié Du Seizème Siècle*. Genève: Librairie Droz S.A., 1995.

Pantin, W.A. *Oxford Life in Oxford Archives*. Oxford: Clarendon Press, 1972.

Pelczar, Maria. "Frederic Berndt A Surveyor of Gdańsk, 16th-17th Century." *Libri Gedanenses* IV/V (1970): 93-118.

Peuckert, Will-Erich. *Das Rosenkreutz*. 2nd ed. Berlin: Erich Schmidt Verlag, 1973.

Popkin, Richard H. *The History of Scepticism: From Savonarola to Bayle*. Oxford: Oxford University Press, 2003.

_____. *The Third Force in Seventeenth-Century Thought*. Leiden: E.J. Brill, 1992.

Powell, Hugh. "Andreas Gryphius and the 'New Philosophy'." *German Life & Letters* 5 (1951): 274-77.

_____. *Trammels of Tradition: Aspects of German Life and Culture in the Seventeenth Century and Their Impact on the Contemporary Literature*. Tübingen: Max Niemeyer Verlag, 1988.

Prowe, Leopold. *Nicolaus Coppernicus*. 2 vols. Osnabrück: Otto Zeller, 1967.

Przypkowski, T. "Notatki Astronomiczne Piotra Crügera, Nauczyciela Jana Heweliusza, Na Egzemplarzu _'De Revolutionibus' Miko³aja Kopernika." *Sprawozdan Polskiej Akademii Umiej* 50 (1949): 607-9.

Reif, Mary Richard. "Natural Philosophy in Some Early Seventeenth Century Scholastic Textbooks." PhD diss., St. Louis University, 1962.

Rheticus, Georg Joachim. "Preface to Arithmetic (1536)." *Orations on Philosophy and Education* Philip Melanchthon, 90-97. Cambridge: Cambridge University Press, 1999.

Rhodius, Ambrosius. *Cometa Per Bootem*.Apud Paulum Helvvigium Bibliopolam, 1619.

Ricci, Saverio. "Un Commento Secentesco Al *De Immenso* Di Bruno: *Oculus Sidereus* Di Abraham Von Franckenberg." *Nouvelles De La Republique Des Lettres* (1985): 49-65.

Rowland, Ingrid D. "Athanasius Kircher, Giordano Bruno, and the *Panspermia* of the Infinite Universe." *Athanasius Kircher: The Last Man Who Knew Everything*, ed. Paula Findlen, 191-205. New York and London: Routledge, 2004.

Ruffner, J. A. "The Curved and the Straight: Cometary Theory From Kepler to Hevelius." *Journal for the History of Astronomy* 2 (1971): 178-94.

Russell, John L. "Kepler's Laws of Planetary Motion: 1609-1666." *The British Journal for the History of Science* 2 (1964): 1-24.

Rutkin, H. Darrell. "Celestial Offerings: Astrological Motifs in the Dedicatory Letters of Kepler's *Astronomia Nova* and Galileo's *Sidereus Nuncius*." *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*, eds. William R. Newman and Anthony Grafton, 133-72. Cambridge, Mass.: The MIT Press, 2001.

Rypson, Piotr. “Seventeenth-Century Visual Poetry From Danzig.” *Gutenberg-Jahrbuch* 66 (1991): 269-304.

Salicetus, J. G. *Vergöttertes Danzig*.1643.

Sammons, Jeffrey L. *Angelus Silesius*. New York: Twayne Publishers, 1967.

Schechner, Sara J. *Comets, Popular Culture, and the Birth of Modern Cosmology*. Princeton, N.J.: Princeton University Press, 1997.

Scheffler, Johannes. *Christliches Ehrengedächtniß Des Weiland WohlEdlen Und Gestrengen Herren Abraham Von Franckenberg*. Ölse: Johann Seyfert, 1652?

Schiebinger, Londa. “Maria Winkelmann at the Berlin Academy: A Turning Point for Women in Science.” *Isis* 78 (1987): 174-200.

_____. *The Mind Has No Sex?: Women in the Origins of Modern Science* Cambridge, Mass.: Harvard University Press, 1989.

Schings, Hans-Jürgen. *Die Patristische Und Stoische Tradition Bei Andreas Gryphius: Untersuchungen Zu Den Dissertationes Funebres Und Trauerspielen*. Köln and Graz: Böhlau Verlag, 1966.

Schmidt, Von Jochen. “Die Opposition von contemplation and curiositas: Ein unbekanntes Denkmuster, seine Tradition und seine poetische Gestaltung durch Andreas Gryphius im Sonett *An die Sternen*.” *Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 77 (2003): 61-76.

Schoolfield, George C. *The German Lyric of the Baroque in English Translation*. Chapel Hill, N.C.: The University of North Carolina Press, 1961 .

Schöffler, Herbert. *Deutsches Geistesleben Zwischen Reformation Und Aufklärung: Von Martin Optiz Zu Christian Wolff*. Frankfurt am Main: V. Klostermann, 1956.

Schottenloher, Karl. “Untergang des Hauses Habsburg, von Wilhelm Misocacus aus den Gestirnen für das Jahr 1583 vorhergesagt: Eine verkappte politische Flugschrift” *Gutenberg Jahrbuch* (1951): 127-133.

_____. *Die Widmungsvorrede im Buch des 16. Jahrhunderts*. Münster: Aschendorffsche Verlagsbuchhandlung, 1953.

Scriba, C. J. “The Autobiography of John Wallis, F.R.S.” *Notes and Records of the Royal Society of London* 25 (1970): 17-46.

Seebaß, Gottfried. “Heidelberg, University of.” *The Oxford Encyclopedia of the Reformation*, ed. Hans J. Hillerbrand, 216-17. New York and Oxford: Oxford University Press, 1996.

Shank, Michael. "How Shall We Practice History?: The Case of Mario Biagioli's *Galileo, Courtier*." *Early Science and Medicine* 1 (1996): 106-150.

Shapin, Steven. *The Scientific Revolution*. Chicago: University of Chicago Press, 1996.

_____. *A Social History of Truth: Civility and Science in Seventeenth-Century England*. Chicago and London: The Unversity of Chicago Press, 1994.

_____. "Pump and Circumstance: Robert Boyle's Literary Technology." *Social Studies of Science* 14 (1984): 481-520.

Shapin, Steven and Simon Schaffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton, N.J.: Princeton University Press, 1985.

Shapiro, Barbara J. *John Wilkins, 1614-1672: An Intellectual Biography*. Berkeley and Los Angeles: University of California Press, 1969.

Silesius, Angelus. *Sämtliche Poetische Werke*. ed. Hans Ludwig Held. 3rd ed. München: Carl Hanser Verlag, 1949.

Singer, Dorothea Waley. *Giordano Bruno: His Life and Thought With Annotated Translation of His Work* On the Infinite Universe and Worlds. New York: Henry Schuman, 1950.

Smith, Jeffrey Chipps. *The Northern Renaissance*. London, New York: Phaidon Press, 2004.

Spahr, Blake Lee. *Andreas Gryphius: A Modern Perspective*. Columbia, S.C.: Camden House, 1993.

Strauss, Gerald. "Ideas of *Reformatio* and *Renovatio* From the Middle Ages to the Reformation." *Handbook of European History, 1400-1600: Late Middle Ages, Renaissance and Reformation*, eds. Jr. Thomas A. Brady, Heiko O. Oberman, and James D. Tracy, 1-30. Leiden, New York and Köln: E.J. Brill, 1995.

_____. *Nuremberg in the Sixteenth Century*. New York, London and Sydney: John Wiley & Sons, 1966.

Szperkowicz, Jerzy. *Nicolaus Copernicus, 1473-1973*. Warsaw: Polish Scientific Publishers, 1972.

Targosz, Karolina. "Johann Hevelius et ses démarches pour trouver des mécènes en France." *Revue d'Histoire des Sciences et de leurs Applications* 30 (1977): 25-41.

Telle, Joachim. "Abraham Von Franckenberg." *Literatur Lexikon: Autoren Und Werke Deutscher Sprache*, ed. Walther Killy, 471-72. Gütersloh/München: Bertelsmann Lexikon Verlag, 1989.

Thorndike, Lynn. *A History of Magic and Experimental Science*. 8 vols. New York: Columbia University Press, 1923-1958.

Three Copernican Treatises: The Commentarialus *of Copernicus, The* Letter against Werner*, The* Narratio prima *of Rheticus*, Edward Rosen, trans., 2nd edition (New York: Dover, 1959).

Turnbull, George. *Hartlib, Dury and Comenius: Gleanings From Hartlib's Papers*. Liverpool: University Press of Liverpool, 1947.

Tvedtnes, John A., Brian M. Hauglid, and John Gee. *Traditions About the Early Life of Abraham*. Provo, Ut.: FARMS, Brigham Young University, 2001.

The Universe of Pontus De Tyard: A Critical Edition of L'Univers. ed. John C. Lapp. Ithaca, N.Y.: Cornell University Press, 1950.

v. Zimmerman, Christian. "'Wie Man Den Cometen [...] Soll Betrachten': Zwei Predigten Des Jahres 1618 Aus Riga Und Magdeburg Im Kontext Der Frühneuzeitlichen Kometenliteratur." *Iliaster: Literatur Und Naturkunde in Der Frühen Neuzeit. Festgabe Für Joachim Telle Zum 60. Geburtstag*, eds. Wilhelm Kühlmann and Wolf-Dieter Müller-Jahncke. Heidelberg: Manutius Verlag, 1999.

Van Dam, Cornelius. *The Urim and Thummim: A Means of Revelation in Ancient Israel*. Winona Lake, Indiana: Eisenbrauns, 1997.

Van Helden, Albert. *Measuring the Universe: Cosmic Dimensions From Aristarchus to Halley*. Chicago and London: University of Chicago Press, 1985.

Van Stekelenburg, Dick. *Michael Albinus 'Dantiscanus' (1610-1653): Eine Fallstudie Zum Danziger Literaturbarock*. Amsterdam: Rodopi, 1988.

Vitruvius. *De Architectura*. trans. Frank Granger, 2 vols. Cambridge, Mass.: Harvard University Press, 1931.

Volkoff, Ivan, Ernest Franzgrote, and A. Dean Larsen. *Johannes Hevelius and His Catalogue of Stars: The Millionth-Volume Acquisition of the J. Reuben Clark, Jr., Library*. Provo, Ut.: Brigham Young University Press, 1971.

von Franckenberg, Abraham. *Briefwechsel*. ed. Joachim Telle. Stuttgart-Bad Cannstatt: frommann-holzboog, 1995.

_____. *Oculus Sidereus*. Dantzig: G. Rhete, 1644.

von Selle, Götz. *Geschichte Der Albertus-Universität Zu Königsberg in Preussen*. Königsberg: Kanter-Verlag, 1944.

von Stosch, Baltzer Sigmund. *Last- Und Ehren- Auch Daher Immerbleibende Danck-*

Und Denck-Seule, Bey Vollbrachter Leich-Bestattung Des Weiland Wol-Edlen, Groß-Achtbarn Und Hochgelehrten Herrn Andreae Gryphii. Leipzig: Christian Scholvien, 1683.

Westman, Robert S. "Copernicus and the Prognosticators: The Bologna Period, 1496-1500," *Universitas*, no. 5 (December 1993), 1-5.

_____. "Kepler's Early Physical-Astrological Problematic." *Journal for the History of Astronomy* 32 (2001): 227-36.

_____. "Proof, poetics, and patronage: Copernicus's preface to *De revolutionibus*." *Reappraisals of the Scientific Revolution*, eds. David C. Lindberg and Robert S. Westman, 167-205. Cambridge: Cambridge University Press, 1990.

_____. *The Copernican Question: Prognostication, Scepticism and Celestial Order*. Under consideration.

_____. "The Literature of the Heavens and the Science of the Stars: Roots of an Early Modern Classification." Paper presented at the conference "Wrestling with Nature: From Omens to Science." Madison, Wisconsin, April 2001.

_____. "Two Cultures or One? A Second Look at Kuhn's *The Copernican Revolution*." *Isis* 85, no. 1994: 79-115.

Whitaker, Ewen A. *Mapping and Naming the Moon: A History of Lunar Cartography and Nomenclature*. Cambridge: Cambridge University Press, 1999.

Wilkins, John. *The Discovery of a New World, or, A Discourse Tending to Prove, That 'Tis Probably There May Be Another Habitable World in the Moone*. 3rd ed. London: John Norton for John Maynard, 1640.

_____. *A Discovrse Concerning A New Planet. Tending to Prove, That 'Tis Probable Our Earth Is One of the* Planets. London: R.H. for John Maynard, 1640.

Winkler, Mary G. and Albert Van Helden. "Johannes Hevelius and the Visual Language of Astronomy." *Renaissance and Revolution: Humanists, Scholars, Craftsmen and Natural Philosophers in Early Moder Europe*, eds. J.V. Field and Frank A.J.L. James, 97-116. Cambridge: Cambridge University Press, 1993.

Wollgast, Siegfried. *Philosophie in Deutschland Zwischen Reformation Und Aufklärung, 1550-1650*. Berlin: Akademie-Verlag, 1988.

_____. *Vergessene und Verkannte: Zur Philosophie und Geistesentwicklung in Deutschland zwischen Reformation und Frühaufklärung*. Berlin: Akademie Verlag, 1993.

Wünsch, J. “The Accuracy of Hevelius's Astrometric Measurements.” *Journal for the History of Astronomy* 30 (November 1999): 391-406.

Zinner, Ernst. *Geschichte Und Bibliographie Der Astronomischen Literatur in Deutschland Zur Zeit Der Renaissance*. Stuttgart: A. Hiersemann, 1964.